Equitably Ending the Fossil Fuel Era: Climate Justice, Capital, & the Carbon Budget

Georges Alexandre Lenferna

A dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

University of Washington

2019

Reading Committee:

Stephen Gardiner, Chair

Carina Fourie

Aseem Prakash

Michael Blake

Program Authorized to Offer Degree:

Department of Philosophy

University of Washington

Abstract

Equitably Ending the Fossil Fuel Era: Climate Justice, Capital, & the Carbon Budget

Georges Alexandre Lenferna

Chair of the Supervisory Committee:

Stephen Gardiner

Department of Philosophy

This dissertation makes the moral case for equitably transitioning away from fossil fuels in line with keeping global warming as close as possible to the Paris Climate Agreement's more stringent target of keeping global warming to 1.5°C above pre-industrial levels. It argues that we should do so while relying as little as possible on risky and uncertain negative emissions and geoengineering technologies, as doing so might prolong the fossil fuel era and pose grave potential costs both to the present and future generations. The dissertation addresses a central objection to the moral imperative to transition away from fossil fuels, namely that it will detrimentally impact the poor and vulnerable. It argues in response that protecting the interests of the poor and vulnerable is best achieved through a rapid yet just transition away from fossil fuels. Based on the moral case to transition away from fossil fuels in line with 1.5°C the dissertation also explores what personal moral responsibility individuals have to take action to reduce fossil fuel usage and act on climate change. It does so by situating our moral responsibility in the context of what it argues is an emergency situation where need to rapidly and comprehensively move away from fossil fuels to avert catastrophic climate change and the immense harms associated with continued fossil fuel dependence. Based on the development of an Anti-Pollution Principle, it concludes that in the face of this emergency we have demanding moral responsibilities to reduce our personal emissions but which can be outweighed by the more important task of collectively pushing for deep, rapid, and comprehensive structural change away from fossil fuel dependency.

Equitably Ending the Fossil Fuel Era

Climate Justice, Capital, & the Carbon Budget

Contents

Introducing the End of the Fossil Fuel Era

Oil, gas, and coal have fundamentally reshaped human society. They have driven development, reshaped global geopolitics, and given those with access to them energy, power and freedoms, many previously unimaginable. Indeed, fossil fuels have produced incredible benefits for many across the globe. However, in this dissertation, I will make the case that, despite this, one of the world's greatest moral imperatives, if not its greatest, is to rapidly and equitably transition away from fossil fuels as a source of energy. We must rapidly end the fossil fuel era, which I define as the era in which fossil fuels are a dominate energy source.

As I will show in this dissertation, while fossil fuel energy has given us great benefits, the harms that burning fossil fuels brings about are immense and are accumulating at an alarming rate, such that they could, at the extreme end of the spectrum, drive the breakdown of global civilized society, and cause widespread poverty, conflict, and ecological collapse. Furthermore, many of the benefits of burning fossil fuels can increasingly be better delivered by alternative available solutions and technologies many of which are rapidly becoming more cost effective than fossil fuels in terms of energy costs alone and would additionally avoid a great amount of harm associated with continued overreliance on burning fossil fuels. Apart from averting increasingly catastrophic climate change, as I will highlight throughout this dissertation, the reasons for rapidly ending the fossil fuels are manifold, including health, community, economic, political, security, stability, environmental, poverty and development related reasons.

I argue that given the state of our climate, the rate of greenhouse gas emissions, and the broader harms associated with fossil fuels, we are in state of relative moral emergency, which demands strong and demanding action of us to rapidly transition away from fossil fuel energy. However, for both moral and pragmatic reasons we need to push for an equitable transition away from fossil fuels which takes into account and attempts to offset the negative impacts that such a transition would have. My thesis aims to provide moral guidance on how to navigate the tensions between equity in the transition away from fossil fuel energy, and the need to act rapidly and potentially disruptively to end the fossil fuel era in line with keeping global warming as close as possible to 1.5°C above pre-industrial level, in order to avert increasingly catastrophic climate change and the range of broader harms created by burning fossil fuels.

Throughout this dissertation, I aim to both morally and empirically describe the scale and nature of the problem we face when it comes to the need to end the fossil fuel era. In doing so I will lean heavily on empirical descriptions of the challenge we face, which may not always seem like strictly philosophical work of the sort one might expect in a PhD thesis in philosophy. However, leaning heavily into the empirical side of this debate in an interdisciplinary arena like climate ethics is central for doing the philosophical work correctly. Many climate ethicists (or philosophers more broadly) develop their philosophical characterizations and responses to climate change based on empirical understandings. Often, in my estimation, they do so in ways that are not entirely accurate, and which can lead to moral, political and philosophical theories about climate change that tend to skew or misrepresent the nature of the problem we face. More maliciously, maligned corporate interests have spread misinformation which has deliberately attempted to skew the empirical and moral nature of the problem we face. Such misinformation and propaganda have successfully infiltrated philosophical, political and public discourse around climate change and fossil fuels. As such, to get the philosophy of climate change right and to resist misinformation, it is important to get the empirical picture straight. After all, climate ethics is very much an endeavor in applied ethics, and to apply ethics to the situation we face, our empirical understanding must preferably map onto reality.

Another reason this may not read like a typical philosophical thesis is that my aim is not to develop a new moral theory or idea of justice in the realm of climate change, or to dive deeply into conceptual differences between different theories of justice or ethics. Instead I attempt to try and describe the nature of the problem we face by applying theories that mostly already exist. The aim is to arrive at the best understanding of the nature of the moral problem we face, in large part by critiquing previous philosophical understandings of the problem which the author takes to be inaccurate or problematic. Building on that understanding, I draw on multiple moral theories and conceptions of justice to defend the thesis of this dissertation, which is that we need to equitably transition away from fossil fuels in line with 1.5°C and do so in way that as best as ethically possible does not rely on risky and unproven negative emissions and geoengineering technologies.

In defending my thesis and related conclusions, I challenge a range of philosophers who I take to have misunderstood the nature of the problem we face, or who have put forward problematic moral arguments in response to it. It also attempts to point to how considerations of justice and morality can provide guidance on how best to solve to the complex fossil fuel problem we face. In such an interdisciplinary space, I attempt as best as possible to draw on my own interdisciplinary training and background in philosophy, climate science, environmental studies, energy economics, and climate and energy policy advocacy. However, recognizing that I will inevitably make some empirical errors along the way, I spell out my empirical views to be explicit about how empirical evidence is informing the moral claims I make. That way the philosophical and empirical work can each be evaluated on its own merits even as they inform each other. It is my hope that this form of applied interdisciplinary philosophy can help clarify the nature of the problem we face and spur on appropriate action. I consider the dissertation very much a piece of philosophical advocacy that attempts to motivate the reader to act, while simultaneously aspiring towards academic and philosophical rigor to accurately and fairly represent the nature of the problem we face. In sum, this dissertation can perhaps best be identified as a form of interdisciplinary, empirically informed applied ethics which advocates for a rapid but just end to the fossil fuel era in line with the goal of keeping global warming from going over 1.5°C above pre-industrial levels.

My dissertation will be divided into three main parts, each with several chapters informing the broader claims made by the respective sections. Broadly speaking, Part A will establish the moral case for why we should transition away from fossil fuels, arguing for a Fossil Free Moral

Imperative, which holds that we have a collective moral imperative to transition away from fossil fuels in line with the Paris Climate Agreement targets. Part B then attempts to establish what the moral imperative established in Part A means in terms of individual moral responsibility to take action. It does so by situating our moral responsibility in the context of what I argue is an emergency situation where need to rapidly and comprehensively move away from fossil fuels to avert catastrophic climate change and the immense harms associated with continued fossil fuel dependence. It argues that in the face of this emergency we have a demanding moral responsibility to reduce our own personal emissions but also more importantly to push for comprehensive structural change away from fossil fuels. Part C then addresses a central objection to the moral imperative to transition away from fossil fuels, namely that it will detrimentally impact the poor and vulnerable. I argue in response to this objection that protecting the interests of the poor and vulnerable is best achieved through a rapid yet just transition away from fossil fuels in line with keeping global warming as close as possible to the Paris Climate Agreement's more stringent target of keeping global warming to 1.5°C above pre-industrial levels. We should do so, furthermore, while relying as little as possible on risky and uncertain negative emissions and geoengineering technologies in our planning for the future, as doing so might prolong the fossil fuel era at grave potential costs to the most vulnerable both in the present and future generations.

Outlining Part A: A Complex Moral Case for Ending the Fossil Fuel Era

In Chapter 1, I will argue that while burning fossil fuels has provided much of moral importance, we have alternative means of accessing needed energy, which have much fewer harmful impacts by many orders of magnitude. Recognizing this, I argue for a Fossil Free Moral Imperative, which holds that there is a collective moral imperative to transition away from fossil fuels at least in line with the Paris Climate Agreement targets, if not more ambitiously. The first half of the imperative argues that we need to undergo such a transition in order to avoid grave, widespread, unnecessary harm. The second inter-connected half of the Fossil Free Imperative builds on the negative duty to avoid causing unnecessary harm and identifies an additional complimentary positive moral responsibility to create a more prosperous future. In making this argument, I will develop a position I will call the Great Multigenerational Reward with Some Immediate Costs Camp, which argues that transitioning away from fossil fuels, while it does incur some costs, nonetheless provides great benefits for both the current and future generations. Such a position is distinct from claims that we can transition away from fossil fuels without sacrificing anything of moral importance, a philosophical camp I will call the No Sacrifice Camp. My view is also in disagreement with a dominant camp in the philosophical literature on climate ethics, which I shall refer to as the Intergenerational Sacrifice Camp (IGC), which argues that climate change mitigation, especially in the form of reducing fossil fuel reliance, entails a significant sacrifice for the current generation to assist future generations.

In Chapter 2, contrary to the IGC, I will argue, that overall, transitioning away from fossil fuels provides major benefits and avoids significant harms both for the current generation *and* for future generations, not just for future generations. To support such claims, I show how climate change impacts are here with us now and that if we do not act, we will impose grave harms on the majority people alive today. I also challenge how those in the IGC often focus only on the harms of greenhouse gases, failing to properly consider the broader harms that fossil fuels bring, a problem I refer to as greenhouse gas parochialism. I aim to more broadly examine the life-cycle costs of fossil fuels to argue that ending the fossil fuel era is about more than just reducing greenhouse gas emissions and averting extremely dangerous, catastrophic climate change. Rather, it is also about recognizing avoiding the broader array of harms that fossil fuels bring, harms such as air and water pollution, corruption, war, violence, and the violation of the rights of communities, particularly of indigenous communities and people of color. Combining both the climate and non-climate reasons, ending the fossil fuel era is not simply about the current generation making sacrifices to leave the world a better place for future generations, it is also to a substantial extent in the interests of the current generation. This is further supported by challenging outdated and conservative estimates of clean energy, which do not recognize how renewable energy is increasingly able to develop a more prosperous future which would bring significant economic growth, and job creation.

In Chapter 3, I argue that the pervasiveness of what I refer to as the neoliberal imaginary, which frames narrow economic individual self-interest as rational without taking into account broader structural factors, has led to limited conceptions of the nature of the problem we face, and of what is possible and appropriate in response to climate change. Furthermore, it has driven analyses of the problem which distort the costs and benefits of action by promoting an individualistic view which fails to understand the structures that shape the costs and benefits of fossil fuels and renewable energy. I argue that this makes climate change seem like an inevitable tragedy of the commons, whereas the logic of the tragedy of the commons can be significantly alleviated if we focus on transforming the structures and policies that make burning fossil fuels appear to be in the interest of individual people and societies. To support this, I argue that if we examine the extent of the welfare received by the fossil fuel industry, we would see that if we removed the subsidies that fossil fuels receive it would be less costly to embrace a renewable energy future than it is to continue with the fossil fueled status quo. Such a view challenges not only those who argue that climate action is not in our interests, but also the framing of climate activists like Naomi Klein, who argue that the central culprit driving the climate crisis is neoliberalism or free market capitalism. Contrary to such views it is not a free market that is driving the problem but rather the fossil fuel industry is one of the largest recipients of welfare, clearly violating the ideals of free market fundamentalists. This is not to say that a free market would solve the problem, but that it is incorrect to suggest that what we have now is anything resembling a free market.

Outlining Part B: Moral Responsibility in a Climate Emergency

In Part B of my dissertation I attempt to define what an individual's moral responsibility to act is if they recognize the urgent moral imperative to transition away from fossil fuels outlined in Part A of the thesis. I show that if we are to act on the Fossil Free Moral Imperative which underpins the case for divestment, that we will have to take on significant responsibilities not only to reduce our own emissions, but also to transform the broader structures that uphold the fossil fuel industry. To provide further context to the nature of our responsibilities in relation to the Fossil Free Moral Imperative, in Chapter 4 I defend what I call the Fossil Free and Climate Emergency Imperative (FFCEI), which holds that given the limited time available to avoid grave, widespread and unnecessary harm associated with catastrophic climate change and the broader harms of fossil fuels, we are in a relative state of emergency which demands rapid, comprehensive, and sweeping action to deeply reduce fossil fuel use and greenhouse gas emissions, and thus meet the Fossil Free Moral Imperative.

Chapter 5 goes on to consider whether individual action to reduce emissions is a sufficient moral response to our predicament and the FFCEI. I argue that individual emission reductions are not sufficient to fully address our moral responsibility to act. I make this argument based on what Chris Cuomo terms the Insufficiency Problem, which, in her words, refers to the fact that the "reductions that average consumers can control, such as household emissions and personal transportation, are insufficient to bring greenhouse gas concentrations down to safer levels, because household consumption and personal transportation account for a significant but minority slice of total greenhouse gas emissions worldwide" (2011, p. 702). I argue, however, that just because individual emissions are insufficient to the task of addressing climate change, does not mean that they are unimportant. Rather, particularly but not only for wealthy individuals who consume significant amounts, reducing their fossil fuel consumption and pollution is an important moral responsibility. I base the responsibility to reduce emissions on what I term the Anti-Pollution Principle (APP), which states that: We should not consume resources, especially limited resources, whose use contributes to the harms of others[1], unless there are sufficiently strong moral reasons for doing so. Based on the APP, I argue that unnecessarily profligate emissions (particularly but not only of affluent individuals) takes up more than their fair share of the carbon budget, contributes to harm, and wastes precious resources.

In Chapter 6, I then apply the APP and argue that if reducing individual emissions conflicts with the ability to pursue more effective climate action, or other more morally significant endeavors, then such considerations should typically outweigh the responsibility to reduce

[1] The term "others" in the anti-pollution principle can extend both to human and non-human others.

one's own emissions. While the APP provides a prima facie duty to reduce emissions, given the speed and scale at which we need to reduce emissions to meet the Paris Agreement goals, much broader and sweeping structural changes will be required than individual emission reductions alone can provide for. The Fossil Free and Climate Emergency Imperative make it such that when determining what actions we should take, we need to judge actions according to whether they can scale up and do so fast enough to collectively avert climate catastrophe. When looking at action for broader structural transformation, individuals, organizations and communities should focus on what within their power may be the most effective and equitable levers for change they can shift. What we need is rapid and transformative short-and-medium term disruption of the fossil fueled status quo, embedded in the context of longer-term deeper reform towards a more just and sustainable future.

In Chapter 7, I then go on to consider the moral question of how demanding our individual responsibility to act on the FFCEI can be. Given the closing window of opportunity left to avert some of the most dangerous impacts of climate change, coupled with resistance from entrenched interests, corruption, and widespread misinformation, these responsibilities will likely be highly demanding on those willing to fully take them up. However, I will argue that the scale of potential harms that continued reliance on fossil fuels would bring creates a strong moral imperative for action, which calls on us to act on these duties despite how demanding they are. This will mean that we may have to accept more burdens than would otherwise be asked of us under more ideal circumstances where everyone was doing their fair share and the climate problem was not this far gone. I argue that the unfairness of undertaking such additional burdens will often be outweighed by the gravity of the harms and unfairness that will occur if we do not act. Drawing on exemplars from other social movements, I show how often those we most admire we do so because of their willingness to take on great sacrifices for a greater cause. I argue that the FFCEI calls on us to follow in such footsteps and dedicate ourselves greatly to equitably and rapidly ending the fossil fuel era.

Outlining Part C: Prioritizing the Poor on the Pathway to Climate Justice

In Part C, I attempt to provide more specific moral guidance as to what a pathway to transition away from fossil fuels consistent with climate justice and prioritizing the interests of the poor and vulnerable should look like. While Part A argues that we should act in line with the Paris Agreements, this too is somewhat vague, as the Paris Agreement provides a range of temperatures to hit and does not specify any particular pathway to achieve them. To address this vagueness, Part C attempts to define more specifically what a just path away from fossil fuels would look like if it were to elevate the interests of the least well off.

Chapter 8 aims to challenge those who argue that in the interest of the poor we should be stalling our transition away from fossil fuels, as fossil fuels are supposedly the key to alleviating poverty. I aim to counteract such arguments and show that if we aimed to elevate the interests of the poor and vulnerable, that we would need to push for a rapid and ambitious transition away from fossil fuels in line with the 1.5°C target I make my argument in favor of 1.5°C by focusing on the arguments of prominent theorists who have argued against the 1.5°C and instead in favor of the 2°C, with particular focus on Darrel Moellendorf. I begin by providing a critical analysis of Moellendorf's philosophical approach to climate and poverty, showing that his Anti-Poverty Principle could be a self-defeating approach which may ironically deepen poverty in the long run.

I then go on to detail how if we follow arguments against the 1.5°C target like Moellendorf's, that we may commit four different yet interconnected forms of injustice, namely, procedural, recognitional, distributional and epistemic injustice. I argue contrary to Moellendorf that the 2°C is not supported by "science" as the safe limit for climate change, rather it is a product of politics and power, particularly from actors in the global north who are both more significant polluters than the global south, and who are also less vulnerable to the impacts of climate change. I argue that that far from 2°C being a safe target, already at 1°C we are seeing dangerous climate change, and the more we allow warming to occur the more dangerous and harmful it will be, particularly for the poor and vulnerable. As such, if we are to elevate the interests of the global poor, we should be aiming not for 2°C, but for more stringent action in line with 1.5°C.

In Chapter 9, I then go on to explore further how questions of epistemic injustice are central to how the voices of the global south are often marginalized in climate discourses, such that their calls for 1.5°C have often been ignored. I aim to argue that determining what levels of climate change are considered dangerous and what targets we should hit constitutes a hermeneutical hotspot, where "the powerful have no interest in achieving a proper interpretation [of the viewpoints of the marginalized]" (Fricker, 2007, p. 172). I argue that those working on climate ethics, particularly those in relatively privileged positions need to take heed of how this affects climate justice discourses. Attention to privilege, class and gender is particularly important given that the so-called consensus in favor of the 2°C target is a worryingly white, male, and/or wealthy consensus whereas many of the voices calling for 1.5°C are black, brown, female, and/or vulnerable and poorer communities.

In Chapter 10, I then go on to consider some possible objections to my argument in favor of the 1.5°C, starting with the objection that aiming for 1.5°C would detrimentally impact economic development and that as such on a precautionary approach we should aim for 2°C. I argue that a true precautionary approach would do its utmost to avoid us going further into the risky territory where we risk hitting tipping point on the climate system. I argue, contrary to commentators like Moellendorf and Lomborg that aiming for 1.5°C would not lead to an economic recession, which will leave the global poor in the dark, without energy access. I draw on economic models and studies to show that a renewable energy revolution in alignment with the 1.5°C could create more energy access, development, economic growth, and prosperity compared to 2°C, and much more compared to missing the Paris Climate Agreement targets altogether. However, to ensure this happens equitably, in line with widely accepted principles of common but differentiated responsibility, there is a three-pronged moral responsibility for rich and developed nations to reduce their emissions much more significantly, leave fossil fuels in the ground, and contribute financially and otherwise to help developing and least developed nations both to transition to a renewable energy future and to deal with impacts of the harmful climate change already locked in.

In Chapter 11, I then consider and respond to the objection that keeping warming to 1.5°C is not feasible. I accept that if the climate turns out to be highly sensitive to greenhouse gas emissions, and/or if we delay action significantly, then we may not be able to meet the 1.5°C. However, if we are somewhat lucky with regards to climate sensitivity, and we take rapid comprehensive climate action, especially to reduce fossil fuels, we can still hold temperatures close to 1.5°C. However, many scenarios which get us there rely on temporarily overshooting the 1.5°C target, and then using negative emissions to bring temperatures back down. I argue that a safer, more just precautionary pathway to get to 1.5°C is not to rely heavily on negative emissions. While some forms of negative emissions strategies can have beneficial consequences, many are unproven, risky and resource intensive technologies, which may have harmful impacts particularly on the poor and vulnerable. I apply a similar argument to 1.5°C scenarios that rely on solar geoengineering. I conclude that the pathway that best serves the interests of the poor and vulnerable, and also best ensures a stable climate and prosperous future, is a pathway in line with 1.5°C that involves a rapid transition away from fossil fuels alongside broader climate action, and that relies as little as possible on future unproven technologies like carbon capture and storage, negative emissions or solar geoengineering.

I conclude the dissertation by reflecting on the deeply non-ideal situation we are in with regards to needed action to move away from fossil fuels. I discuss how the odds are deeply stacked against the sort of pathway to climate justice defended in this dissertation and admit that it is quite possible that we may fail. I argue that if we do, we will have committed a significant injustice particularly to the poor and vulnerable both of this generation and especially to future generations. Such an injustice will require us to grapple deeply with how to justly compensate for all that will be lost, knowing full well that the extent of what will be lost can never be truly compensated for. However, I argue that it is not yet time to resign to such a fate, for a rapidly closing window of opportunity to meet 1.5°C still exists, although the odds of getting there are slim, barring a radical departure from the status quo. In the face of such difficult odds what is required is a virtue of defiant hope, which is not naively optimistic that such changes can be easily made, nor pessimistically prematurely resigned to climate chaos when we still have the possibility to avert it. Acting on such a virtue of defiant hope, will require not just hope but actual defiance against the vested interests and defenders of the status quo. It will require great moral courage and unprecedented levels of action both individually and, especially, collectively.

Part A:

A Moral Case for Ending the Fossil Fuel Era

"We need to bend the global curve of emissions no later than 2020 and reach a fossil-fuel free world economy by 2050. Yes, this is a grand transformation. Is it doable? Yes. Is it a sacrifice? No. The evidence grows day-by-day that a decarbonized world is a more attractive world." - Professor Johan Rockström, Director, Stockholm Resilience Centre

"What if global warming isn't only a crisis? What if it's our best chance to build a better world?"
– Naomi Klein

"We need an apartheid-style boycott to save the planet… People of conscience need to break their ties with corporations financing the injustice of climate change… This is a moment that demands unprecedented collective action. We can no longer tinker around the edges. We can no longer continue feeding our addiction to fossil fuels as if there is no tomorrow. For there will be no tomorrow. We are on the cusp of a global transition to a new safe energy economy. A transition that unites people in common purpose [and] advances collective well-being"
- Archbishop Desmond Tutu (in Blumberg 2014)

"Why, we have just begun to commence to get ready to find out about electricity. This scheme of combustion to get power makes me sick to think of - it is so wasteful…. You see, we should utilize natural forces and thus get all of our power. Sunshine is a form of energy, and the winds and the tides are manifestations of energy. Do we use them? Oh no! We burn up wood and coal, as renters burn up the front fence for fuel." - Thomas A. Edison

"Carbon-intensive modes of production established in 19[th] Century Europe will incur enormous social and economic cost in the medium- and long-term, whereas shifting to a carbon- neutral future based on green technology and low-carbon energy creates wealth, jobs, new economic opportunities, and local co-benefits in terms of health and reduced pollution… countries which take the lead in embracing this future will be the winners of the 21st Century."

First Male' Declaration of the Climate Vulnerable Forum November 2009

In Part A, we shall lay the ground work for a moral case to rapidly end the fossil fuel era. I open chapter 1 with a brief primer on the fossil fuel divestment movement and the nature of their calls for divestment from fossil fuels. I then critically examine the claim that transitioning away and/or divesting from fossil fuels does not sacrifice anything of moral importance. I show that while the fossil fuel industry has provided much of moral importance, the grave harms fossil fuels cause and the availability of alternative means of delivering human well-being make it such that continuing the fossil fuel era will cause grave, widespread and unnecessary harm. As such, I argue that we have a moral responsibility to transition away from fossil fuels in line with at least the Paris Climate Agreement target of keeping climate change to well below 2°C and as close as possible to 1.5°C. In Chapter 1, I argue for a Fossil Free Moral Imperative, which holds that there is a collective moral imperative to transition away from fossil fuels at least in line with the Paris Climate Agreement targets, if not more ambitiously. The first half of the imperative argues that we need to undergo such a transition in order to avoid grave, widespread, unnecessary harm, what I'll call the GWUH Principle. The second inter-connected half of the Fossil Free Imperative builds on the negative duty to avoid causing unnecessary harm and identifies an additional complimentary positive moral responsibility to create a more prosperous future.

In Chapter 2, I will show how if we move past greenhouse gas parochialism and outdated and conservative renewable energy analyses, that the Intergenerational Sacrifice camp's claims about the costs to current generations prove to be somewhat inaccurate, such that the challenge of ending the fossil fuel era may be much more in the interests of the current generation than intergenerational sacrifice proponents suggests. I focus particularly on how this might make climate change less of a Perfect Moral Storm, as suggested by Gardiner, and instead it may be a significant moral opportunity to benefit current and future generations. Then in Chapter 3, I reflect on how the neo-liberal imaginary compounds the problems of greenhouse gas parochialism and outdated analyses, making it seem like acting is not in our interest by obscuring how a transformation in structures and policies can make acting to end the fossil fuel era more in the interest of individual people, communities and countries. The pervasiveness of an individualistic neoliberal imaginary, which frames narrow economic individual self-interest as rational without considering broader structural factors, has led to limited conceptions of the nature of the problem we face, and of what is possible and appropriate in response to climate change. Furthermore, it has driven analyses of the problem which distort the costs and benefits of action; and obscures the structures and policies that keep fossil fuels in place.

Chapter 1: A Fossil Free Imperative

While fossil fuels are not the only contributor to greenhouse gas emissions, they have been and will continue to be the dominant contributor of greenhouse gas emissions, barring major action to reduce fossil fuel burning and use. As the alongside figure from the Global Carbon Budget Project highlights, fossil fuels combined with industry have contributed 91% of the world's CO[2] emissions thus far, with 4.5% of that total coming from emissions from cement production (Le Quere et al., 2016).[2] Beyond just CO_2, the 2018 Global Carbon Project shows that fossil fuels for energy and industrial processes, including methane, now constitute about 80% of all global GHG emissions.

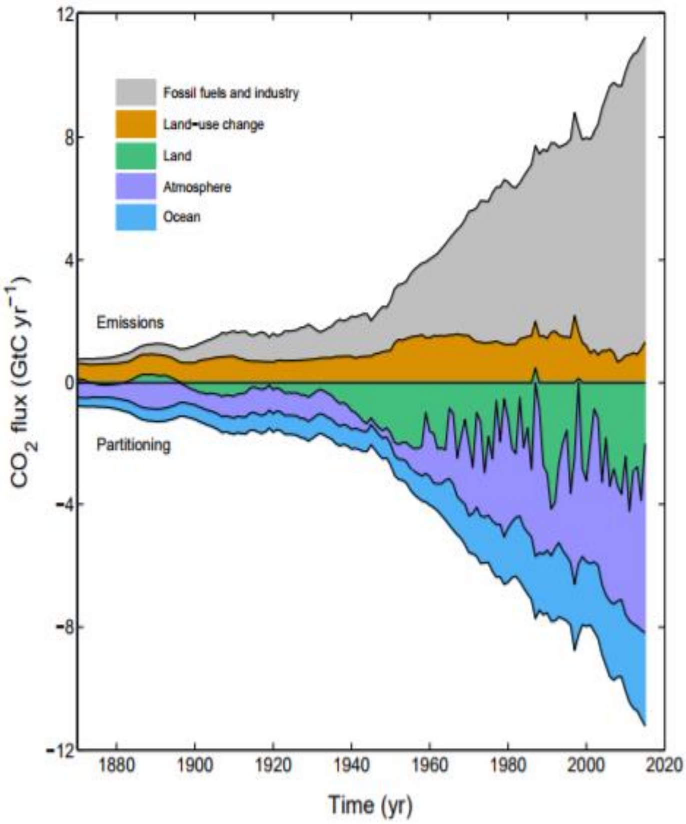


Figure 1 - Combined components of the global carbon budget as a function of time. Emissions refers to carbon dioxide emissions and partitioning refers to where the emission emitted have ended up (Le Quere et al. 2016)

In the U.S. context, as the U.S. Energy Information Administration (EIA) highlights, "in 2016,

[2] Rather than fossil fuel emissions declining as we have become more away of anthropogenic climate change - a date arguably dating back to the 1960's (see Jamieson, 2014) – global CO2 emissions from fossil fuels and industry have increased every decade from an average of 3.1±0.2 GtCyr−1 in the 1960s to an average of 9.3±0.5 GtCyr−1 during 2006–2015.

emissions of carbon dioxide (CO_2) produced from burning fossil fuels for energy were equal to 76% of total U.S. anthropogenic GHG emissions (based on global warming potential) and about 94% of total U.S. anthropogenic CO_2 emissions".[3] The EIA's estimate, furthermore, excludes non-CO_2 greenhouse gas emissions from fossil fuel production and burning, such as methane and nitrous oxide which also contribute significantly to climate change. Thus, fossil fuels are by far and away the largest contributor to climate change and reducing greenhouse gas emissions from fossil fuels is central to addressing climate change.

Beyond reducing fossil fuels, we will need much broader action if we are to avert catastrophic climate change (Figueres et al., 2017a). Chapter 8 details how if we are to hit ambitious but ethically important targets like keeping warming to 1.5°C then we will also need strong action to reduce other contributors to climate change, such as greenhouse gas emissions associated with land-use change, agriculture, and refrigerants. Tackling these other sources, as well as pursuing negative emission technologies, is vital to undertake alongside reducing fossil fuels if we are stand a reasonable chance of averting extremely dangerous climate change. However, tackling fossil fuels is the sine qua non of halting climate change, without which we simply cannot avoid catastrophic climate change. Furthermore, the less we act on fossil fuels, the more climate action will have to rely on these other sectors which are often more expensive, difficult to implement, unproven or simply not up to the scale of the challenge we face, as Chapter 8 will further explore.

While I aim to focus on the need to reduce burning fossil fuels in producing energy, I want to also acknowledge it is not just the burning of fossil fuels that causes harms. The refining of fossil fuels for non-combustion purposes also causes significant harm whether it's through air and water pollution in their extraction and production, or through the pollution they create when fossil fuel-based products eventually find their way into ecosystems. Perhaps the starkest example of harms from fossil fuels not used for energy purposes, comes from plastic

[3] I am struggling to find data that properly disaggregates fossil fuels from other sources of greenhouse gases at the global level, as many lump together fossil fuels with other sources.

pollution, which poses a grave threat to ecosystems the world over particularly but not only our ocean ecosystems (Center for International Environmental Law, 2018). The pollution created in fossil fuel extraction, refining, production, and end-product pollution makes clear that the challenge for the broader fossil fuel industry goes beyond the limited focus in this thesis in the burning of fossil fuels. Nonetheless, the burning of fossil fuels is by far and away the predominant use of fossil fuels with over 90% of fossil fuels being combusted to create some form of energy (EIA, 2015; Montgomery, 2010).

On the other hand, fossil fuels also play an important role both in nature and in human societies apart from the energy we get from burning them. In nature, fossil fuels help maintain the carbon cycle, and also often filter out toxins, which are released when we burn them. When not burnt, fossil fuel products can be incredibly valuable, and there are many important applications of fossil fuels such as in medicines, materials and other spheres. As such, my thesis is not a moral case against fossil fuels altogether, rather it's a moral case against wastefully and harmfully burning fossil fuels given how valuable and important role they can play when not burnt. In other words, my arguments to end the fossil fuel era are targeting the burning of fossil fuels as a wasteful use of an incredibly precious resource, particularly when we have an abundance of increasingly affordable renewable resources that can provide us with energy without unnecessarily depleting valuable and important fossil fuel stocks just to burn them up. That being said, the problem we face with climate change is not that we have too little fossil fuels, but rather that we have too many.

Contrary to earlier worries that we would run out of fossil fuels, reflected in concerns that we would reach "peak oil" (cf. Lynch, 2018), technological advancements that have allowed for accessing more fossil fuels than we can safely burn. Recent estimations have shown that private, public and state-owned fossil fuel companies jointly own more fossil fuel reserves than we can afford to burn if we want to avert catastrophic climate change and keep to the Paris Climate Agreements. Awareness of this contradiction has come to the fore of climate justice movements across the globe (Grady-Benson & Sarathy, 2016; McKibben, 2016). It has sparked calls for fossil fuel divestment, to leave fossil fuels in the ground, and for no new fossil fuel infrastructure or development. Central to these calls, and key to understanding the need to get off fossil fuels, has been the interconnected concepts of the carbon budget, and the carbon bubble. Thus, to lay the groundwork for the moral case to rapidly transition away from fossil fuels, I begin by giving a brief history and explanation of these interconnected concepts.

In 2009, at the United Nations Framework Convention on Climate Change (UNFCCC) 15th Conference of the Parties (COP 15) in Copenhagen, Denmark, some of the world's governments agreed to the target of limiting global mean temperature change to below 2°C above pre-industrial levels (Knutti, Rogelj, Sedláček, & Fischer, 2015). The same year, a study by Meinshausen et al. (2009) highlighted a large contradiction between proven oil, coal and gas reserves and the 2°C target. [4] They attempted to provide an estimate of the carbon budget – a concept which refers to how much carbon we can emit into the atmosphere to stand a particular chance of keeping warming to a particular target. On their estimates to stand a 75% chance of staying below the 2°C target, we could only afford to emit a cumulative amount of approximately 1000 Gt CO^2 in the atmosphere. Comparing the carbon budget with how our stock of fossil fuel reserves, the researchers pointed out that only half the proven economically recoverable oil, gas and coal reserves could still be burnt before we depleted the 1000 Gt CO^2 carbon budget estimate for 2°C they had put forward.[5]

In 2011, building on the carbon budget concept, the Carbon Tracker Initiative (CTI), a London-based financial think tank, pioneered analysis of a concept they coined the carbon bubble. The carbon bubble refers to the fact that a financial bubble might be caused by the fact that proven fossil fuel reserves of both private and publicly listed fossil fuel companies as well as those

---

[4] While Meinshausen et al.'s paper did bring the concept of the carbon budget to prominence, it was not the first paper to highlight the contradiction between cumulative emissions targets and the fossil fuel industry. As Muttitt highlights, in 1997 Bill Hare, then Climate Policy Director of Greenpeace, showed that if burned, the fossil fuel reserves that were known at that time would release twice as much as the budget to keep below 2°C(Muttitt, 2016). Several campaign groups then used the analysis to argue that exploration for new reserves should be stopped. However, it was many more years before such calls started to gain traction as discussed in this paper.

[5] Carbon budget estimates for 1.5°C were often not included in these earlier estimates, as there was still a focus on the supposed 2°C consensus, a consensus which I problematize in Part C of this thesis.

held by state-owned fossil fuel companies were jointly up to five times greater, than could be burnt to limit global warming below 2°C (CTI, 2012, 2013; McKibben, 2012). In other words, the amount of fossil fuel reserves collectively held by the fossil fuel industry, would blow us way past our carbon budget. On the other hand, if we were to act on climate change in line with the 2°C target, then fossil fuel companies would lose significant amounts of value and potential revenue, given that the value of their fossil fuel reserves is largely based on their ability to be burnt. In financial speak, this means that fossil fuel reserves were at risk of turning into stranded assets – "assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities" (Ansar, Caldecott, & Tilbury, 2013).

According to Carbon Tracker's analysis, rigorous climate action in line with meeting 2°C, entails the possibility that up to four fifths of the world's fossil fuel reserves could become stranded assets. [6] Looking to the stock exchange, Carbon Tracker's analysis showed that approximately 73% of the reserves listed on the world's stock markets in the next 40 years contained enough emissions to exhaust the carbon budget for 2°C (CTI, 2012). What's more, the vast majority of fossil fuel reserves are not held by publicly traded companies. They are held by private, state and national oil companies. As such, when allocated a proportionate share of the remaining carbon budget, the largest 200 oil, coal and gas companies on the stock

[6] The amount stranded depends on how high of a chance of staying below two or one point five degrees is acted on (cf. CTI, 2013). It is also dependent on the extent to which carbon capture and storage can be adopted in fossil fuel production. However, CCS could make only a small difference, according to calculations by Ekins and McGlade's (McGlade & Ekins, 2015), and certainly not enough to prevent the coal industry facing significant amounts of stranded assets if we act in accordance with the two degree target. What's more, much of the suitable locations for carbon capture and storage may be needed for negative emissions such as bioenergy coupled with carbon capture and storage. Thus, given the lack of suitable CCS sites given technical and technological feasibility constraints (Scott, Haszeldine, Tett, & Oschlies, 2015), relying heavily on CCS for fossil fuel production, competes with other important potential uses for CCS.
Another factor affecting how much fossil fuel assets will be stranded, relates to the future of fossil fuels that aren't burned but used for other purposes. Not all of fossil fuels are used for combustion and so not all fossil fuel production will be curtailed by climate regulations and clean energy. However, this does not change the dynamic of stranded assets significantly as the vast majority of demand for fossil fuels is for combustion. For instance, the EIA (2015) points out that "a typical barrel of oil (approximately 42 US gallons) yields 19 gallons of gasoline, 11 gallons of diesel, 4 gallons of jet fuel, and 7 gallons of other products". As Montgomery (2010, p. 54) highlights, only about 1.5% of petroleum is used as "petrochemical feedstock" which forms the raw material for an immense variety of products such as plastics, artificial fibers, drugs, fertilizers, cosmetics, paint. Thus the vast majority of the value of fossil fuels is based on the assumption that they will be burnt.

exchange, have over 6 times more fossil fuel reserves than could be burnt to stay within the 2°C target (Connolly et al., 2017).[7] The realization that climate action could strand fossil fuel assets means that it could trigger a potential financial asset bubble on the stock market, as well as entail major losses of revenue for fossil fuel companies and countries reliant on fossil fuel rents and exports.[8]

The carbon bubble concept was propelled further into the mainstream popular discourse with the publication of McKibben's 2012 Rolling Stone piece *Global Warming's Terrifying New Math* (2012). The widely-read piece and the logic of the carbon bubble, helped spur on the rapidly growing fossil fuel divestment movement, which has put forward calls to stop investing in the fossil fuel industry for moral, political and financial reasons (Grady-Benson & Sarathy, 2016; G. A. Lenferna, 2018c). Reflecting on the movement's growth, McKibben (2016) highlighted how in the space of a few years, divestment efforts had helped drive "the necessity of keeping carbon underground from the fringes into the heart of the world's establishment" into places as diverse as the G20, the world's major financial establishments, universities across the globe, and the world's largest pension funds.

The necessity of keeping carbon underground was further underscored in 2015 at COP 21 in Paris, where 195 governments across the world unanimously agreed to keep global warming not just to "below 2°C" as was the previous international target. More ambitiously, thanks in large part to the efforts of small island nations, least developed countries, and those most vulnerable and impacted by climate change, the agreement committed to keep warming "to well below 2°C", and "to pursue efforts" to limit warming to 1.5°C (UNFCCC, 2015). The Paris Agreement and its more ambitious targets were heralded as "at once both historic, important – and inadequate" (S. Lewis, 2015). In the words of Christiana Figueres (2016), the UNFCCC Executive Secretary at the time, the Paris Agreement was historic for bringing together the

[7] The amount of reserves they have, furthermore, has increased from a year-to-year basis.
[8] Estimates suggest that adhering to the 2°C target would result in $28 trillion in lost revenue for the fossil fuel industry in the next two decades, with the oil industry accounting for $19.3trn, gas $4trn, and coal $4.9trn (M. C. Lewis, 2014). In the longer term, Citibank estimates over $100 trillion in lost revenue by 2050 (Citi, 2014).

largest gathering of global leaders in history, who all agreed to "a common direction of travel" towards the temperature targets set out in the Paris Agreement. This was a truly remarkable diplomatic achievement. However, it was also deeply inadequate, for if you added up the actions and policies to reduce greenhouse gas emissions that each government had voluntary agreed to under the Paris Agreement, their Intended Nationally Determined Contributions (INDCs), then the world would be on a path to well above, not well below 2°C.

As demonstrated by the graph below from Climate Action Tracker (2016), collectively the INDCs under the Paris Agreement put us on a pathway of between 2.6-3.2°C by 2100, provided that countries would meet their voluntary targets.[9] Recognizing this gap, the hope of the crafters of the Paris Agreement was that countries would ratchet up the ambition of their emissions targets over time such that they would gradually bend the emissions curve in line with Paris' goals (cf. Figueres, 2016). The aspiration was that advances in renewable energy technology and growing political will to tackle climate change, among other things, would allow for more ambitious action in the future. For some commentators, this was an immoral delay tactic, for others it was a necessary political compromise, and a strategic move to lay the ground for more ambitious action. Whichever interpretation you prefer, it is clear that given the inadequacy of the current INDCs, much stronger and more ambitious action is required to meet the Paris Climate Agreement target.

[9] Some calculations are more pessimistic about where the Paris Agreement targets would get us. This is partly because this graph is updated with the latest INDCs. It is also because some assume greater climate sensitivity.
This will be discussed more in Chapter 3 in reference to trajectories for keeping warming below 1.5°C.

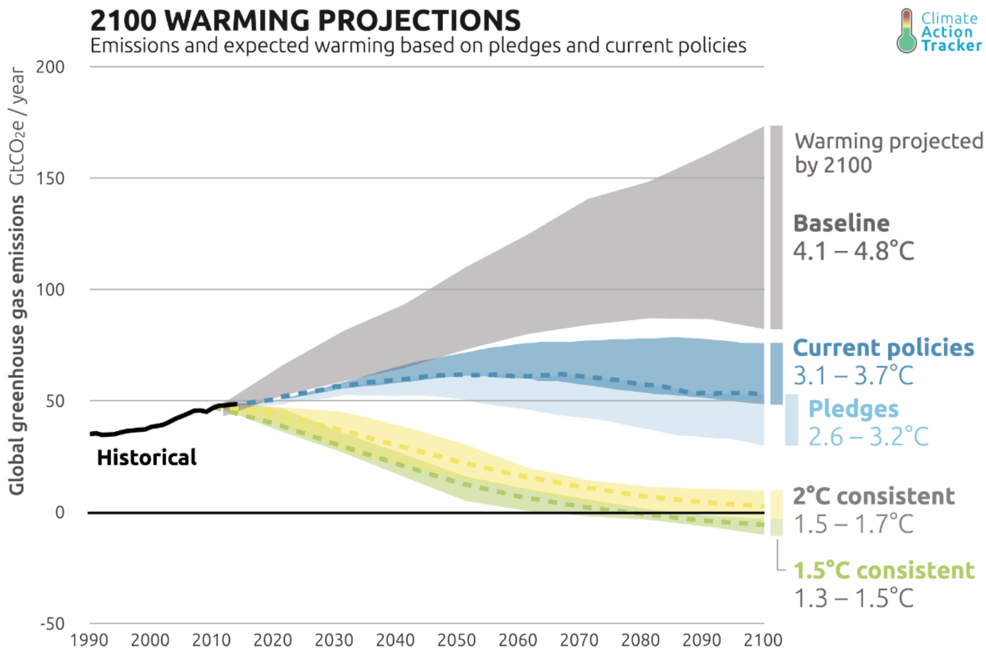


Figure 2 - The Difference Between the Paris Climate Agreement Targets and agreed to action is significant as demonstrated by this Climate Action Tracker (2018) graph

The Paris Agreement's commitment to keeping warming to well below 2°C and aspire to keep it to 1.5°C meant that the reserves held by fossil fuel industry were even further out of line with the world's aspirations on climate change. Demonstrating the fossil fuel industry's misalignment with the Paris goals, and advancing analysis of the carbon bubble, analysis by the non-profit *Oil Change International* showed that the potential carbon emissions just in the oil wells, coal mines or gas fields *already* in operation were sufficient, if burnt, to push passed 2°C (Muttitt, 2016). Furthermore, just the reserves in currently operating oil and gas fields, even with no coal, would take the world beyond 1.5°C. As such, meeting the Paris Climate Agreement targets meant that significant amounts of fossil fuel reserves would have to remain unburnt. Determining just which fossil fuels we should leave in the ground, and how to manage a decline in fossil fuel production has become a matter of significant debate filled with complex question of economics, ethics and politics (cf. Caney, 2016a; Kartha, Caney, Dubash, & Muttitt, 2018; Lazarus & Asselt, 2018; McGlade & Ekins, 2015).[10]

Beyond simply missing the Paris Agreement targets, many fossil fuel companies were planning and building their business models on a future defined by climate chaos. Some fossil fuel companies were developing fossil fuel extraction plans based on economic projections of the future which put the world on track to hit 4°C or over by the end of the century (Connor, 2015; Jagger, 2015).[11] For instance, despite claiming in public to support the Paris Agreement, recent analysis shows that the business models of Shell and BP are based on a future temperature rise of 5°C by 2100 (Chapman, 2017). As a study by Xu & Ramanathan (2017, p. 1) elucidates, when looking at temperature changes we can see ">1.5 °C as dangerous; >3 °C as catastrophic; and >5 °C as unknown, implying beyond catastrophic, including existential threats". As such, Shell, BP and the business models of many in the fossil fuel industry, would take us into a future, beyond catastrophic, posing existential threats to the globe, such as rising sea levels of up to if not more than 1 metre, severe droughts and flooding, widespread food and water shortages, more destructive storms, and potentially widespread extinction and poverty (IPCC, 2013; cf. Lynas, 2008; NASA, 2017; The World Bank, 2012).

In response to the contradiction between the fossil fuel industry holding more reserves than can be burnt to stay within a carbon budget consistent with the Paris Climate Agreements, many climate activists have argued that we need to act on climate change, and leave fossil fuels

[10] [Note to committee: The initial thesis outline had a part of the thesis dedicated to addressing fossil fuel supply side questions. However, in consultation with Steve, we realized the thesis was already very long and so for time and length related reasons the thesis now focuses more on the question of divestment and aligning with 1.5°C. The longer planned book length version of the thesis though will include a supply side section.

[11] Some of the scenarios that fossil fuel companies base their plans on even have a significant chance of going beyond 6°C if coal use continues along International Energy Agency projections and/or the climate turns out to be highly sensitive to greenhouse gas emissions. The IEA has consistently over-estimated coal growth, as such the 6°C scenario is somewhat less likely (Evans, 2017). However, if the climate proves to be highly sensitive, then even without coal growth on such continued trajectories, we face a significant possibility of pushing past 6°C, with some estimates suggesting that business-as-usual scenarios put us at a 1-in-10 chance of 6°C (Connor, 2015). There is a possibility that the climate might be less sensitive to greenhouse gas emission, and warming related with a business-as-usual scenario ends up being less than 4°C. Nonetheless, to further an analogy from Bill McKibben, the fossil fuel industry business model is like playing Russian Roulette, except with almost all the chambers loaded with catastrophic or beyond catastrophic climate change outcomes.

in the ground. For instance, the *Lofoten Declaration for the Managed Decline of Fossil Fuel Production*, signed by over 300 civil society organization, calls for a managed decline of fossil fuel production with the need to phase out many existing fossil fuel projects "faster than their natural decline". The moral legitimacy of the divestment movement has in turn been challenged by fossil fuel industry representatives many of whom argue that we will continue to need the fossil fuels that we produce along the lines with their business plans if we are able to provide energy and ensure development across the globe (Ayling, 2017). In response, I aim to argue that despite the moral importance that fossil fuel have played, in order to avoid grave, widespread and unnecessary harm, the fossil fuel divestment advocates are right to argue that we have a moral responsibility to align our economies and investments with the Paris Agreement target of keeping warming to well below 2°C, and to pursue efforts to limit warming to 1.5°C (UNFCCC, 2015).

Recognizing the Limited Benefits of Fossil Fuels

To make our moral case for transitioning away from fossil fuels, one which recognizes both their benefits and the costs, we can start by exploring a moral argument for fossil fuel divestment put forward Katie Ullman (2013). Ullman, co-founder of Vanderbilt University's fossil fuel divestment campaign, adapted a moral argument from Peter Singer's seminal paper *Famine, Affluence and Morality* (1972). She argued that because fossil fuels cause resource scarcity, pollution and natural disasters, which cause human suffering and death, that fossil fuels are therefore bad. Moving from that starting point, she applied the following principle from Singer's paper: "If it is in our power to prevent something bad from happening, without thereby sacrificing anything of moral importance, we ought, morally, to do it". She then claims that "divesting from fossil fuels and reinvesting in high-returns clean energy investments does not sacrifice anything of moral importance". Based on those premises she concludes that "We ought, morally, to divest from fossil fuels"

Ullmann does not explain her argument further, and rather merely presents her argument in premise form. As such, there is some potential ambiguity that may arise in terms of how to interpret her claim that divesting from fossil fuels and reinvesting in high-returns clean energy investments does not sacrifice anything of moral importance, let us call this her Moral Divestment Premise. One way to interpret that premise, is to take it to be claiming that for the individual divesting, one can divest one's investments in fossil fuels, and reinvest them into clean energy without sacrificing anything in terms of returns, as one can secure equally good investments and thus not lose anything monetarily in terms of one's investments. A second interpretation is that broadly speaking if society collectively divests from fossil fuels and moves towards a clean energy future, then we will not sacrifice anything of any moral importance whatsoever. A third possible interpretation, what I call the Net Benefit Interpretation, involves reading more into the premise then is actually there, and to claim that if we divest, then overall, we will gain more of moral importance than we will lose, and that as such overall, we will not have sacrificed but gained.

As I will argue, while the first interpretation of her Moral Divestment Premise can be defended as an accurate argument, it is too narrow a view of morality for the purposes of this dissertation, which aims to discuss the moral importance of fossil fuel divestment for society collectively, not just in terms of an individual's investment returns. The second interpretation, I will argue, is either false, as there is bound to be some sacrifices as we transition away from fossil fuels, or it could be read as taking a crude utilitarian moral outlook that says that all that matters is maximizing welfare, and that as such any losses faces are not morally important as long as they help us to maximize welfare. The third interpretation then is the one of most moral significance, as we can recognize that transitioning away from fossil fuels will bring more benefits overall than the fossil fueled status quo. However, I aim to argue that the possibility of a net benefit is only one morally important consideration, and that to ensure a just transition we also need to factor and address the morally significant negative impacts that transition away from fossil fuels will bring. Additionally, the Net Benefit framing does not quite capture the moral gravity of the harms of fossil fuels nor the benefits gained through shifting away from it, as such I propose shifting to the Fossil Free Moral Imperative as a more robust moral foundation upon which to build the case for transitioning away from fossil fuels. If we follow the logic of the Fossil Free Moral Imperative, as Chapter 2 will explore, while it can support the case for fossil fuel divestment as an important contribution to moving away from fossil fuels, fully meeting that imperative would require us to do much more than divest from fossil fuels.

In terms of the first interpretation of the Moral Divestment Premise, there is good evidence to suggest that one can indeed get equal if not better returns by divesting and reinvesting in clean energy (cf. Trinks, Scholtens, Mulder, & Dam, 2018). As such on a narrow financial perspective on divestment such an interpretation of Ullman's premise is true. One can indeed say that for the individual divesting, one can divest one's investments in fossil fuels, and reinvest them into clean energy without sacrificing anything, for a growing body of evidence shows that one can likely secure equally good if not better investments and thus not lose anything monetarily in terms of one's investments. However, such a view of what is morally important, as being only about an individual's investment returns, is too narrow, and is not the scope of what is morally important that I am interested in in this dissertation. Rather this dissertation's interest lies in determining the moral case for a collective transition away from fossil fuels. Thus, while that is one possible interpretation of Ullmann's argument, I will not focus on it here given its rather narrow scope.

The second interpretation is that broadly speaking if society collectively divests from fossil fuels and moves towards a renewable energy future, then we will not sacrifice anything of any moral importance. This interpretation is problematic, for despite much of the climate movement's oft justified vilification of the fossil fuel industry, for some, indeed many, the fossil fuel industry is of some moral importance. Consider, for instance, that coal and other fossil fuels provide jobs, energy, or revenue sources to millions of people across the world. By unlocking vast amounts of energy, fossil fuels have played a key role in the industrial revolution along with the progress (and regress) that came with it. Thus, despite all the harms that fossil fuels do cause, for many, fossil fuels are certainly of some moral importance.

It is important to consider the importance of fossil fuels both so that we can adequately assist those for whom a transition away from fossil fuels would have negative impacts. Additionally, doing so can help counter fossil fuel industry public relations campaigns which have often caricatured the climate justice movement as naïve environmentalists who do not recognize what it takes to create a prospering society. For example, fossil fuel lobbyist Alex Epstein, in his book *The Moral Case for Fossil Fuels* (2013), argues that environmentalists are naïve and their actions would hinder human development, which is provided in large part by the fossil fuel economy. He concludes that, contrary to the supposed "blind, anti-development hostility and hysteria" of environmentalists, we are morally obligated to use more fossil fuels because of their contribution to prosperity.[12] The fossil fuel industry lobby has used analyses like Epstein's to paint the fossil fuel industry as saviors of human progress, given their past role in driving development. For instance, echoing Epstein's analysis, Peabody Coal's Public Relations Campaign, *Advanced Energy For Life*, claimed that coal is the best answer to development and solving energy poverty, and that it is one of the best solution to the world's number one environmental crisis, lack of access to energy (Sheppard, 2014).

As a wide body of evidence has shown, such public relations campaigns are part of a vast, well-funded, sophisticated, decades long propaganda campaign by the fossil fuel industry and other polluting allies, such as utilities, auto-makers, and large polluting manufacturers, to spread misinformation and distort science, economics, politics, religion, ethics, and policy in order to block action on climate change and fossil fuel regulation (Banerjee, 2015; Brulle, 2014, 2018; Conway & Oreskes, 2010; Franta, 2018; McKinnon, 2016; Supran & Oreskes, 2017; Westervelt, 2018a). Catriona McKinnon (2016) argues that such public relations campaigns often amount to a form of propaganda, in particular a type propaganda that Jason Stanley calls "Undermining Demagoguery", which is "a contribution to public discourse that is presented as an embodiment of a worthy political, economic, or rational ideal, but is in the service of a goal that tends to undermine that very ideal" (Stanley, 2015, p. 65). McKinnon

[12] Bjorn Lomborg has played a similar fossil fuel apologist role as Epstein within the climate change discourse (Atkin, 2017).

limits the scope of her analysis to climate science denial, but fossil fuel industry undermining demagoguery is also pervasive in climate policy, economics, ethics, and across most disciplines and elements of the climate problem. Fossil fuel apologists and spokespersons often claim to be engaging in good faith, but often their engagement on these issues serves merely to undermine climate action. I highlight this point about fossil fuel propaganda not to avoid grappling with the arguments fossil fuel apologists put forward, but rather to put in context the nature of many fossil fuel apologist arguments, which are often made in bad faith.

While Epstein does a lot to play up the moral importance of fossil fuels, his piece, like that of many fossil fuel apologists, fails (likely intentionally)[13] to adequately consider either the harms of fossil fuels or the much better future that can be provided by renewable energy and climate action. As we will explore in more detail in the following sections, there are numerous studies that show that a renewable energy future has clear advantages in terms of clean air, water, jobs, energy security, economic growth, and a range of other benefits. Such studies show that the benefits and co-benefits of climate action would result in significant economic, environmental and health benefits, such that climate action aligns with our collective interests, regionally, nationally, and internationally, both for present and future generations.

While fossil fuel energy has provided benefits in the past, those benefits can increasingly be better supplied through alternative energy sources, alternatives which can create a more prosperous society which avoids the myriad range of harms that come with continued reliance on fossil fuels. However, even though studies show that a renewable energy future has clear advantages in terms of clean air, water, jobs, energy security and a range of other benefits it brings, we nonetheless must grant that coal and the broader fossil fuel industry do currently have some moral importance because of the contributions they make to current livelihoods and the energy they provide. Thus, if we were to use the second interpretation of Ullmann's

[13] For writers like Epstein who are paid to serve a particular agenda favoured by the fossil fuel industry, it may be the case that such omissions and failures to take into account the broader harms of fossil fuels and the benefits of clean energy are intentional omissions and distortions aimed at creating a narrative that favours fossil fuels by distorting the truth or telling partial truths. They are likely a form of undermining demagoguery.

argument, then we might have reason not to divest, as it relies on the claim that the fossil fuel industry does not have any moral significance whatsoever.

Ullman is not the only person to have claimed that we can transition away from fossil fuels without sacrifice. John Broome, in *Climate Matters: Ethics in a Warming World* (2012), also proposed that we could transition away from fossil fuels without the current generations having to make sacrifices. According to Broome's proposal, we could borrow from the future in order to compensate people for refraining from emitting dangerous amounts of greenhouse gas emissions, achieving what he refers to as 'efficiency without sacrifice', whereby we take the most efficient path to reducing greenhouse gas emissions without making sacrifices in the present. People in the future would also be better off under this proposal, for while they would pay for the loans we took out to fund renewable energy, they would receive the benefits of climate action, which would outweigh those costs. Thus, Broome's proposal is intended to be a win-win for future and current generations.[14]

If Broome's proposal is right, it could provide support for the claim that we could transition away from fossil fuels without sacrificing anything of moral importance. However, as Simon Caney points out, one of the major weaknesses in Broome's argument, lies in its assumption that it is possible to act now without imposing any sacrifices on the current generation.[15] As Caney points out, while it may be possible to pass on some and perhaps even many costs, we have reason to be skeptical of Broome's claim that we can pass on all costs of the transition, as there are some costs such as the loss of jobs in the fossil fuel industry, and other negative

[14] While Broome believes that as a matter of justice, we should make emitters pay for their harmful behaviour and make sacrifices in doing so, he believes that for two reasons we should pursue his "efficiency without sacrifice" proposal. Firstly, he holds that for utilitarian reasons we should pursue his proposal, as it would result in the greatest overall utility. Secondly, he holds that for pragmatic reasons we should pursue the efficiency without sacrifice proposal, as it would be one of the few ways we could push past the current lack of ambitious climate action. Broome believes his proposal would allow us to secure the requisite climate action, while increasing overall utility and not requiring the current generation to have to make sacrifices, something he holds to be a major roadblock in progress.
[15] Gardiner (2017c) argues that passing on such costs to future generations is a form of morally problematic extortion. However, I am not convinced that all forms of borrowing from the future to pay for climate action are problematic, as the benefits in the future may well indeed be so significant and can even pay off the initial loan several times over, even when looking at fuel costs alone, as I discuss in Chapter 2.

impacts of the transition away from fossil fuels which may not be able to be adequately compensated for by simply borrowing from the future. For instance, while we can retrain workers and fund a just transition for them, there are some moral losses that may nonetheless ensue, such as communities reliant on fossil fuels, losing their identity and having to move. Additionally, as Part B of this dissertation discusses, to ensure that we actually end the fossil fuel era in line with the Paris Climate Agreements, many individuals will have to take on numerous obligations and sacrifices both to reduce their consumption and, more importantly, to advocate for broader climate action.

One way of interpreting Broome's claim that we will not sacrifice anything, is to see it as a grounded in a utilitarian moral outlook. For a utilitarian, the ultimate goal of morality is to maximize overall welfare or happiness. According to economic modelling, climate action would indeed lead to a greater overall welfare and as such would fulfil a utilitarian moral outlook (IPCC, 2013). This aligns with the third possible interpretation of Ullmann's argument too, the Net Benefit Interpretation, which claims that if we divest, then overall, we will gain more of moral importance than we will lose, and that as such overall we will not have sacrificed but gained. However, while at a broad utilitarian perspective, we may be able to make the transition without reducing and instead increasing overall welfare and economic growth, at a more fine-grained level, when we look at particular communities and individuals, it is unlikely that a transition at the speed and scale needed to meet the Paris Agreements will be painless for all involved as there will indeed be sacrifices that will have to be made.

Already, we are seeing fossil fuel-dependent communities and individuals having to make sacrifices in the transition, and while it is possible to do much better to protect them, there are numerous obstacles to doing so, not the least of which is political obstacles. Looking forward, as Part B will detail, the scale and speed of the transition required to meet climate targets, and the changes set in motion just by technological shifts, are set to be disruptive. While we should do our best to pursue a just transition, it is arguably wishful and idealistic thinking to suggest that we can ensure that no one loses out in the transition, given the rate and scale of needed change, and the lack of robust and just action currently occurring. As such, while we can say that acting on climate change will provide a net benefit and better ensure that we maximize welfare relative to staying locked into the fossil fuel era, we cannot say that no one will lose out. For individuals and communities, there will indeed be costs and sacrifices associated with the transition away from fossil fuels, even if from a broad utilitarian perspective, it is the morally correct thing to do.

In sum, we should resist the line of thinking that suggests that because transitioning away from fossil fuels will increase overall welfare that it thus does not entail sacrifices, as for many individuals and communities it will involve some, even if they see overall benefits from the transition. On the other hand, we must also resist the line of thinking that suggests that because a particular trajectory comes with costs, that therefore it is unethical to pursue it. As Cheryl Hall (2013) points out, any trajectory we choose as a society inevitably involves some sacrifice and moral trade-offs, and this is no different for a renewable energy future. It would be a double-standard against a renewable energy future to say we shouldn't take it on because it comes with some costs, particularly when all other available scenarios come with costs, and much worse costs at that as I explore throughout this dissertation. Given the inevitability of some costs, the question we should be asking is not whether a pathway is costless, but rather whether the trajectory we aim to choose is morally preferable, and if it is, then how do we go about equitably dealing with the costs that it might have.

Recognizing that the transition away from fossil fuels would likely impose some costs, it is imperative to find a position between that of Ullman and Broome on one hand, a camp I will call the No Moral Sacrifice Camp, who argue that we can transition away from fossil fuels without sacrificing anything of moral importance, and Epstein and Lomborg on the other, a camp I will call the Fossil Fuel Apologists, who argue that transitioning away from fossil fuels will cost us too dearly. One can find such a position by recognizing on one hand that the fossil fuel industry does have some moral importance because of the contributions it makes to current livelihoods and the energy it provides. On the other hand, we can recognize that a renewable energy future is far preferable, as the limited short-term benefits of staying invested in fossil fuel energy production are significantly outweighed by their costs when compared to the benefits of a renewable energy future. To flesh out such a position we can turn to numerous studies which have illustrated that by phasing out fossil fuels in line with the Paris Agreements we can avoid significant amounts of environmental and climate change impacts, while increasing health benefits, economic savings, and job creation.

For instance, International Energy Agency (IEA) estimates show that transitioning in line with Paris Agreements could result in net savings on fuel costs of $71 trillion by 2050 – that's despite the fact that IEA estimates are typically very conservative against renewable energy, and fossil fuel-friendly (D. Roberts, 2015a). Across Africa and India, IEA estimates suggests that high renewable energy penetration in line with the 2°C target could result in significant costs saving and higher energy access in both the near and long-term (Calitz, Mushwana, & Bischof-Niemz, 2015; CTI, 2014a; IEA, 2014a; G. A. Lenferna, 2016b). More broadly, the IPCC (2014), the Deep Decarbonization Pathways Project (DDPP) and other global analyses have shown that "deeply reducing greenhouse gas emissions and achieving socio-economic development are not mutually exclusive. [Rather] robust economic growth and rising prosperity are consistent with the objective of deep decarbonization. They form two sides of the same coin and must be pursued together as part of sustainable development" (Deep Decarbonization Pathways Project, 2014, p. vii). A growing number of studies show that a renewable energy future has clear advantages in terms of clean air, water, jobs, energy security, economic growth, and a range of other benefits, such that climate action aligns with our collective interests, regionally, nationally, and internationally (cf. L. R. Brown, 2009; IPCC, 2014; Jacobson & Delucchi, 2011).

As I will argue in more detail in Part C, acting in line with the more ambitious 1.5°C target will provide major benefits when compared both with business-as-usual and even the 2°C target. For instance, Rogelj et al. (2015) provided economic estimates showing that that even when one excludes consideration of the economic benefits from, for example, avoided climate damages, reduced air pollution and improved energy security, meeting the 1.5°C target would only result in a reduction of a few tenths of a percentage point in global GDP growth per year. When you incorporate those broader benefits, research from the Low Carbon Monitor (2016) shows that action in line with the 1.5°C would result in major benefits, including creating many more jobs, improved global health, and improved energy access compared both to business as usual or the 2°C target. Furthermore, achieving the 1.5°C target rather than the 2°C goal has "enormous repercussions", such as avoiding the virtual disappearance of coral reefs; preventing a 10-15% increased risks of crop yield losses for key breadbasket areas in the coming decades; & averting a 10% reduction of the global economy by 2050.

In order to finance a renewable energy future, we could also consider that, according to the International Monetary Fund, globally eliminating fossil fuel subsidies could free up US$2.9 trillion in government revenue annually even when excluding the environmental and social externalities created by the fossil fuel industry (Clements, Coady, & Fabrizio, 2013). That is close on double the US$1.6 trillion in estimated annual investment needed in renewable energy and energy efficiency that would be needed globally by 2035 to keep warming to 2°C, according to the IEA (2014b). If all fossil fuel subsidies were re-invested in a low-carbon future, we would even have more than enough money to meet the safer and more just target of keeping warming to 1.5°C, which only requires an additional $460 billion per year compared to the 2°C target. As such, on such estimates, just by re-directing fossil fuel subsidies we would have more than enough money to finance a renewable energy transition in line with the 1.5°C and have close on a $1 trillion left over to spend on other important social priorities.

Some object that transitioning away from fossil fuels will disrupt the ability to alleviate poverty and ensure robust development. However, as Part C will detail, transitioning away from fossil fuels in line with the 1.5°C with prices dropping at a swift rate, renewable energy is increasingly much better placed to address energy poverty, as a growing body of evidence demonstrates (Bradshaw, 2017; CTI, 2014b; Kyte, 2015; G. A. Lenferna, 2016b). Combined with the fact that the harms of climate change and fossil fuels fall disproportionately on low income communities, indigenous peoples, people of color, women, and the global south, a commitment to prioritizing the poor and to racial, global, and gender justice, favors climate action – points highlighted by the Black Lives Matter Movement in their platform's call for fossil fuel divestment, Pope Francis in his encyclical on climate change, and a vast and growing body of academic literature (Abeysinghe & Huq, 2016; Cuomo, 2011; Pope Francis, 2015; The Movement for Black Lives, 2016).

It is, however, important not to deny the moral case to ensure that climate action itself adequately addresses the needs of the poor and marginalized and does not disproportionately impact them. While acting in line with the Paris Agreement can bring about major benefits particularly for the global poor and vulnerable, it is important not to forget the negative impacts that moving away from fossil fuels might bring. As such, Chapter 10 argues that a just transition which adequately accounts and addresses the negative impacts of a transition is important, particularly if we want to avoid unnecessary harms in the transition away from fossil fuels. It argues that domestic justice requires that countries and communities ensure that domestically they do not put the costs of transitioning away from fossil fuels on those who can least afford it, and that they assist those vulnerable in the transition including fossil fuel workers and those marginalized in society. In terms of international justice, I argue that the developed world has a three-fold responsibility to reduce their domestic greenhouse gas emissions, leave fossil fuels in the ground, and to assist the developing world in a just transition to a resilient low-carbon future (cf. Holz, Kartha, & Athanasiou, 2017). Considering the need for a just transition though, what the above studies show, and as I will elaborate on throughout this chapter, we can align the global community with the Paris Climate Agreements and receive significant benefits through doing so.

Recognizing that transitioning away from fossil fuels may have some costs, means that we cannot base the moral case for transitioning away from fossil fuels on Ullman's and Broome's arguments that we can transition without incurring costs or sacrificing anything of moral significance, unless we simply want to make a blunt utilitarian argument that transitioning away from fossil fuels would increase overall welfare and is not making a net sacrifice. In the place of such arguments, I aim to argue for a two-part Fossil Free Moral Imperative, which argues that there is a collective moral imperative to transition away from fossil fuels at least in line with the Paris Climate Agreement targets, if not more ambitiously. The first half of the imperative argues that we need to undergo such a transition in order to avoid grave, widespread, unnecessary harm, what I'll call the GWUH Principle. The second inter-connected half of the Fossil Free Moral Imperative identifies an additional complimentary positive moral responsibility to transition away from fossil fuels in order to create a more prosperous future. As Chapter 2 will highlight, not only can transitioning away from fossil fuels avoid significant harm, it can also potentially provide great benefits, such as reduced water consumption, increased job creation, energy cost savings, and a more equitable and democratic future. Together these two halves form the Fossil Free Moral Imperative.

Let us begin with arguing for the GWUH Principle, that we should transition away from fossil fuels in line with at least the Paris Climate Agreement targets in order to avoid grave, widespread, unnecessary harm. The moral foundation of this argument draws on that most moral outlooks agree that we have a moral responsibility not cause unnecessary harm. Consider, for instance, a broadly supported moral principle that we should avoid doing harm where possible. In its most uncontroversial form, as stated by Elizabeth Cripps, a harm avoidance principle states that: Moral agents have a "moral duty to avoid inflicting serious harm… on another human being or human beings… *at least* if she can avoid doing so without suffering comparable harm herself" (Cripps, 2013, p. 11). If we then take it as established that reduction in fossil fuel dependence in line with the Paris Agreements will lead to the avoidance of much harm, then by the *Harm Avoidance Principle* we collectively have the moral responsibility to act in line with the Paris Agreements and in doing so avoid inflicting or contributing to serious harm.

Some might object that harm is an unfortunate but necessary feature of running our societies. For instance, Holly Lawford-Smith argues that duties to reduce emissions cannot be grounded in an unqualified duty to do no harm as “it is virtually impossible in our current social context—for those in developed countries at least—to do no harm, and we cannot have duties to do what we cannot do” (Lawford-Smith, 2016).[16] She argues that this shifts the general injunction from 'do no harm' to 'do the least harm'. Recognizing Lawford-Smith’s point, fortunately, does not undercut the moral case for acting in alignment with the Paris Agreements, because we can refine our moral argument to doing the least harm, or to avoiding unnecessary harm. Drawing on the evidence highlighted earlier, we can argue that if we burn fossil fuels beyond the Paris Climate Agreement targets, we would be creating unnecessary harms, and that as such we have a moral responsibility to act in line with at least the Paris Agreements, as doing so can provide us a more prosperous future without causing significant harm to others. To formalize this point, one can draw on an argument put forward by John Nolt who provides us with a principle, which I will call the *No Unnecessary Harm Principle*, which holds that “one may not contribute significantly and unnecessarily to the bodily harm of others” (Nolt, 2013, p. 140). As Nolt (2013) points out, such a principle is supported by most, if not all, widely recognized moral theories thus giving it significant traction as a firm and widely supported foundation upon which to base the moral imperative to transition away from fossil fuels.

Furthermore, the No Unnecessary Harm Principle should be augmented to reflect the fact that it is not just small amounts of harm that would be inflicted if we failed to rapidly transition to a renewable energy future, but rather as the following chapter details, it would be widespread and grave harm. As a report by Cleveland Cutler has succinctly summarized, “the fossil energy system causes pervasive human health, environmental, and social harm across every society” (Cleveland, 2015). It is particularly important to point this out, because some institutions have declined divestment partly on the grounds that the harm caused by fossil fuels is not sufficiently grave (cf. Paxson, 2013). However, if causing disastrous climate change and

[16] Lawford-Smith initially discuss this in terms of just private duties of individuals to reduce emissions. However, here I aim to expand the discussion such that the principles discussed are meant to provide moral principles of action which identify a collective societal duty, which applies to a broad array of actors and agents, including individuals, policy makers, institutions and corporations.

detrimentally affecting the well-being of billions of people, particularly the poor, marginalized and vulnerable, is not sufficiently grave, I am not sure what is. Causing the premature deaths of millions through air and water pollution (Landrigan et al., 2017; World Health Organization, 2014), causing widespread ecosystem and species collapse, and greatly increasing the likelihood of a mass extinction (cf. Nolt, 2011b), radically and detrimentally altering human civilization as we know it (cf. Ahmed, 2014; Anderson & Bows, 2011), creating a future defined by catastrophe (cf. Hartzell-Nichols, 2014), contributing to major increases in war and conflict (cf. Burke et al., 2009), and the many other impacts of prolonged reliance on fossil fuels, all seem like very grave harms indeed.

Recognizing that continued fossil fuel dependence along the lines of the fossil fuel industry collective business model creates grave, unnecessary, and widespread harm provides strong moral reasons not to continue fossil fuel dependence in line with the current business model of the fossil fuel industry, and instead to rapidly transition away from fossil fuels in line with the Paris Agreements, and as close as possible to 1.5°C given the major benefits and avoided harms of doing so. The argument to transition away from fossil fuels can thus be grounded in a principle to avoid grave, unnecessary and widespread harm – the GWUH principle. Importantly, the Fossil Free Moral Imperative and the GWUH principle are not just about avoiding harms for future generations through climate change, rather, as I will explore more thoroughly in Chapter 2, they are also about avoiding the broader harms that fossil fuels bring on both present and future generations, and also about realizing the broader benefits that a renewable energy future can bring in comparison to sticking with the fossil fueled status quo.

The Intergenerational Sacrifice Camp

The GWUH Argument attempts to find a position between that of Ullman and Broome, who fall into the No Moral Sacrifice Camp, and Epstein and Lomborg, who fall into the Fossil Fuel Apologist camp. However, it is not the only position that falls between these two camps. Another camp within the climate ethics literature that falls between them, is a position I shall call the Intergenerational Sacrifice Camp. Those in this camp argue that climate action places a burden on the present generation, but that nonetheless we have an intergenerational moral obligation to incur those costs to avoid passing on unacceptable costs to future generations in the form of climate catastrophe. In the remainder of this chapter, I aim to differentiate myself from this camp too, as they fail to adequately consider how climate action, especially to reduce fossil fuel dependence, is in the interests of not just future generations but also the present generation. This camp often fails to countenance how action climate action and reducing fossil fuels will also provide significant benefits to the present generation, such that it will be very much in the interests of the present generation to take action, apart from a small minority with vested interested in fossil fuels, and those who might be impacted by the transition if we do not adequately ensure a just transition away from fossil fuels.

The Intergenerational Sacrifice Camp is arguably one of the more dominant camps within the climate ethics literature. For instance, in their recent, *Climate Justice: An Introduction,* Dominic Roser and Christian Seidel argue that "when we reduce emissions today, it is not we who enjoy the benefits, but primarily future generations across the globe" (2017, p. 14) They see climate mitigation as "an intergenerational problem… because future generations are the main beneficiaries. Every ton of CO2 we save today will mainly protect the climate in the future. In this respect, climate mitigation can be viewed as something that we do for future generations." (31 Roser & Seidel, 2017). Similarly, Stephen Gardiner, in his seminal piece, *A Perfect Moral Storm: Climate Change, Intergenerational Ethics, and the Problem of Corruption,* claims that "the benefits of carbon dioxide are felt primarily by the present generation, in the form of cheap energy, whereas the costs – in the form of the risk of severe and perhaps catastrophic climate – are substantially deferred to future generations" (Gardiner, 2006, p. 92).[17] Such an analysis underpins Gardiner's claim that climate change is not simply a tragedy of the commons, but is rather a perfect moral storm – a much more vicious and intractable problem, insofar as it has much stronger intergenerational, global and

[17] A graph illustrating the change in costs since 2006 is available at this link: https://www.greentechmedia.com/articles/read/next-generation-electricity-technology-is-being-held-back-by-outdated-marke#gs.QbDH8i8

theoretical difficulties than a tragedy of the commons; difficulties which make it even more difficult to resolve (Gardiner, 2004b, 2006, 2011a). Perhaps most starkly within the Intergenerational Sacrifice camp, Joshua Horton and David Keith claim that “rapid emission cuts would impose significant economic costs that may, for example, appear as increased energy prices.” (2016, p. 81). They conclude that “while the net short-term effects of mitigation would be harmful and may be concentrated on the poor, the long-term effects would generally be beneficial and universal” (Horton & Keith, 2016, p. 82).[18]

While the authors within the Intergenerational Sacrifice Camp vary greatly on many questions of climate ethics, what they all have in common is that they frame climate action as a burden that the present generation takes on in order to protect future generations or rather avoid imposing grave harms upon them. Unlike Epstein and Lomborg they argue that we should take robust action on climate, but most say that such action is done predominately in order to fulfil our intergenerational obligations where the present generation sacrifices in order to protect future generations. While I agree with them that we do have an intergenerational obligation not to harm future generations, I disagree with their characterization that climate action is predominately about the present generation sacrificing for future generations. Rather, I aim to argue that climate action, especially action to reduce fossil fuel dependence, is not only about protecting future generations, but is also substantially grounded in the interests of the present generation.

The reason that climate action can be said to be in the present generation’s self-interest is firstly because as the latest IPCC report highlights, previous estimates of climate change have often underestimated how soon the more harmful impacts of climate change will be upon us, such that given the shorter time frame it is very much in the present generation’s interest to reduce contributions to climate change lest they be impacted by potentially catastrophic

[18] Keith and Horton share a similar view to the of Darrel Moellendorf who argues that we should weaken our climate ambition to ensure we do not impose undue impacts on the poor. Keith and Horton build on such a view to make the case for solar geoengineering to alleviate the costs of climate action. Part C will debunk the idea that the burdens of climate action will argue contrary to Moellendorf, Keith and Horton, rapid climate action is in the best interests of the poor and vulnerable.

impacts (IPCC, 2018). The next reason acting on the Fossil Free Moral Imperative is in the current generation's self-interest, has to do with considering the broader benefits that reducing fossil fuel use will bring, apart from simply reducing greenhouse gas emissions. Those benefits are what many refer to as the co-benefits of climate action, as they are the benefits of climate action that are not from reducing greenhouse gas emissions. If we count those benefits, then we will find that acting on the fossil Free Moral Imperative is significantly in the interests of the present generation

In the words of Megan Smith, co-benefits are "the added benefits we get when we act to control climate change, above and beyond the direct benefits of a more stable climate" (A. Smith, 2013). These co-benefits are often treated as a side-note or an additional consideration when thinking about climate policy, but if they are made more central to our analysis of the problem, they motivate action much more than a limited focus on greenhouse gases, as their impacts are much more direct, tangible and proximate both in time and in space. Those potential benefits include: reductions in air, water, and soil pollution, violence and political intimidation, that harms of which fall disproportionately on communities of color, indigenous communities, the poor and vulnerable; increased energy access; lower fuel costs; broader more sustained development; increased job creation; less war; and reduced corruption. When we factor in the broader non-GHG benefits of action, the case for reducing fossil fuel dependence becomes clearly grounded in both an intergenerational moral obligation and in protecting the common good of the current generation, particularly for the most poor and vulnerable, as I will highlight in Part C. It is instructive to note that in attempting to weaken the latest IPCC report, Saudi Arabia, who has consistently sought to undermine climate action to protect its oil interests, pushed back against the sort of analysis I am calling for (Darby, 2018). They were pushing for a framing akin to the intergenerational sacrifice camp, which emphasized the costs of climate action and downplayed the sustainable development benefits

While some of those who I am putting in the Intergenerational Sacrifice Camp do recognize in some way the co-benefits of climate action, not all authors do. Others downplay the co-benefits, do not treat them as substantial, or treat them as a footnote or an aside. Doing so frames the problem in ways which might contribute to inaction, ignores some of the major harms involved with fossil fuels, and arguably serves the interests of the small minority who benefit from the status quo and want to see the transition away from fossil fuels stymied, despite the great benefits it brings. Such analyses are correct to recognize that acting on climate change will impose some costs on current generations, while benefiting future generations greatly, however, acting on climate change will not be a net harm for the current generation. Rather, as I argue throughout this chapter, transitioning away from fossil fuels is also very much in the interest of the current generation, and, as I will argue in Part C, is also in the benefit of the global poor, provided it is done right. Thus, in contrast to the Intergenerational Sacrifice Camp, I aim to stake out a position, which I will call the Great Multigenerational Reward with Some Immediate Costs Camp, which argues that transitioning away from fossil fuels, while it does incur some costs, nonetheless provides great benefits for both the current and future generations. Based on this position I will argue that the Fossil Free Moral Imperative is grounded in powerful intergenerational obligations to prevent grave, widespread unnecessary harm, as well as strong moral obligation to the current generation, especially to the global poor.

To defend my position, in the chapters that follow, I will show that both the Intergenerational Sacrifice and the Fossil Fuel Apologist Camp, to differing degrees, often rely on four different errors in terms of how they understand and/or frame the costs and benefits of transitioning away from fossil fuels. If we correct these four errors, we will see that acting on the Fossil Free Moral Imperative is very much in the interests of present and future generations:

1. **Climate Lag and Downplay**: Either because they rely on outdated science or because they distort the science that exists, authors often fail to recognize how acting on climate change is very much in the interests of current generations because of how the impacts of climate inaction in the present will fall on most of the current generation.

2. **Greenhouse Gas Parochialism:** a limited view of the costs of fossil fuels, which typically focuses solely or predominately on greenhouse gas emissions as their frame of analysis, and through doing so they ignore or downplay the broader harms of fossil fuels and the broader benefits of transitioning to renewable energy.

3. **Outdated and Conservative Renewable Energy Analysis**: Analyses that are outdated either because they were written before the rapid cost-reductions that have occurred in the renewable energy sector, or because they put forward inaccurate or conservative views about the costs and benefits of renewable energy.

4. **The Neo-Liberal Imaginary**: The pervasiveness of neoliberal thinking has led to limited conceptions of what is possible and appropriate in response to climate change. Furthermore, it has driven analyses of the problem which distort the costs and benefits of action by promoting an individualistic view which fails to understand the structures that shape the costs and benefits of fossil fuels and renewable energy.

To summarize, in Chapter 1, I argued that to develop a more nuanced moral case for divesting from fossil fuels and ending the fossil fuel era, that we should move away from blunt moral arguments such as those claiming we can transition without sacrificing anything of any moral importance. In their place I suggested and began to defend a two-part Fossil Free Moral Imperative which argues that there is a collective moral imperative to transition away from fossil fuels at least in line with the Paris Climate Agreement targets, if not more ambitiously. The first half of the imperative argues that we need to undergo such a transition in order to avoid grave, widespread, unnecessary harm the GWUH Principle. The second inter-connected half of the Fossil Free Imperative is about the positive moral responsibility to embrace and create a more prosperous future.

In Chapter 2, I will deepen the case for the Fossil Free Moral Imperative and show that contrary to the Intergenerational Sacrifice Camp, following the Fossil Free Moral Imperative is in both the present and future generation's interests. I do so by challenging analyses that draw on a) climate lag and downplay; 2) greenhouse gas parochialism and 3) outdated and conservative energy analyses. Then in Chapter 3 I reflect on how the pervasiveness of an individualistic neoliberal imaginary, which frames narrow economic individual self-interest as rational without considering broader structural factors, has led to limited conceptions of the nature of the problem we face, and of what is possible and appropriate in response to climate change. The neoliberal imaginary compounds the problems of greenhouse gas parochialism and outdated analyses, making it seem like acting is not in our interest by obscuring how a transforming our structures and policies can make acting to end the fossil fuel era more in the interest of individual people, communities and countries. Furthermore, it has driven analyses of the problem which distort the costs and benefits of action; and obscures the structures and policies that keep fossil fuels in place.

Chapter 2: An Awesome Moral Opportunity

Climate Change, Co-Benefits and a Renewable Revolution

In Chapter 1, I defended the Fossil Free Moral Imperative, arguing that there is a collective moral imperative to transition away from fossil fuels at least in line with at least the Paris Climate Agreement targets. Doing so will avoid grave, widespread, unnecessary harm and create a more prosperous future than the fossil fueled status quo. In response, many claim that while acting on this imperative may be in the global collective good and an important intergenerational responsibility, that it runs contrary to the economic self-interest of individual nations and the current generation, and that as such it is a vicious problem that requires us to overcome our individual interests in order to benefits future generations and distant others.

While it is true that acting on the fossil free imperative will fulfil important moral obligations to future generations and distant others, in this chapter I aim to argue that acting on the fossil free moral imperative also presents an awesome moral opportunity to create a much better future both for individual countries and communities and for the current generation. It is an awesome opportunity, not in the watered-down common parlance sense of the term, but rather in the true sense of presenting an awe-inspiring and incredible task ahead of us. As Part B and C explore, the scale and speed of the transformation we will have to undertake will require unprecedented global collective action. However, the results if we undertake this action, as this chapter explores, will be to create a world that is deeply preferable on so many fronts to the fossil fueled status quo, whether it through cleaner air, water, ecological integrity, more jobs, energy cost savings, increased economic growth, and potentially more democratization as a result of weakening the concentrated and corrupting centralized power structures typical of the fossil fuel industry.

Rather than just being about reducing greenhouse gas emissions, it is this broader possibility that shapes the Fossil Free Moral Imperative into an awesome moral opportunity to create a much better world for both present and future generations. I begin by exploring how climate change is set to occur faster than expected and is already upon us, such that even from a perspective that focuses solely on climate change it is in the current generation's interest to act on the Fossil Free Moral Imperative. I then show how if we incorporate the broader non-greenhouse gas benefits of acting, that it will be even more in the interests of the current generation to act. I then show that many who argue that it is against the current generation's interests rely on outdated and conservative analyses of renewable energy. Finally, I show how if we combine these three factors, it challenges how climate change has been presented as intractable tragedy of the commons or even more intractably as a perfect moral storm. Instead, I will conclude that is an awesome moral opportunity.

Dangerous Climate Change Is Here and Getting Increasingly Catastrophic Fast

One of the common refrains one hears when discussing climate change is that acting on climate change is something we do for future generations. There is no doubt that acting on climate change will be of significant benefits to future generations, for the effects of greenhouse gases will be with us for hundreds indeed thousands of years to come. As David Archer highlights in his overview of the lifespan of greenhouse gas emissions, a good shorthand for public discussions is that "CO^2 sticks around for hundreds of years, plus 25% that sticks around forever" (Archer, 2005) . Building on this, Gardiner (2006) argues that climate change is a resilient, seriously backloaded problem, whose negative effects are substantially deferred such that the full effects of emissions in the present won't be felt until quite far in the future.

Due to the dynamics of greenhouse gas emissions and our climate system, climate change is indeed a problem which could entail the current generation passing on great costs and harms onto future generations. However, the problem comes in when we move from that claim, to then say that acting on climate change is not in the current generation's interests but rather something we do against our own interests to benefit future generations. Recall that in their recent, *Climate Justice: An Introduction,* Dominic Roser and Christian Seidel argue that “when we reduce emissions today, it is not we who enjoy the benefits, but primarily future generations across the globe” (2017, p. 14) They see climate mitigation as “an intergenerational problem… because future generations are the main beneficiaries. Every ton of CO2 we save today will mainly protect the climate in the future. In this respect, climate mitigation can be viewed as something that we do for future generations.” (31 Roser & Seidel, 2017).

While it is true, that the more harmful effects of climate change will be visited upon future generations, where Roser and Seidel go wrong is by claiming that it will not be current generations who will enjoy the benefits. To see why, we can turn to the latest Intergovernmental Panel on Climate Change (IPCC) Special Report on 1.5°C, which was released in October 2018. As the report highlighted, barring major action in the present, the world could begin suffering some of global warming’s worst and more catastrophic consequences not in the distant future, but rather as early as 2040, much sooner than previously forecast. The report warned that the world could pass the 1.5°C mark by 2040 on current trends and that if it did so, in the words of David Wallace Wells (2018), “hundreds of millions of lives would be at stake, nearly all coral reefs would die out, wildfires and heat waves would sweep across the planet annually, and the interplay between drought and flooding and temperature would mean that the world’s food supply would become dramatically less secure”. What’s additionally notable about 2040 is that it is a time when the majority of people alive today will still be alive, and so contrary to Roser and Seidel it will indeed be the majority of us who could “enjoy the benefits” of climate action, which could entail averting the displacement of millions of people by drought and sea-level rise by 2040. The IPCC estimates the economic damage will cost $54 trillion by 2040, when babies born this year in 2018 will be old enough to graduate from college

What’s more not only would increasingly catastrophic climate change start in 2040, but every additional amount of warming that we add into the atmosphere compounds the already dangerous amounts of climate change impacts that we are already facing, particularly the world’s most vulnerable. As Abeysinghe and Huq highlight in significant detail, the evidence shows that dangerous climate change is already here, especially for the worlds' least developed countries (LDCs), for whom the effects of climate change are already bringing more "frequent and extreme climate- and weather-related disasters such as floods, cyclones, tornadoes, landslides, droughts, heatwaves, and malaria outbreaks" (Abeysinghe & Huq, 2016, p. 9). The importance of recognizing that dangerous climate change is already here is that while it is the case that many of the worst impacts of climate will be substantially deferred and fall disproportionately on future generations, each additional bit of warming also makes the current dangerous climate change worse for the current generations.

Thus, even if we are just looking at the effects of greenhouse gas emission, we have two reasons to push back against the Intergenerational Sacrifice Camp's claim that climate action is something we do just for future generations. Firstly, increasingly catastrophic climate change is set to arrive earlier than expected and well within the lifetimes of the majority of people alive today. Secondly, dangerous climate change is with us already such that each additional bit of warming worsens the dangerous impacts we already face, even if some of the worst impacts will be deferred and felt later in time, much of the emissions we release will also have effects on the present generation, especially but not only fast acting greenhouse gases like methane and nitrous oxide which have much quicker effects on the atmosphere than CO^2. When we combine the fact that dangerous climate change is already with us and getting worse the more we emit, and that increasingly catastrophic climate change will arrive sooner than expected, then we can argue, contra Roser and Seidel, that for the majority of people alive today, acting on climate change is not simply "something we do for future generations", it is also about avoiding worsening already dangerous climate change and avoiding increasingly catastrophic climate change within our lifetimes. Thus, acting on climate change is very much something that the majority of the current generation does both for future generations and for ourselves too. And when we broaden our analysis to include the non-climate related harms of fossil fuels and the benefits of getting off it, then that equation becomes even more in our own interests as the following two sections explore.

Greenhouse Parochialism

Trying to examine an issue necessarily requires drawing boundaries around our analysis to provide a manageable frame through which to understand a problem. We cannot analyze everything at once due to the overwhelming complexity involved in doing so, limitations in our understanding, and limited resources both epistemic and otherwise. However, while creating boundaries in our analyses is necessary, where we draw those boundaries can profoundly affect how we view an issue depending on what we choose to include and what we choose to leave out. When it comes to climate change, many of the dominant framings of the problem have served to obscure the nature of the problem in ways that tend to serve inaction, weigh against motivating people to support the transition away from fossil fuels, and obscure morally relevant harms from fossil fuels. One of the most problematic ways in which this has occurred has been the tendency to limit analysis of what is harmful about fossil fuels to include only the effects of greenhouse gas emissions and to bracket out the broader benefits of shifting away from fossil fuels – what I am terming greenhouse gas parochialism.

The greenhouse gas parochialism point was highlighted by George Marshall (2014) in his book *Don't Even Think About It: Why Our Brains Are Wired to Ignore Climate Change*. Therein he attempted to answer why global society has been so incapable of rising to the problem of climate change. According to Marshall, analyses and policy approaches to climate change "lost the plot" by misframing climate change as a technocratic problem solely about the reduction of greenhouse gas emissions. Instead of focusing on fossil fuels and the broader harms they bring, climate analysts focused on greenhouse gases whose effects were incredibly complex and had a major time lag before their harms played out. Marshall argues that this framing of climate change as simply about greenhouse gases was "the largest, most extraordinary, and damaging framing" when it comes to how we tackle climate change. [19]

[19] As Healy and Barry (2017) highlight, this shift in analysis away from the tailpipe up the extractive production line is missing in both the climate ethics and energy justice literature,

Such a framing has been quite persistent within the climate ethics literature. For instance, Gardiner (2011a) argues that the peculiar features of the climate change problem pose substantial obstacles to our ability to make the hard choices necessary to act on climate change. Gardiner points to several confounding factors, prominent among them is how the full effect of GHGs are substantially delayed in time. While greenhouse gases mix in the atmosphere within weeks of being emitted, it takes decades to millennia for the full effects of increased carbon dioxide to take hold, although these effects can persist and potentially worsen for hundreds and thousands of years. Furthermore, the cause and the effects of climate change are very dispersed with billions of different acts throughout time contributing to the problem and the effects playing out in complex and multi-causal ways. For Gardiner, this time-lagged and dispersed nature of the problem makes it very difficult to motivate action, particularly if the benefits of emitting greenhouse gasses in the form of energy and power are much more immediate, or so the analysis goes. Focusing on greenhouse gases, leads Gardiner to claim that "the benefits of carbon dioxide are felt primarily by the present generation, in the form of cheap energy, whereas the costs – in the form of the risk of severe and perhaps catastrophic climate – are substantially deferred to future generations" (Gardiner, 2006, p. 92). Such a framing fails to include the broader benefits of moving away from fossil fuels, and also relies on an outdated analysis of the costs of renewable energy, which are increasingly beating out fossil fuels, as we will explore in this chapter.

Similar to Gardiner, recognizing how the complex, backloaded, global and delayed nature of greenhouse gas emissions make it difficult to motivate action, philosopher Dale Jamieson (2016) in his article "Slavery, Carbon & Moral Progress" attempts to call for a new abolitionism when it comes to climate change. He argues that like abolitionists, climate campaigners should mount a moral campaign against fossil fuels. However, he argues that doing so is difficult, for unlike slavery, the moral wrongness of "carbon" is not as tangible and direct:

> Slavery is dehumanizing. It treats people as if they were mere things. A purely consequentialist critique of slavery seems to leave out an important dimension

> of its wrongness, though such an account may be plausible for carbon emissions. Climate campaigners do talk about our energy policy discounting the interests of future people and low-emitters, but carbon's assault on what it is to be a person seems less deep, direct, visceral and even true than slavery's assault on our shared notions of humanity. Another important difference is that the harms caused by slavery are direct, while those caused by carbon emissions are indirect. There is no atmosphere mediating the suffering of the slave and the institution itself. The master and slave were often in immediate proximity. This point about indirectness suggests what is perhaps the most important lesson climate campaigners can learn from the movement to abolish the Atlantic slave trade. For people to support moral change in a world in which there is a rupture in space, time, or scale between a cause and a harm, they must somehow be reconnected in people's consciousness. Abolitionism succeeded because it closed the circuit between the near and the far, the proximate and the distal - Jamieson 2016, 181.

Jamieson's call to "close the circuit between the near and the far, the proximate and the distal" is indeed an important one for climate campaigners to take to heart (see Marshall, 2014; Monbiot, 2015). However, Jamieson's piece fails to shift the framing of the climate problem in ways that would facilitate such a closing of the circuit. Instead he reinforces the same framing that promotes such a rupture, by framing the climate change issue solely in terms of "carbon" or greenhouse gases. He goes on to say that "the fundamental challenge faced by fossil fuel abolitionists is to connect the harms of climate change with the use of fossil fuels". However, rather than connecting to the broader harms of fossil fuels, he doubles down on greenhouse gas parochialism by saying that "since carbon dioxide is an invisible, odorless, tasteless gas, and climate change damages are highly mediated by nature, society, space, and time, this is a daunting task" (Jamieson, 2016, p. 181).

While Jamieson is correct in arguing that carbon's assault on what it means to be human may be less direct than that of slavery, he misses out on a much more direct connection by limiting his analysis of fossil fuels to being about carbon. If we broaden the analyses to think about the wider impacts of fossil fuels, we can see that the fossil fuel industry's assault on what it means to be human may be more direct, especially when it comes to those who are often marginalized in society, namely, people of color, indigenous communities, developing countries and low-income people the world over. If we broaden our analysis beyond greenhouse gasses alone, and look up the production chain for fossil fuels, from the tailpipe all the way to the point of extraction then we'll find the harms are much more direct. Protecting clean air, clean water, jobs and energy security are much more tangible and immediate benefits than carbon, "an invisible, odorless, tasteless gas". Likewise, the avoidance of the many harms that the fossil fuel industry has visited upon communities, whether it is through pollution, violence, intimidation, corruption, or displacement, are much more direct and tangible.

When we look to the experience of many indigenous peoples, the fossil fuel industry's extractive processes have long served to violate their rights, directly harm their people through violence, murder and intimidation, and undermine their communities and the ecosystems they rely on. For instance, in the Niger Delta, the indigenous Ogoni people were subject to significant violence and intimidation from Shell who worked with the state military and police forces to quell resistance from communities where Shell aimed to extract oil from the lands of the Ogoni communities (Bond, 2011). Shell's push for oil extraction led to the eventual execution of leaders within their community who resisted Shell's plans ultimately unsuccessfully, such that the Ogoni region is now heavily polluted, while the communities have remained relatively impoverished seeing many harms, but very few benefits from the exploitation of their land, leading to the eventual displacement of much of the community. Shell's legacy in the region has driven a descent into violence with the group Movement for Emancipation of the Niger Delta engaged in a prolonged militant campaign aimed at disabling oil production to resist the exploitation and oppression of the people of the Niger Delta and devastation of the natural environment.

The experience of the Ogoni in the Niger Delta echoes that of many indigenous communities, such as communities in Ecuador suffering human rights violations from Chevron, or Exxon's human rights abuses in Indonesia (Bond, 2011). As a result of the violence and intimidation oft-visited upon indigenous communities, their analysis of the climate problem often differs significantly from those who employ greenhouse gas parochialism. Kyle Powys Whyte, a Potawatomi philosopher in North America, details how indigenous peoples often perceive climate change not through the lens of the far and distal effects of greenhouse gas harms, but rather through "their experiences of already having been deeply harmed by the economic, industrial, and military drivers behind anthropogenic (human-caused) climate change" (2017, p. 2). Whyte catalogues how settler colonialists across the globe have long "displaced, terrorized and polluted Indigenous communities for the sake of profiting from coal oil and gas". It is for this reason that Whyte argues that indigenous climate justice movements are distinct "in putting their resistance to the nexus of colonialism, capitalism and industrialization at the vanguard of their work" (K. Whyte, 2017, p. 2). This distinctness of indigenous climate justice perspective can be partly explained by how the harms of fossil fuel extraction, both historically and presently, fall disproportionately on indigenous communities. Despite making up only 5% of the global population, 39% of oil and gas was produced on or near indigenous territory and 46% of oil and gas reserves were located on or nearby too (First Peoples Worldwide, 2013).[20]

Echoing the disproportionate impacts on indigenous communities, through a range of structural factors, the burdens and harms of pollution also fall disproportionately on low-income people and communities of color, as is widely recognized within the environmental justice literature (Bullard, 1993; Pulido, 2000; Schlosberg & Collins, 2014). For instance, recent analysis concluded that in the United States, low-income, black Americans are disproportionately exposed to toxic air pollution from the fossil fuel industry, with more than

[20] Likewise when it comes to the protection of biodiversity, "traditional indigenous territories encompass up to 22 percent of the world's land surface and they coincide with areas that hold 80 percent of the planet's biodiversity" (Sobrevila, 2008, p. 5)

1 million African Americans living within a half-mile of oil and natural gas wells, processing, transmission and storage facilities (not including oil refineries), and 6.7 million in counties with refineries, potentially exposing them to an elevated risk of cancer due to toxic air emissions (Fleischman & Franklin, 2017). As Naomi Klein (2014) points out, part of the reason the more white and affluent climate movements are starting to shed greenhouse gas parochialism and pay more attention to the harms of fossil fuel extraction, is that fossil fuel companies are increasingly beginning to extract fossil fuels in their communities too. Additionally, climate justice movements and scholars are increasingly realizing that analyses that employ greenhouse gas parochialism are incomplete and exclusionary, serving to further marginalize those who are already marginalized and harmed through the process of fossil fuel extraction and burning (Grady-Benson & Sarathy, 2016; Healy & Barry, 2017; G. A. Lenferna, 2018c; Schlosberg & Carruthers, 2010; Schlosberg & Collins, 2014).

The harms of the fossil fuel industry and the benefits of action to reduce them can be characterized along different lines as either intrinsic to the process of extracting and burning fossil fuels, or as being reflective of broader structural and systemic factors which tend to magnify or concentrate the harms of fossil fuels on some communities.[21] It is possible to address some of the structural factors and reduce harms, through the implementation or enforcement of regulations, although such regulation is often resisted by the fossil fuel industry in the name of protecting profit, so it is not clear how much such regulation can be implemented against fossil fuel industry resistance. [22] For instance, ensuring that fossil fuel projects do not violate the right to Free, Prior and Informed Consent is a central demand for indigenous peoples, given that the fossil fuel industry often violates such principles even though they are enshrined in the United Nations Declaration of the Rights of Indigenous

[21] Thanks to Carina Fourie for suggesting the introduction of a distinction like this.

[22] Leif Wenar (2016) has a long and impressive manifesto calling for stronger trading regulations to avoid blood oil and reduce the harm and violence associated with resource extraction more broadly. However, the major flaw in his analysis is that he argues we should clean up the trade in fossil fuels without paying much attention to how questions of climate change mean we cannot just make our trade of fossil fuel fairer, rather we need to move towards leaving fossil fuels in the ground if we are to meet our climate goals.

Peoples. However, while regulatory environments can help address some of the structural factors and reduce harm and violence to a certain extent, harms, such as climate, air, water and soil pollution are relatively intrinsic to the process of extracting and burning of fossil fuels and cannot be fully reduced by regulations, except those that stop fossil fuel extraction altogether. Even if the harms and pollution can be mitigated somewhat by better regulatory environments, overall fossil fuels produce more harmful impacts than a renewable energy alternative would, as I will detail later on, and to meet climate targets we need to leave fossil fuels in the ground unburnt. As such, action to reduce fossil fuels will reduce the overall amount of pollution and harms created by our energy system, even if we can improve the structural and regulatory environment in which fossil fuel operate.

The way that the harms of fossil fuels fall disproportionately on certain communities is something that is not only reflective of something intrinsic about fossil fuels themselves, but is also about the broader socio-economic-political context within which they operate. As such, a transition to a renewable energy system which does not address the broader socio-economic-political context may also place burdens disproportionately on vulnerable and marginalized communities, even though it would be creating much fewer harms and burdens. That being said, as I will explore in more detail later, the nature of fossil fuel extraction in some ways tends to magnify structural inequalities, as their means of production is typically heavily centralized, capital-intensive processes which tend to the centralization of power and resources, which in turn leads to higher potential for inequality, corruption and less democratization. Thus, renewable energy, through its more distributed and decentralized nature has significant potential, *if done correctly*, to reduce the socio-economic-political factors which tend to concentrate harms on marginalized and vulnerable communities.

Bearing in mind that the costs and harms of fossil fuels fall disproportionately on communities of color, indigenous peoples and low-income communities, let us now turn to analyzing the range of benefits that can come from reducing our dependence on fossil fuels. Let us start by considering air pollution, arguably one of the most important reasons to transition away from fossil fuels. As a recent study based on World Health Organization data reports, outdoor air pollution alone is responsible for causing 4.5 million deaths a year (Landrigan et al., 2017). A study in *Nature Climate Change* found that a global energy transition consistent with a relatively stringent climate target[23] could avoid 0.5±0.2, 1.3±0.5 and 2.2±0.8 million premature deaths per year in 2030, 2050 and 2100 respectively (West et al., 2013). The study found that globally the reduced air pollution benefits of taking action exceeded the costs of mitigating climate change. In other words, the benefits from reduced air pollution alone would be more than enough to compensate for the costs of taking action. This was particularly true in East Asia where the benefits were 10-70 times greater than the costs of mitigation.

Looking at China, the largest current greenhouse gas emitter, a recent study in *Nature Climate Change* shows that the healthcare costs saved through reducing pollution in line with its climate targets would save China upwards of $339 billion by 2030. That's enough money for the nation to meet its climate goals four times over, the study states, and the benefits increase with the increased stringency of the climate policy. Looking at even more stringent climate policy, a recent study by in The Lancet found that for China and India "the extra effort of trying to pursue the 1·5°C target instead of the 2°C target would generate a substantial net benefit in India (US$3·28–8·4 trillion) and China ($0·27–2·31 trillion)" (Markandya et al., 2018). That net benefit came from just looking at the health benefits from reduced air pollution by taking action. That both China and India can receive significant net benefits when looking at air pollution alone is immensely important, given that they are the world's first and third largest current emitters of greenhouse gasses.

[23] The study used the IPCC's RCP 4.5 scenario, which holds climate change to 2.4°C. They compared RCP 4.5 it to a reference scenario assuming intermediate economic development and population growth, and no climate policy. As even stricter climate action in line with a 1.5°C target would have even greater benefits, as was recently highlighted in the 2016 Low Carbon Monitor report, released by the United Nations Development Program and the Vulnerable Countries Forum (Low Carbon Monitor, 2016).

Air pollution tends to impact low- and middle-income countries the most, where 92 percent of pollution related deaths occur (Landrigan et al., 2017). However, air pollution benefits are also strong in developed countries. For instance, Prehoda and Pearce (2017) found that in the United States, the world's largest historic and second largest current GHG emitter, swapping out coal energy for solar would prevent 52,000 premature deaths every year – by way of comparison, as of 2014, the U.S. coal industry only employed 76,572 people in total, less people than is employed by the fast food chain Arby's (Ingraham, 2017). In addition to preventing tens of thousands of premature deaths per year, and having significant environmental benefits, Prehoda and Pearce found that making the switch to solar would be profitable when looking at energy costs alone. Additionally, a study by MIT, which assessed the interwoven effects of climate policy, air pollution, and the cost of health problems related to air pollution, showed that the benefits to human health from carbon reduction policies, when looking at just reductions in air pollution, would likely offset and then some the costs of implementing those policies in the US (T. M. Thompson, Rausch, Saari, & Selin, 2014).

More broadly, a recent study in *Nature Climate Change* found that if we acted in line with 1.5°C, instead of the weaker 2°C target, the effects of reduced air pollution alone could avoid 153 ± 43 million

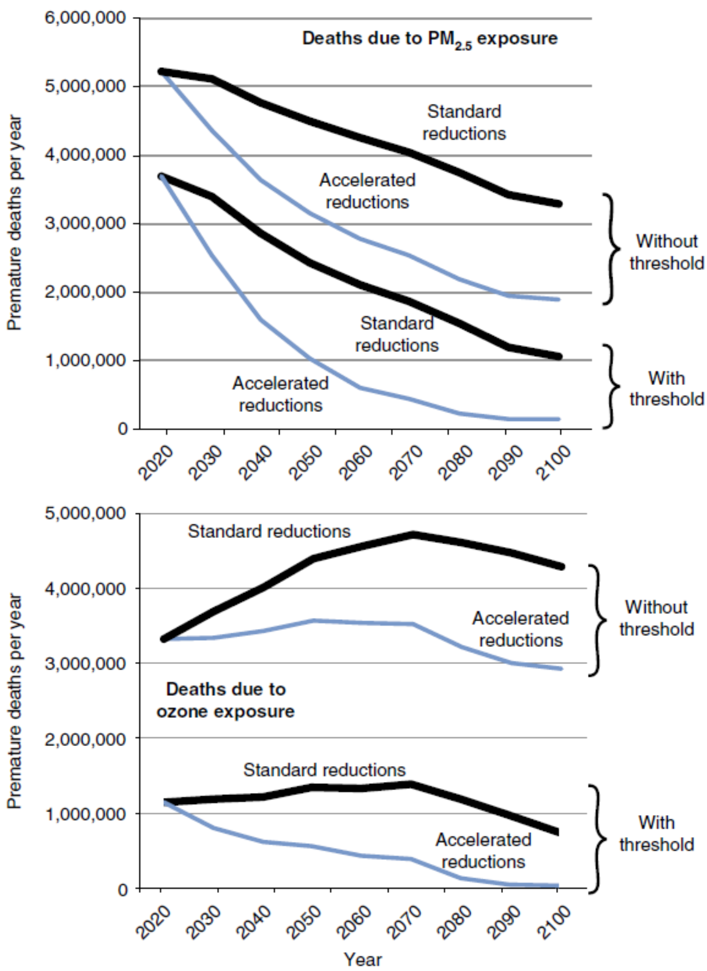


Figure 3 - Global Total annual premature deaths (all-cause) due to PM2.5 and ozone exposure (Shindell et al. 2018). Values are given for the standard scenarios (RCP2.6 and 2C) and under those with accelerated CO2 emission reductions (NoNegRCP2.6 and 1.5C).

fewer premature deaths worldwide, with ~40% occurring during the next 40 years (Shindell, Faluvegi, Seltzer, & Shindell, 2018). That number is close on triple the estimated 60 million deaths from World War II, the deadliest military conflict in history. As the above graph demonstrates, the reduction in premature deaths would begin occurring pretty much immediately, thus challenging the notion that acting on climate change is only something we do in the interests of future generations. Likewise, as the IPCC Special Report on 1.5°C summarizes, "Improved air quality resulting from projected reductions in many non-CO2 emissions provide direct and immediate population health benefits in all 1.5°C model pathways".

The Lancet Commission released a report wherein they explicitly focus on the co-benefits of acting on climate change (N. Watts et al., 2015). [24] Therein they argued that not only would climate action be good for us in the long run, but that curbing air pollution, rapidly phasing out coal, and providing access to renewable energy would have substantial and immediate gains for human health. In line with the argument I am making on the need to move beyond greenhouse gas parochialism, the authors argue that focusing on concern over human health could accelerate climate action in a way that just talking about greenhouse gases cannot. In their words, "these concepts are far more tangible and visceral than tonnes of atmospheric carbon dioxide, and are understood and prioritised across all populations irrespective of culture or development status" (N. Watts et al., 2015, p. 1862). They detail that many mitigation and adaptation responses "are 'no-regret' options, which lead to direct reductions in the burden of ill-health, enhance community resilience, alleviate poverty, and address global inequity" (1861). The report concludes that, both because of the health impacts of climate change, and the co-benefits of climate action, "tackling climate change could be the greatest global health opportunity of the 21st century".

[24] "The Lancet Commission is a body set up to map out the impacts of climate change on health, and make recommendations to improve health standards worldwide" (Pidcock, 2015).

What becomes clear from these results is that excluding the air pollution benefits of action to reduce fossil fuel dependence, leaves out one of the great moral and pragmatic motivators for why we would want to act – a motivator that is more tangible, immediate and proximate than greenhouse gases. Furthermore, the harms from air pollution, particularly for especially dirty fossil fuels like coal, are at times even greater than the climate impacts. For instance, IMF economists estimated that if we were to put a price on air pollution from coal it is often higher than that for carbon, depending on public exposure to emissions, values for mortality risk and the pollution intensity of different coal types (Parry, Veung, & Heine, 2014). This is particularly significant given that coal is the most greenhouse gas intensive fossil fuel, such that in the assessment of Oxford Economic Professor Dieter Helm, "the overwhelmingly immediate question in climate change is how to stop and then reverse the dash-for-coal, and to do it quickly" (Helm, 2012).[25] As such, recognizing the co-benefits of air pollution aligns with the most urgent and significant elements of climate action, while also providing major gains in human health which are morally valuable in and of themselves.

Next on the co-benefits agenda, is to examine the costs of fossil fuels in terms of water pollution. Thanks in large part to indigenous led resistance to pipelines such as the Dakota Access Pipeline (DAPL), the United States public is becoming increasingly aware of the connection between water pollution and fossil fuel extraction. Among factors such as indigenous rights, sovereignty, and climate change, protecting water was central to the motivations of those resisting DAPL (K. P. Whyte, 2016b). Many advocating against DAPL referred to themselves as Water Protectors and resisted the pipeline under the mantra "Mni Wiconi", Lakota for Water is Life.[26] The centrality of water has been a strong motivation for

[25] Already approximately 80% of the coal industry's listed reserves need to stay unburned if we want just a 50% chance of staying within the internationally agreed upon target of 2°C above pre-industrial averages. Even burning 20% of coal reserves is like flipping a coin with the future of the planet, so arguably even more needs to stay unburned. Despite that fact, coal companies are still investing enormous capital to expand their reserves and have increased them from 358 to 402 gigatons from 2010 to 2015.

[26] There is a movement now called the Water is Life Movement: https://www.waterislifemovement.com/

resistance to fossil fuel extraction, storage and transportation projects the world over, in the Niger Delta, the Peruvian Amazon, the Albertan Tar Sands, and many other locations.

A significant focus for the Water Protectors opposed to DAPL was the threat of pipeline spills contaminating water. The threat that pipelines posed to water is reflected in the fact that in the United States, 9 million gallons of oil have leaked from pipelines since 2010 alone (Bajak, 2016). While it is difficult to find robust data on global spill rates, the problem is of course not limited to the United States. Furthermore, beyond pipeline spills and leaks, the potential for fossil fuels to pollute water also manifests in many other ways, such as:

- oil tanker spills, such as the BP Horizon and Exxon Valdez;
- acid mine water pollution from coal mines;
- toxic metal pollution from coal power plants, which in the U.S. contribute to 72% of toxic water pollution in 2011 (Osann & Hayat, 2014);
- pollution from fracking both in terms of leaking chemicals during drilling, and water leaching from fracking tailing ponds;
- tar sands tailing pits leaching into the water (Weber, 2014);

The impacts that fossil fuel pollution has on water quality is profound and has been a central motivation for resistance to fossil fuels. Pollution, however, is not the only impact that fossil fuels have on water. In addition to water pollution, fossil fuels are also incredibly water intensive in terms of how much water is used in their extraction, refining and in the running of power plants. Looking at power production alone, we can see that fossil fuels pose a major threat to water security. For instance, CNA's Energy, Water and Climate division released two reports highlighting how "electricity generation from thermoelectric power plants is inextricably linked to water resources at nearly all stages in the power production cycle, yet this critical constraint has been largely overlooked in policy and planning"(Faeth et al., 2014,

p. iii) (Faeth et al., 2014).[27] As the world increasingly faces fresh water scarcity, this oversight will be hard to maintain, as fossil fuel power production competes for water supply with agricultural, industrial, and residential sectors. CNA warns that this competition threatens to become acute in several global regions, with the likelihood of "insurmountable" water crises within the next few decades if action is not taken. In this context, switching to renewable energy can help free up the 15% of global water use that is estimated to be used in power production (International Energy Agency, 2012), helping avert water crises in the future.

	Withdrawal	Consumption
	m^3/MWh[15]	
Coal	2.3	1.9
Coal w/CCS	4.3	3.2
NGCC	1.0	0.7
Nuclear	4.2	2.5
Wind	-	-
PV	0.1	0.1
Energy efficiency	-	-

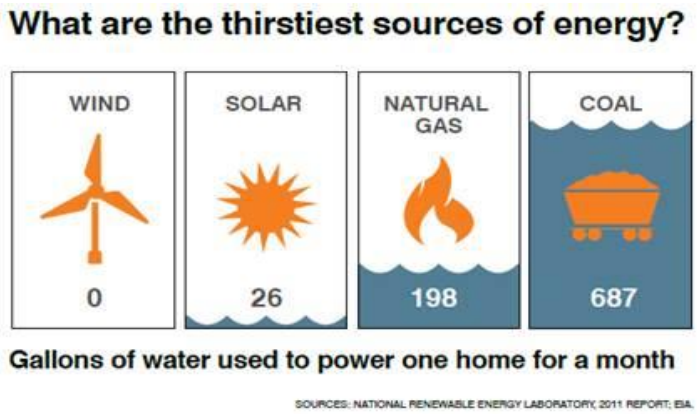


Figure 4 - Amount of Water Consumed and Withdrawn During Power Production Only
Adapted from: (Faeth & Sovacool, 2014)

As the two graphs in Figure 3 above demonstrate, switching to renewable energy provides major benefits in terms of water availability. While natural gas combined cycle (NGCC) power production may be less water intensive than other forms of fossil fuel power production, it is important to note that such figures only take into account the water used in power plants. If we look further upstream to the water used to extract fossil fuels, then natural gas, especially gas obtained through hydraulic fracturing/fracking is still highly water intensive. As life cycle analysis of shale gas wells indicates, each well requires on average approximately 4,4 million gallons of water (Jiang, Hendrickson, & Vanbriesen, 2014).[28] In comparison, analysis by Tony

[27] As the report further points out, for two technologies to reduce GHGs, Nuclear and carbon capture and sequestration (CCS), there are water penalties as opposed to savings. Due to nuclear's lower efficiency and lack of heat loss through smokestacks, and CCS's parasitic loads, these both have considerably higher cooling water requirements.

[28] Additionally if the water from fracking is left untreated it would contaminate the water with "300–3000 kg N-eq eutrophication potential, 900–23 000 kg 2,4D-eq freshwater ecotoxicity

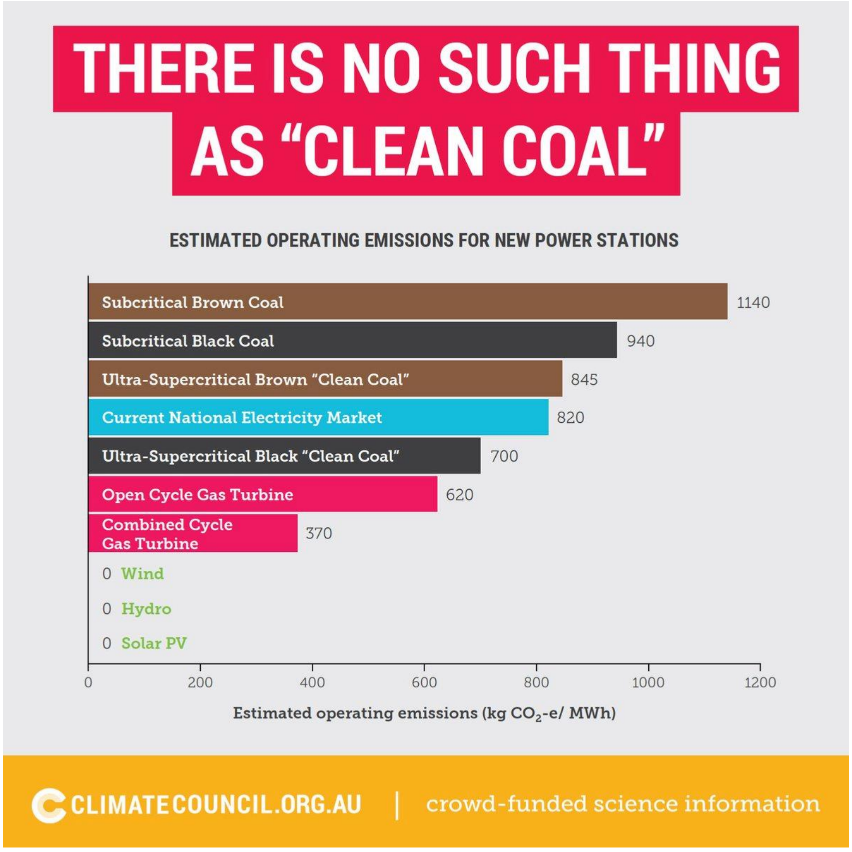
Seba (2014, p. 197) highlights, if we used solar PV or wind to meet energy needs, the U.S. would only require 2.9 million gallons of water, almost half of what it takes to frack a single well on average.

Showing the co-benefits of getting off natural gas is important, as it is often touted as a cleaner burning bridge fuel. However, advertising it as such is often reflective of a limited, misleading analysis, which examines only carbon emissions emitted at the power plant, which are half of those produced by an average coal power plant. However, when examining methane produced and leaked during the full production cycle, natural gas can be just as greenhouse gas intensive as coal depending on the rate of fugitive methane leakage from transport and extraction processes. For instance, Lord Nicholas Stern (2013) and Robert Howarth et al. (2011) estimate that at just 3% of leakage, natural gas' supposed benefits over coal is nullified. Estimates of methane leakage vary significantly, with some estimating leakage rates higher than 3% and others lower (IPCC, 2013), showing that whether natural gas is in fact cleaner for the climate than coal depends significantly on methane leakage rates.

Perhaps more importantly though, with or without significant leakage, natural gas is still much more GHG intensive than solar, wind and hydro. As such, Climate Action Tracker (2017) analysis indicates that to meet the temperature goals agreed to in Paris, we will need to phase out natural gas by 2050, if not before. As they point out, this runs contrary to the business model and plans of many in the oil and gas sector, who are expanding natural gas infrastructure and development at rates incompatible with meeting climate targets, often under the guise that natural gas is a low carbon fuel. However, while it is a lower carbon fuel relative to coal, provided it does not have leakage rates higher than 3%, it is still a high carbon

potential, 0–370 kg benzene-eq carcinogenic potential, and 2800–71 000 MT toluene-eq noncarcinogenic potential" (Jiang et al., 2014, p. 1911). The costs to treat the water to surface discharge standards range from $59,000-270,000 per well, adding significant costs to natural gas production.

fuel relative to solar, wind and other renewable technologies. As the graph alongside from the Climate Council makes clear, from a climate change perspective, while cleaner coal is better than dirtier coal, and natural gas is typically better than coal, provided leakage rates are low, neither so-called clean coal nor natural gas are really low-carbon technologies when compared to wind, solar or hydro.



Examining the water- energy nexus, we see the possibility of a virtuous or vicious cycle depending on which energy pathway the world chooses. If we stay reliant on fossil fuels, we will drive further water scarcity through climate change, and will simultaneously be locked into a form of water-intensive energy production which competes for increasingly scarce water supplies, and which also pollutes many remaining sources of water. Alternatively, if we switch to renewable energy, we will reduce the amount of water needed by energy production by several orders of magnitude, reduce water pollution, and reduce water scarcity driven by climate change. In our potentially heavily water-constrained and scarce future, a renewable energy future is vastly preferable. Conserving water through clean energy is vital for our societal functioning given how central the availability of clean water is to our health, our ecosystems, our food production, our communities, our societies, and our economies.

Considering Renewable Energy's Impacts

While it is true that renewable energy has some of its own impacts, if we examine the extent of those impacts, they are much, much smaller than that of the fossil fuel industry, and as such renewable energy remains deeply preferable despite the impacts it has. At the same time, to best ensure a just transition to renewable energy which does not create unnecessary harm and impacts, it is important to ensure renewable energy is sited and constructed in a way so as to reduce its negative impacts. In the construction of renewable energy, we should be sensitive to ecological and community impacts and do our best to cause the least negative impacts and to ensure that those impacts do not disproportionately impact particular communities.

Allow me to define what I mean by renewable energy. By renewable energy, I adhere to the following definition from Ellabban et al (2014, 749): "Renewable energies are energy sources that are continually replenished by nature and derived directly from the sun (such as thermal, photo-chemical, and photo-electric), indirectly from the sun (such as wind, hydropower, and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy). Renewable energy does not include energy resources derived from fossil fuels, waste products from fossil sources, or waste products from inorganic sources". As part of this definition, renewable energy does not include nuclear energy, which, as we will explore shortly, likely only has a very limited role to play in addressing climate change. With this definition of renewable energy in mind, let us consider how its impacts compare to that of fossil fuel energy. Let us turn to some studies that provide empirical evidence to the claim that renewable energy has much smaller impacts and is thus preferable to fossil fuel energy, as well as to supposedly clean alternatives like nuclear and "clean" coal.

One of the first comprehensive life-cycle analyses of a global switch to renewable energy sources, showed that the negative impacts of renewable energy are rather miniscule in comparison to those of fossil fuels (Gibon, Hertwich, Arvesen, Singh, & Verones, 2017).[29] For instance, Gibon et al. demonstrated that the entire process of manufacturing, setting up and operating photovoltaic panels causes less pollution than only delivering fuel to a coal-fired power plant when mining is included. They also demonstrate that the amount of land needed for a solar energy system would be about equivalent to that currently used by coal, except that for solar half of that land could be on existing rooftops. [30] Thus, solar could use half the land of coal, and unlike coal which often pollutes and fundamentally alters the landscape, solar's impact when installed on rooftops is much more benign.[31]

Of course, there are material needs for creating solar, wind and other forms of renewable energy, but often the claims that renewable energy would deplete supplies of copper, iron, and other materials are exaggerated. For instance, a life-cycle analysis of switching to renewable energy showed that only two years of current global copper and one year of iron production will suffice to build a low-carbon energy system capable of supplying the world's electricity needs in 2050 (Hertwich et al., 2015, p. 6277).[32] Another worry that is often cited is that clean energy has high indirect greenhouse gas emissions i.e. greenhouse gasses emitted in the creation of clean energy technologies. However, as Pehl et al (2017) demonstrate, renewable energy sources typically have much smaller indirect and direct greenhouse gas emissions than

[29] The researchers calculated the total environmental impact of the energy sector every year from 2010 to 2050 under two different scenarios. In the business-as-usual scenario, coal and natural gas would each supply about 30-35% of global power in 2050. In the low-carbon scenario, a mix of renewable sources would supply the majority of the world's electricity by mid-century.

[30] Similarly, when it comes to the land question, we can think about the potential for EVs and autonomous driving to reduce the need for car ownership and parking by their ability to facilitate car sharing. As Nash Islam (2016) highlights, today, the average car is parked 95% of the time, with only 5% on-the-road time, with an IBM survey reporting that, worldwide, urban drivers spend an average of 20 minutes per trip looking for parking. A University of California study found that the United States has close to a billion parking spots, which means there are roughly 4 times more parking spaces than vehicles (C. Thompson, 2016). By enabling car sharing, and autonomous vehicles, EVs can significantly reduce the need for parking, thus allowing us to unpave paradise and tear down some parking lots. The additional GHG benefits of autonomous electric vehicles are also significant. For instance, a model of city traffic deduced that emissions would be 90% lower if cars were all autonomous and electric (Greenblatt & Saxena, 2015).

[31] Technologies such as solar windows and roads, may significantly reduce the amount of land we need to use.

[32] An MIT analysis also shows that there are more than enough raw material supply to allow for battery expansion to meet clean energy growth (Chandler, 2017). However, the researchers warn that if proper planning is not undertaken, then there is a risk of some bottlenecks in the supply of certain metals.

fossil fuels, with the exception of bio-energy and hydropower, which have higher life-cycle emissions than other renewable energy with significant uncertainty surrounding just how high. Pehl et al conclude that “during the transition to clean power supply, the additional life-cycle emissions for building up wind and solar capacities are much smaller than the remaining emissions from existing fossil power plants before they can finally be decommissioned”. They conclude then that the faster the low-carbon transformation the better for reducing greenhouse gas emissions.

Just because renewable energy is much less harmful than fossil fuels, this does not provide us with carte blanche to rampantly use renewable energy without questioning the negative impacts it might have. The overall benefits of renewable energy do not excuse us from considering local negative impacts they might have and ensuring that the building of renewable energy technologies adheres as best as possible to questions of distributional justice, so that we are not concentrating the impacts of such technologies unfairly in marginalized and vulnerable communities, as has been the case under the fossil fueled regime. As Gibon et al. highlight, “power plant siting, project design and technology choice are critical issues that investors and governments should consider very carefully” (Hertwich, Arvesen, Suh, & Gibon, 2017). In addition to paying attention to the distribution of impacts in the citing of renewable energy, a broader more comprehensive approach to environmental should also pay attention to questions of procedural and recognitional justice in the citing and building of renewable energy – categories of justice I will explore further in Part C and which is discussed comprehensively in the work of David Schlosberg (2007).

Questions of environmental justice are particularly pertinent for hydropower and biomass, which if relied on heavily and not properly sited can have much more significant impacts than other forms of renewable energy. Gibon et al. demonstrate that due to the ecological impacts associated with increased land use from wide-scale adoption, biomass is potentially much more resource intensive than other forms of renewable energy. Likewise, Jakob and Steckel warn that “using large fractions of globally available arable land [for biomass] could potentially drive up food prices and hence seriously undermine food security. In addition, extensive use of biomass could also deplete groundwater reserves and as a result exacerbate already prevailing water scarcities" (Jakob & Steckel, 2016, p. 7). Additionally, as Booth (2012) highlights, "burning biofuels releases ultra-fine particulates, even more dangerous than coal-fired particulates (Booth, 2012)." Gibon et al conclude that biomass energy only becomes environmentally favorable relative to fossil fuels when used with carbon capture and storage included and/or when sourced in ways that do not have high biodiversity and ecological impacts. Similarly, realizing the impacts of biomass, the UK Committee on Climate Change (2018) recommends phasing out biomass use in cars and vans and using it only where there are few alternatives such as in aviation fuels, or conditional on much tougher regulations for lifecycle greenhouse gas emissions in conjunction with CCS.

Hydropower also has a range of potentially problematic impacts, which should lead us to be very sensitive to questions of environmental justice if and when we construct hydro power, and as best as possible reduce our reliance on ecologically and socially problematic hydropower projects. As David Suzuki (2018) explores, large hydropower projects often involve: the displacement of communities, especially indigenous communities; the inundation of ecologically sensitive and valuable areas; and impacts on the broader ecological systems, especially rivers. The inundation of ecosystems for dam construction in turn leads to the creation of methane gas from the plant material decomposing at the bottom of the dam, and additionally there is a large amount of other greenhouse gasses created in the manufacture of steel and concrete for dams. While there is uncertainty about just how much methane is released, and much of it depends on how and where the dam is constructed and sited, recent studies suggest that the amount is quite high, such that comparative to other renewable energy sources dams may be less favorable, albeit still more favorable compared to fossil energy (Deemer et al., 2016).

Given the increased impacts of hydropower and biomass relative to other renewable energy sources, a just transition away from fossil fuels should focus on reducing the need for problematic hydropower and biomass projects. Fortunately, a low-carbon transition with reduced reliance on hydro and biomass is increasingly possible due to rapid advances in solar and wind. For instance, a study by researchers at Lappeenranta University of Technology showed that "a global transition to 100% renewable electricity is feasible... and more cost effective than the existing system, which is largely based on fossil fuels and nuclear energy" (Ram et al., 2017) . Their report demonstrated that due to the rapidly falling costs of solar, wind and storage, the total electricity mix in 2050 globally could be: solar PV with 69%; wind energy 18%; hydropower 8% (compared to 16% today); and bioenergy at just 2%. Thus, advancements in technology allow us to avoid the need to rely heavily on problematic bioenergy and hydropower projects.

While nuclear power and fossil fuel generation coupled with carbon capture and storage technologies have often featured as significant parts of scenarios for a low carbon future, recent trends in technological developments and the economic, social and ecological costs of these technologies suggest they will play much less of a role in a low carbon future. As a study by Eyre et al highlights, "renewables, in particular wind and solar, are now almost certain to be the major contributors to low-carbon electricity supply. They are abundant resources and the lowest cost low-carbon options almost everywhere [4,5]. Nuclear power and fossil fuel generation with carbon capture and storage (CCS) have featured prominently in earlier discussion about electricity decarbonization, including the IPCC AR5 report [1]. However, it is increasingly clear that they cannot compete on cost with renewables, that they have other non-carbon environmental risks, and their development and build times are long. They are less suitable supply options in scenarios requiring very rapid decarbonization." (Eyre, Darby, Grünewald, Mckenna, & Ford, 2018, p. 1)

The latest IPCC report echoes a similar note for the prospects of nuclear energy. It admits that nuclear has some benefits, "comparative risk assessment shows health risks are low per unit of electricity production and land requirement is lower than that of other power sources". However, it also points to major problems with nuclear saying that "the current time-lag between the decision date and the commissioning of plants is observed to be 10-19 years". Such long time frames mean that it can only have a very limited role in the urgent near-term emission reductions required. Making prospects even more dim for nuclear, the economics of nuclear suggest that it will play even less of a role, as nuclear is proving to be prohibitively expensive across the world compared to renewable energy alternatives. As the IPCC notes, nuclear power provides an example of "where real-world costs have been higher than anticipated ... while solar PV is an example where real-world costs have been lower". As Jim Green (2018) notes in his analysis of the IPCC report, nearly all of the scenarios presented in the IPCC report envisage a decline in nuclear power generation to 2030, and while some scenarios suggest an uptick between 2030 and 2050, this depends on large assumptions about cost decline in nuclear which may not materialize, particularly as renewable energy costs continue to rapidly decline, while nuclear is mostly getting more expensive.

While the ecological and health impacts of nuclear are much less than fossil fuel energy, they are not negligible. As Green points out, the long-term storage of nuclear waste is a politically fraught subject, with no large-scale long-term storage operational worldwide. Furthermore, as IPCC SR1.5 points out, there are several studies finding an increased incidence of childhood leukemia in populations living within five kilometers of nuclear power plants. Additionally, as Kristin Schrader-Frechette highlights, when we consider the full life-cycle impacts of nuclear power, then the greenhouse gas emissions are significantly higher. Based on a number of studies she estimates that life-cycle carbon-equivalent nuclear emissions while still significantly less than fossil energy are roughly nine times greater than those from wind, and more than four times higher than those from solar-PV" (Shrader-Frechette, 2017, p. 396).

What this speaks to is that nuclear energy that is already constructed, provides low-carbon power with much smaller ecological and health risks compared to fossil fuel energy, but is much more costly, slow to construct, and ecologically damaging than renewable energy. As such, it is problematic to do as Germany did, which was to prematurely shut down nuclear power and replace it predominately with coal. The result was much higher health, ecological and climate change impacts from increased coal use. Additionally, much of the ecological and economic costs from nuclear had already been sunk in the construction of the plants, as such Germany got rid of a relatively inexpensive source of low-carbon, less negatively impactful energy in favor of a much more harmful one, at least until they replace coal with renewable energy. Thus, retiring nuclear plants early and replacing them with fossil energy seems ethically problematic given that it will result in more harms. However, looking forward, constructing new nuclear, barring major advances in the industry, does not seem like a particularly promising route to end the fossil fuel era due to long construction times, high costs, higher carbon emissions and higher ecological impacts than renewables, along with low public acceptance.

As for those who argue that we should rely heavily on carbon capture and storage as a way of producing so-called “clean coal” or “clean” fossil gas, evidence from carbon capture and storage for fossil fuel power plants (CCS-FF) does not provide much hope, and its ecological and social impacts are quite significant. While CCS-FF might work on a limited scale as an expensive process to remove some carbon from coal emissions, it does not eliminate the other harmful consequences of coal extraction, transport and combustion: air/soil/water pollution, ecosystem disruption and related harm to public health. Further, because CCS requires 15-30% more coal to achieve the same energy output as non-CCS methods, it would increase the negative impacts of coal that are not due to carbon emissions (e.g. mercury and arsenic release). In contrast to renewable energy, CCS would also use enormous amounts of water in a world where water is an increasingly scarce resource. As John Rodriguez (2014) points out: the ‘average’ Sydney household uses around 20 kW·hr of energy per day and if this electricity comes from a coal-fired plant, the equivalent of more than 2,800 bottles of water would be used per household in just one day, a figure which would be increased 15-30% by CCS’s parasitic load.

Even at its current small scale, CCS is already causing seismic activity and has significant leakage problems, both of which would drastically worsen if CCS were scaled up enough to play a meaningful role in meeting energy demands (National Academy of Sciences, 2015). To quote research from Cusack et al, "the possibility of leakage of CO_2 from storage could seriously compromise the strategy's long-term potential [because] achieving the same long-term climate benefits as low-emission abatement scenarios would require leakage rates from storage sites of less than 1% per thousand years… CCS methods are also associated with the risk of accidental leakage of concentrated liquid CO_2, which displaces oxygen and can lead to human suffocation if the gas reaches high concentrations … Further, storage of CO_2 in the deep ocean could lead to extreme ocean acidification and high levels of dissolved CO_2 in the water column" (Cusack et al., 2014, p. 284). Additionally, CCS-FF uses up suitable geological storage areas which might be needed for other forms of carbon capture and storage which might be required to get the world to net zero emissions, as explored in Chapter 11.

Even if we disregard its harmful impacts, CCS-FF is more expensive than renewable energy. As the next section will explore, across the world renewable energy is cost-competitive or cheaper than coal or natural gas. As such, renewable energy will be even more cost-competitive against CCS-FF, as CCS adds significant costs onto power production. Benson et al. (2012) estimate that CCS would increase the cost of electricity by 50-100% due to large capital costs and parasitic energy requirements of between 15-30% of a power plant's electricity output. As the costs of renewable energy are rapidly declining, fossil fuels will be increasingly priced out of the market, add in CCS-FF and fossil fuel energy becomes prohibitively expensive. While some will continue to point to the need for more research and subsidies for CCS to help it take off, already we have dedicated significant amounts of investment to it, which has not paid off, such that CCS looks highly unlikely play a meaningful role in a low carbon future.

Even if clean coal wasn't expensive and harmful, it is highly doubtful we would be able to bring it to scale in time. As a recent National Academy of Science (NAS) report points out, "the current scale of CCS is on the order of one megaton of CO_2 per year, with four large-scale CCS projects in place totaling ~50 MtCO2 sequestered and demonstrated with monitoring sufficient to ensure the efficacy of the injected CO_2" (National Academy of Sciences, 2015, p.

62). However, the IEA CCS Roadmap shows that for CCS to comprise just 17% of desired CO_2 mitigation, it would need to be increased by more than several orders of magnitude--from a few MtCO2/yr to 7 GtCO2/yr (1 Mt = 0.001 Gt). With the development of CCS-FF stalling year after year, it is developing at a rate 100 times slower than what would be needed for it to play a meaningful role in mitigation efforts, according to a study by Haszeldine et al (2018). To quote Cleveland and Reibstein (2015, p. 32) "the time to scale suggests that [CCS] will not play a significant role in the short effort to reduce emissions that must begin immediately. Energy efficiency and low-carbon energy are viable today and have reasonable costs. Their widespread deployment must not in any way be slowed by assuming that CCS is a silver bullet for the climate challenge".[33]

Of course, the energy that has the least impact is the energy we do not use. As such, where possible societies should pursue energy and resource efficiency and energy and resource demand reductions measures to reduce the need for additional energy and resources in the first place. Energy efficiency measures hold great potential to help wean us off fossil fuels. For instance, the IEA's Energy Efficiency (2018) report showed that energy efficiency measures alone could peak global emissions and reduce energy bills by $500 billion, and by 2040 energy efficiency gains alone could allow the world to extract twice as much economic value from the energy it uses compared to today. As world renowned energy expert Amory Lovins (2008) argues, energy efficiency is the "world's biggest untapped energy source", and "the largest, cheapest, safest, cleanest, fastest way to provide energy services" . His most recent estimates show that the IEA's estimates of energy efficiency's potential are deeply conservative (Lovins, 2018). Drawing on a range of empirical evidence, he shows that by pursuing more integrative

[33] An interesting proposal by Myles Allen (2013) is to pass laws requiring fossil fuel producers to capture and sequester a rising proportion of the carbon dioxide emissions that the fuels produce. Such a proposal in my estimation would lead to the rapid decline of fossil fuel power, given the additional costs associated with CCS and the difficulties associated with the technology. I do not altogether foreclose the possibility that such a law might lead to significant innovation within the sector. However, as things currently stand the CCS-FF is far behind where it needs to be to make a meaningful difference, and given the additional costs it faces, it is unlikely to play a major role in the future even if Allen's law was passed, which I do not see much a chance of happening. For a comprehensive critique of Allen's proposal see (Skuce, 2013)

design the potential for energy efficiency is severalfold larger and cheaper than had previously been thought. As such, Lovins points out that our ability to meet the Paris Climate Agreement targets could be achieved much more profitably and efficiently than is often assumed. Thus, making our energy use more efficient and reducing the amount of energy we use, is one of the best and most equitable tools we have to ensure we end the fossil fuel era.

In sum, when looking at the impacts of different energy production, it becomes clear that CCS-FF and nuclear are not very promising options for a renewable energy future given their costs, technical challenges, ecological and social impacts, and prohibitively long-time frames to build. Biomass and hydropower also have significant ecological and social impacts which should be factored in to decisions about when, whether, where and how we build them. Fortunately, other renewable energy sources such as solar, wind, geothermal and tidal power can do almost all the heavy lifting we will need for a renewable energy future, such that we do not need to rely heavily on problematic renewable energy sources like hydro and biomass, or on nuclear or CCS-FF. Coupled with energy efficiency and demand reduction measures, renewable energies such as solar, wind, geothermal and tidal power have a great potential to ensure a low carbon transition which greatly reduce the harmful social and ecological impacts of the current fossil fueled regime.

Broader Non-Ecological Benefits of Renewable Energy

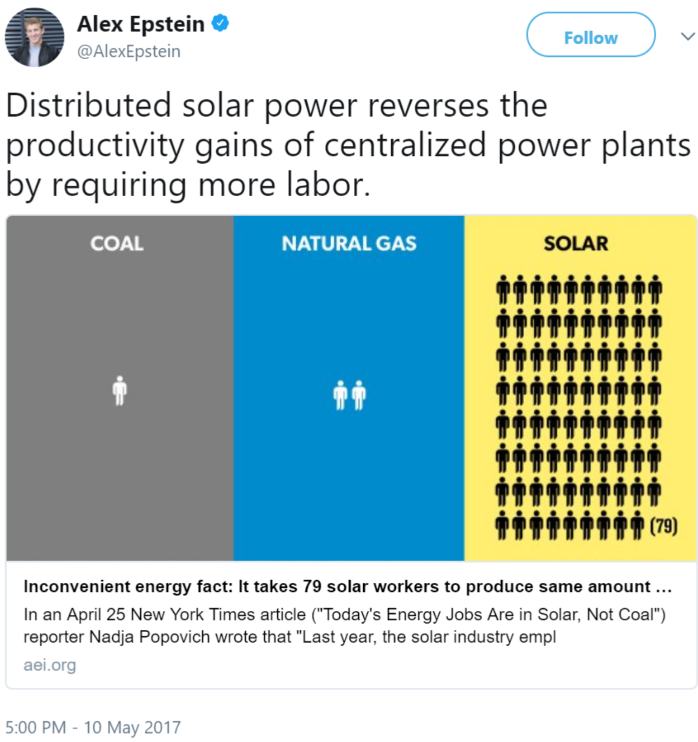
Ecological benefits, such as clean air and water, are arguably some of the most important benefits of reducing our dependence on fossil fuels. There are, however, a range of other benefits worth considering, such as reducing some of the other social costs associated with extracting fossil fuels. These include, for instance, the military costs associated with ensuring that fossil fuels can be extracted. Trillions of dollars have been spent and countless lives lost securing fossil fuel interests through wars the world over. The U.S. military regime, for instance, spends hundreds of billions each year, and its seemingly perpetual warfare arguably exists in a significant way to secure access to fossil fuel resources (Muttitt, 2012). According to Kristin Shrader-Frechette, the United States imports more than 60% of the oil it uses, and it has spent billions of dollars, many lives, and military force to try to secure its oil imports. In the words of Noam Chomsky, "it was pretty obvious that [the U.S] invaded Iraq not because of [their] love of democracy but because [it is one of the largest sources] of oil in the world and is right in the middle of [a] major energy-producing region" (2013, 55). Shrader-Frechette highlights that not counting losses of human lives, "the direct costs of the Iraq War have been about $100 billion/year, equivalent to about $100 for each barrel of oil imported by the United States from the Persian Gulf region. Thus, economists say the real price of gas is about $13 per gallon, just to offset the cost of the Iraq War" (Shrader-Frechette, 2017, p. 392). By countries increasingly producing their own renewable energy and becoming less reliant on fossil fuel resources, we can reduce the need for such interventionist wars aimed at securing fossil fuel interests.

Relatedly, we should consider how fossil fuels contribute to the corrupting, undemocratizing and undermining of governments the world over by fossil fuel interests (cf. McQuaig, 2006). We can look to how: U.S. democracy is being subverted by fossil fuel interests among other corporations who are turning it into a corporatocracy; the Russian government being run by oil oligarchs; Saudi Arabia being run by oppressive oil sheiks; Australia's government being dominated by coal interests; petrostates like Venezuela and Iran; and corrupted government's like those of Nigeria who have violently oppressed resistance to companies such as Shell. The fossil fuel industry through its centralizations of power and capital has undermined the democratic functioning of governments across the world, with some notable exceptions such as Norway. Recognizing how fossil fuel interests tend to corrupt, a renewable energy future can also help liberate people from oppressive and powerful fossil fuel regimes and interests, and to reclaim democracy and ensure a more democratic and decentralized energy future.

Averting these social, political and military costs associated with fossil fuels, and instead becoming more energy independent should be one of the major driving factors behind climate action, and for some it already is. For instance, according to Mathews and Tan (2014), China's incredible push for renewable energy has been driven in large part to ensure energy security for China, thus ensuring less reliance on unstable and problematic fossil fuel regimes. Other more democratic leaders are recognizing this potential too, and many are seeing renewable energy as a pathway to overcome histories of inequitable political patronage and corruption, as this quote from the members of the Africa Progress Panel demonstrates:

> "For too long, Africa's leaders have been content to oversee highly centralized energy systems designed to benefit the rich and bypass the poor. Power utilities have been centres of political patronage and corruption. The time has come to revamp Africa's creaking energy infrastructure, while riding the wave of low-carbon innovation that is transforming energy systems around the world. Africa cannot afford to stand on the sidelines of the renewable energy revolution. It can play its part in this revolution and tackle the challenges of transitioning away from fossil fuels" (Africa Progress Panel, 2011)

To put the final nail in the coffin of climate inaction, significant amounts of evidence show there is a great net gain in job creation through the switch to a renewable economy, and the jobs gained, furthermore, are healthier and more environmentally benign. For instance, Pollin et al. (2009) found that more jobs would be created at more than a 3-1 margin for every $1 million invested in renewable energy as compared to the fossil fuel industry. Additionally, as we will explore in more detail in the coming section, thanks to incredible advances in renewable energy, switching away from fossil fuels to renewable energy can lead to significant increases in economic growth.



There is no small irony in fossil fuel apologists such Alex Epstein, who have long defended the fossil fuel industry as the economic engine of job creation, now complaining that renewable energy reverses "productivity gains" from centralized fossil fuel power plants by requiring more labor i.e. creating many more jobs than the fossil fuel industry. Despite being more labor intensive though, renewable energy is still proving more cost effective than fossil fuels, as the following section details.

However, while renewable energy does create more jobs overall, it is important not to lose sight of the fact that the jobs that are created are not necessarily in the same geographical regions as those where fossil fuel industry and other carbon intensive jobs may be lost. Additionally, many fossil fuel communities may be relatively geographically or economically isolated such that they do not have many alternative economic opportunities. This is often compounded by the fossil fuel industry actively discouraging and even fighting off alternative engines of economic growth in communities dependent on fossil fuels, so as to keep workers and communities dependent on and thus defending fossil fuel interests (cf. Bonfiglio, 2017). This reality underpins the need for a meaningful just transition for laborers who stand to lose their jobs in the transition and who cannot easily find alternative livelihoods to replace the ones that are lost as we transition away from fossil fuels.

Bearing in mind the need to ensure a just transition, what this section on greenhouse gas parochialism has been able to demonstrate is that the Intergenerational Sacrifice camp's claim that "climate mitigation can be viewed as something that we do for future generations" misrepresents how action to reduce fossil fuels is also in our own generation's interest. It is something we should be doing for this generation to protect human health, our air, water and ecological integrity, to create more jobs and a more robust economy, and to reduce the social, political, military, corruption, and human life costs associated with securing fossil fuels. Thus, while we have a strong intergenerational obligation to reduce greenhouse gas emissions, when we look beyond greenhouse gas parochialism, the current generation would benefit greatly from acting on climate, especially when it comes to reducing fossil fuel use. While the transition away from fossil fuels will not happen overnight and needs to be just, the sooner we begin the transition the sooner we will see benefits.

To conclude this section, GHG emissions are understandably treated as central to an analysis of climate change. Indeed, transitioning away fossil fuels is the sine qua non of climate action, as fossil fuels are by far the largest contributor of greenhouse gas emissions and the amount of fossil fuel reserves collectively owned is several times more than we can afford to burn to meet the targets set out in the Paris Climate Agreements. However, if we only look at GHGs in our analysis we miss many of the most important reasons to take action to reduce our dependence on fossil fuels. If instead we treat greenhouse gas emissions as only one of the many harmful symptoms of a deeply veracious, harmful, extractive, and exploitative process of providing energy through fossil fuels, we will see that the benefits of taking action are much more substantial, immediate and tangible than those of the "invisible, odorless, tasteless gas" that is carbon dioxide. As such, when looking at reducing fossil fuel dependence, we can reframe the issue, and think of it not only as a crisis where we act in the name of future generations. Instead, it is one of the truly great opportunities we have to rebuild our energy systems so as to avoid substantial harms associated with the current system and create a better world. While doing so does come with some costs, it provides both current and future generation with immense benefits that vastly outweigh those costs. And those benefits are even greater when we consider the rapid developments in renewable energy currently occurring.

Contesting Outdated and Conservative Renewable Energy Analysis

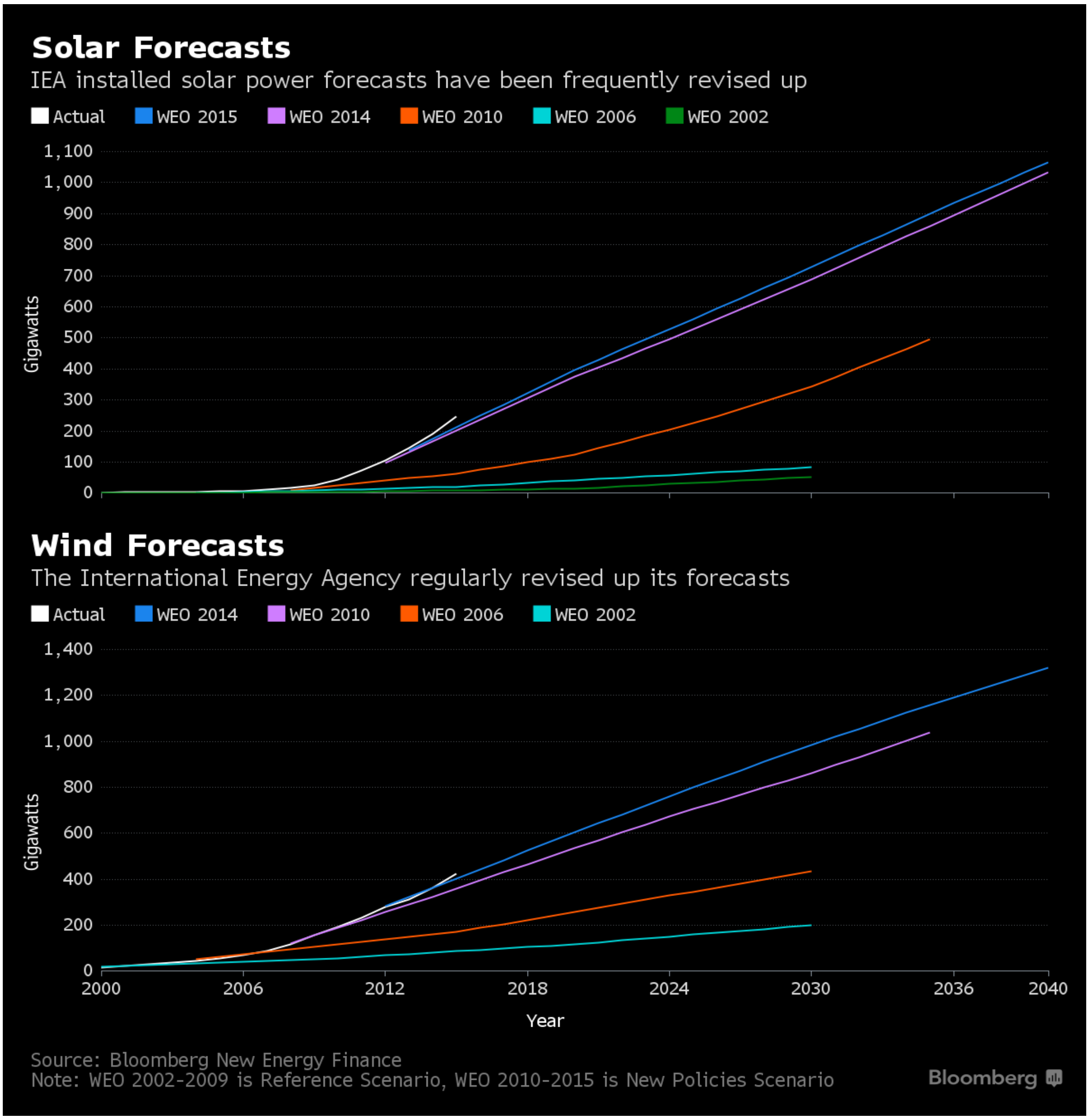
In the words of Henry Shue, "one of the principal ways in which scholars make themselves irrelevant to society's choices is by continuing to repeat old formulations of moral and political issues and to go back over the same aspects of problems without noticing that in fact the world has moved on and the problems have evolved" (Shue, 2016, p. 65). While Shue mentioned this in relation to the use of discounting in climate economics, a similar insight can be applied to the realm of energy and climate. In this realm it is almost par for the course to have an outdated and conservative analysis of just how fast renewable energy is becoming affordable. Those who are regarded as the typical energy experts have consistently underestimated renewable energy. Even the most optimistic are being consistently proven too pessimistic. For example, Greenpeace who was said to have wildly optimistic forecasts for renewable energy, ended up significantly underestimating the speed of the renewable energy transition in their forecasts (Ash, 2015). Indeed, the advances in renewable energy are moving so fast that, in the words of NRG CEO David Crane, *"if you evaluated rooftop solar a year ago, or even three months ago, you are way out of date"* (in Seba p. 19). The same can be said of much of the renewable energy sector, including wind, batteries, and electric vehicle technologies as this section will explore.

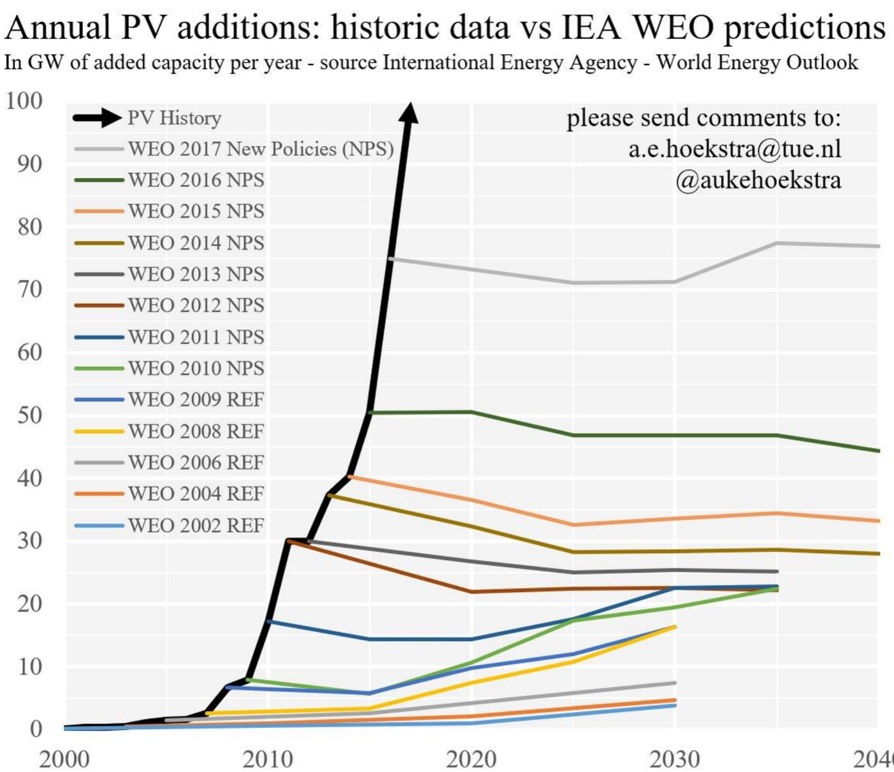
Given that even many of the energy experts are underestimating renewable energy, it is understandable that philosophers sometimes still repeat the refrain that renewable energy is expensive, whereas fossil fuels provide cheap energy. However, that reality is increasingly being flipped on its head, and so our analyses must adapt to this rapidly changing landscape. No longer is it the case, as Fossil Fuel Apologists claim, that fossil fuels are the cheapest and more reliable energy source to fuel development (Epstein, 2013; Lomborg, 2001). Such claims have been used to bolster fossil fuel PR campaigns that fossil fuels are the answer to global development, and are echoed by corrupted politicians in bed with the fossil fuel industry like Australia's Former Prime Minister Tony Abbott and President Donald Trump who argue that "coal is good for humanity" and will spur on development (Atkin, 2017; Ryall, 2014). Far from being the cheapest fuel for propelling development, coal is increasingly becoming so expensive that in the words of University of New South Wales Professor Martin Green, the Director of the Australian Centre for Advanced Photovoltaics, burning coal to generate electricity in today's era of cheap power from the sun makes as about as much economic sense as "burning dollar notes" (Vorrath, 2017).

Despite the vast advances in renewable energy, many scholars do not update their analyses and simply continue to use outdated analyses to argue that a rapid transition away from fossil fuels will be prohibitively expensive, or impose significant costs on us. The problem with them doing so is not, as the earlier Shue quote suggests, that these scholars are simply making themselves irrelevant to society by repeating outdated analysis. Instead the problem is that their continued influence serves to inhibit our ability to make the necessary transition away from fossil fuels. Indeed, recognition of the power of outdated analyses to stifle renewable energy progress is a central strategy of fossil fuel companies. Companies like Shell, Exxon and BP, use conservative analyses of renewable energy, which exaggerate its costs and wildly underestimate its potential, in order to try persuade the general public of the continued need for fossil fuels (Muttitt, 2017a). Their models simultaneously drastically downplay the challenges and problems facing fossil fuels, instead projecting its dominance long into the future. They often do this in rather duplicitous ways too, whereby in PR statements they claim to support the Paris Agreements and other climate action, while basing their business models and plans on their own self-serving outlooks which see the world pushing way past the Paris Agreements.

Fossil fuel industry energy outlooks and those of sympathetic agencies, such as the International Energy Agency, help to control energy narratives, and the policies and public understanding surrounding them. Their narratives make a fossil-fueled future seem inevitable, and a renewable energy future seem like unrealistic whimsy, even though the opposite is becoming increasingly true. The fossil fuel industry and their polluting allies then lobby aggressively, spending hundreds of millions against any policies that would challenge their dominance in the future or allow us to meet the Paris Climate Agreements targets, as has been evidenced time and time again. For instance, in the 2018 U.S. mid-term elections, the fossil fuel industry spent over $100 million spreading misinformation, undermining demagoguery, and/or propaganda to squash a handful of citizen initiatives aimed at putting in place modest climate policies (Sirota, 2018).

Challenging false energy narratives, and the powers it serves, this section aims to provide a few empirical counterpoints to demonstrate that a better, cleaner world is not only possible, it is also potentially more affordable and prosperous. Given the rate of development in renewable energy, my analysis will also soon be outdated, if it is not already, but if the history of renewable energy is to serve as a guide, it will likely be outdated in such a way that I will have underestimated the potential of renewable energy technologies to help us rapidly transition away from fossil fuels. On the note of underestimating renewable energy, let us begin by looking at forecasts from the International Energy Agency (IEA) about the potential costs of a renewable energy transition. It is worth taking their forecasts with a large pinch of salt. As many commentators have noted, and the below graphs demonstrate, the IEA has consistently underestimated the potential of renewable energy (Muttitt, 2017b; D. Roberts, 2015a; Shankleman, 2016). Almost every year the IEA underestimates renewable energy so badly that if I'd consistently bet my measly graduate student stipend against them I could well have become a millionaire by now. Despite this remarkable tendency to underestimate renewable energy, the IEA's analyses have long indicated that a renewable energy transition in line with the Paris Agreement would be profitable and prosperous.





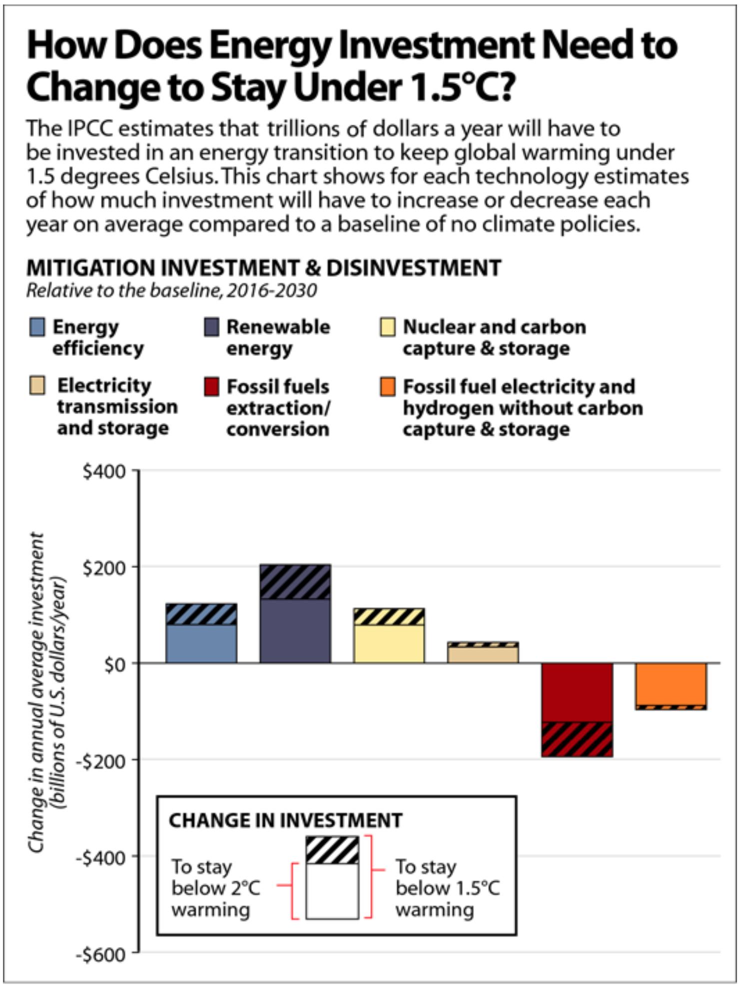
Back in 2014, the

International Energy Agency (IEA) estimated that transitioning the global energy system in order to keep warming to 2°C will result in net savings on fuel of $71 trillion by 2050. According to the IEA, by 2050 $44 trillion in additional investment would be needed to decarbonize the energy system in line with its 2-degree scenario (2DS). While that might seem like a large sum of money it is important that we consider two things. Firstly, the amount is relatively small compared to the amount of capital available in the global economy as it represents less than 1% of global GDP in that period. It is also less than would be saved in government revenue by eliminating fossil fuel subsidies which would, when excluding externalities, add up to over $100 trillion over the same period, based on IMF statistics (Clements et al., 2013). Secondly, the costs of the initial investment would be more than made up by the over $115 trillion in fuel savings that the IEA estimates would be gained by implementing such a policy. In total, achieving the 2°C would result in net savings on fuel of $71 trillion. [34] Thus, if we do not act, by investing 1% of global GDP into renewable energy, we will see additional fuel costs of $71 trillion by 2050 and if we continue to subsidize fossil fuels, we will also waste about $100 trillion in government revenue that could have been used elsewhere on social services like health and education.[35]

The IEA is yet to produce scenarios consistent with meeting the 1.5°C target, but for this we can turn to the IPCC who latest report shows that in order to meet the 1.5°C target, the world will have to invest an average of around $3.5 trillion a year over the next three decades in transforming its energy supply systems. Much of that investment is money that would be spent on energy systems anyway, with only $0.5 trillion of that $3.5 trillion being additional to what might have been spent for a 2°C scenario (IPCC SR1.5, Chapter 4). Due to a relatively limited literature with significant gaps, the IPCC did not assess the total mitigation costs of the economy and benefits of transitioning in line with 1.5°C (SPM p.18). However, extrapolating

[34] Even with a 10% discount rate, the net savings add up to more than $5 trillion.
[35] Even if the 1% GDP investment in clean energy was simply a sunk cost, providing no returns on investment, which is it is not, the sunk cost would be a small one relatively speaking. As the Stern Report demonstrated, diverting 1% away from the global economy would mean that it would take world economy would take roughly an additional six months to reach the level of income it would otherwise reach by 2050.

from the IEA results on 2°C, the fuel savings from moving towards a renewable energy future and from reducing fossil fuel subsidies could more than compensate for the additional $0.5 trillion needed to move towards 1.5°C, with tens of trillions of dollars in savings left over, even without considering externalities, co-benefits or climate impacts. Given that the costs of renewable energy continue to fall well below the projections of the IEA, those figures should furthermore be much more favorable towards a renewable energy future.



SOURCE: IPCC PAUL HORN / InsideClimate News

For those who worry about energy access, Part C will deal more with the intersection of poverty and climate justice, but here I briefly make a few remarks about how renewable energy can help bolster energy access. Firstly, across Africa and India, IEA estimates suggests that high renewable energy penetration could result in significant costs saving and higher energy access compared to the fossil fueled status quo (CTI, 2014a; IEA, 2014a; G. A. Lenferna, 2016b). Those benefits furthermore, are not only distant benefits to be had by 2050, but rather many of the benefits are near-term and in the present. For instance, in my home country South Africa, studies by the Centre for Scientific and Industrial Research (CSIR) has shown that in 2015 wind was already providing energy 40% cheaper than coal, such that wind energy had produced a net saving for the country of R1.8 billion in the first half of 2015 (Calitz et al., 2015). Collectively wind and solar saved R4 billion in energy costs from just January to June in 2015.

A more recent study by the CSIR estimates that South Africa could radically cut its energy costs if it aims for a 70% renewable energy share by 2040 (Wright, Bischof-Niemz, Calitz, & Mushwana, 2016). The study concludes that: “avoiding CO_2 emissions and least-cost is not a trade-off anymore. South Africa can de-carbonise its electricity sector at negative carbon-avoidance cost.” In other words, decarbonizing the electricity sector is more profitable than the fossil fueled status quo. More broadly, a recent study used state-of-the-art Integrated Assessment Models to show that across the entire African continent “an almost complete shift towards renewable energy by 2050, sourced largely from solar, wind and hydro power is feasible and affordable” (Schwerhoff & Sy, 2018).

This trend of renewable energy undercutting fossil fuels is happening across the world. One of the few relatively successful renewable energy predictions was by Deutsche Bank, and it predicted back in 2015 that solar would reach grid parity in 80% of global markets by 2017 (Parkinson, 2017). Already, back in December 2016, solar was the cheapest form of energy in 60 emerging markets across the globe (Nield, 2016). Now, in 2018, leading energy analyst Bloomberg New Energy Finance reports that the unsubsidized cost of wind and solar now beats coal as the cheapest form of bulk generation in all major economies except Japan (Parkinson, 2018). Likewise, the respected financial firm Lazard most recent analysis found that North America has “reached an inflection point where, in some cases, it is more cost effective to build and operate new alternative energy projects than to maintain existing conventional generation plants” (Lazard, 2018). Indeed, wind and solar technologies are now as cheap, or even cheaper, than existing coal, gas and nuclear power plants – even compared to existing and fully-depreciated fossil fuel generators - and new solar and wind have a huge cost advantage compared to new coal, gas or nuclear power, even without including considerations of externalities.

In Colorado, building new renewable power plus battery storage is now cheaper than running old coal plants (Gray & Watson 2018). In Indiana, building renewable energy is cheaper than keeping existing coal plants open, according to plans from one utility in the state (Bade, 2018).

And in India, best-in-class solar and wind plants are now half the cost of new coal plants (Parkinson, 2018). With the costs continuing to come down, renewable energy is likely to dominate India's future and has led to the cancellations of 84% of proposed coal power plants in India (Buckley, 2018). In addition to solar's meteoric rise, wind power is already one of the cheapest energy sources across the globe, and its costs are also set to continue to decline (Griffin, 2017; Mearian, 2017). As a UNEP and Bloomberg New Energy Finance report highlight, across the world solar and wind are becoming the cheapest source for new electric power, sometimes by a factor of two (McCrone, Moslener, D'Estais, & Grünig, 2017). With prices continuing to drop at a dramatic rate they are set to increasingly undercut both new and existing fossil fuels and not just coal, but also gas.

As Ramez Naam (2013) details, we can expect continued price reductions in renewable energy technologies as we scale them up due to learning curves and price reductions in components through mass production, as well as the refinement of efficiencies in technologies. That should be coupled with more streamlined and favorable financing mechanisms as the technologies continue to gain market share. Renewable energy is increasingly more favourable than renewables, and as such, the obstacles to rolling out renewable energy will often be more social and political than technological. This point is succinctly highlighted in the following quote from a Wuppertal Institute for Climate Environment and Energy Report entitled *Towards a Global Energy Transformation*:

> Only rarely are there immutable facts or technical conflicts that impede or even prevent the expansion of renewable energy. Instead, long-established structures and elites problematize the challenges of an energy transformation and sustain the existing system and their own (market) power with corresponding narratives. The success of an energy transformation will depend on whether a broad alliance of civil society, politics, science, and industry develops a convincing alternative and positive narratives – and implements them against resistances (Kofler et al., 2014, p. 2).

As we have seen rapid developments in renewable energy production, so when it comes to batteries the advancements in technology over recent years are astounding. This is incredibly important, as batteries are crucial for energy storage, which enables both renewable energy production and electrifying transportation. Here, like other sectors of the renewable energy economy, we see battery technologies ahead of even the most optimistic forecasts, developing 2x faster than projections of Bloomberg New Energy Finance, and 20x faster than the U.S. Energy Information Agency. As Joe Romm highlights*, i*n 2016, batteries hit a key price point - $300 kilowatts per hours – which enabled them to begin to gain widespread and affordable traction in both the energy and transportation sectors (Romm, 2016). Already we are beginning to see this in the energy storage arena where utilities are increasingly turning to battery storage to meet their need during peak times where they need additionally flexible power above and beyond their usual demand levels. Bloomberg New Energy Finance reports that in 2018, batteries are the cheapest source of new fast-response and peaking capacity in all major economies (Parkinson, 2018). This new reality will drive more investments in batteries for peaking needs, which increases demand for battery storage, which in turn leads to costs reductions through learning curves, making batteries increasingly competitive in replacing baseload fossil fuel energy altogether.

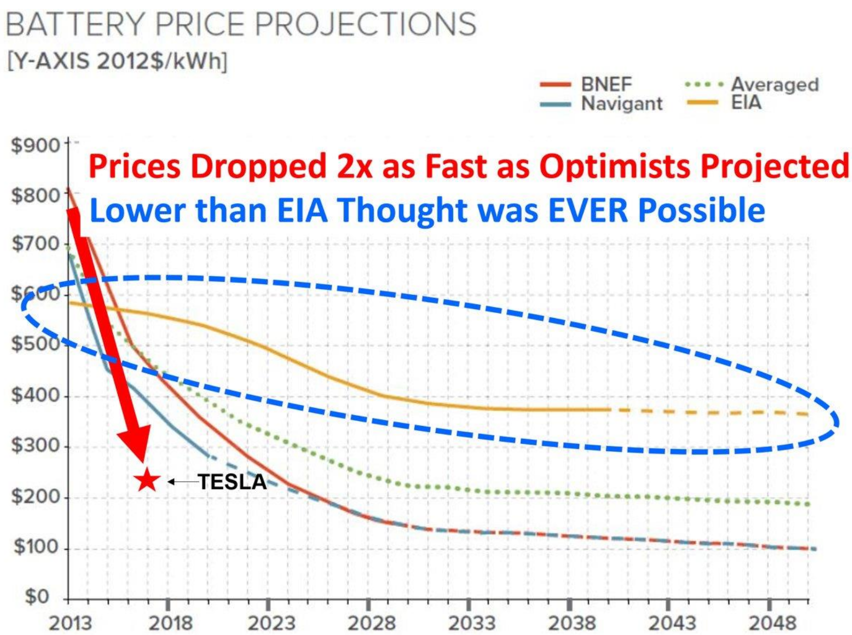
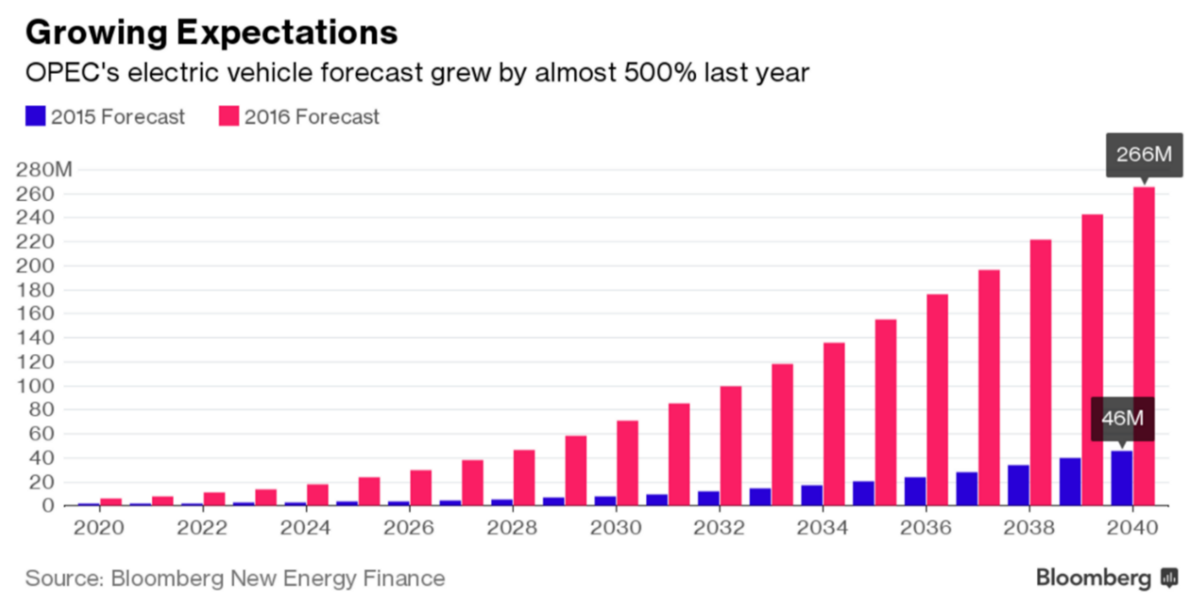


Figure 5 – Battery Price Projections versus Actual Costs (Romm 2016)

As a number of analysts suggest, reaching these pricing points can lead to a mass migration towards electric vehicles (EVs), which in turn drops the prices further due to learning curves, which leads to even further defection from internal combustion engine vehicles, creating a rapid, disruptive, virtuous cycle in favor of EVs (Arbib & Seba, 2017; Naam, 2017). It seems the mass migration may have begun, with Holland and Norway announcing they will implement a policy, prohibiting new sales of internal combustion engine (ICE) vehicles after 2025, India announcing a similar goal by 2030, Scotland by 2032, France lagging behind with 2040, and China currently in the process of developing plans to do something similar. In the private sector, GM, Aston Martin, Volvo and Jaguar Land Rover recently announced that all their cars will be electric by 2020-2023, and a range of other car makers are introducing a range of new electric vehicles moving towards mostly EVs (Davies, 2017; D. Roberts, 2017b). This move is spurred on by incredibly rapid developments within EV technologies making them more economic than internal combustion engine. The pace of developments are so rapid that, as the above graph demonstrates, in just one year OPEC had to increase its forecast of EV vehicle market growth by 500%. These developments give hope that with continued technological advancements alongside more supportive policies we can meet one step that studies suggest is needed for meeting the 1.5°C target, which is to have the last ICE car sold by 2035 (Kuramochi et al. 2016, 2018).



EVs are already cheaper per mile to run than ICE's when we compare vehicles on lifetime costs (Carrington, 2017), providing on average $800 per year worth of savings in the United States (Union of Concerned Scientists, 2017). In a recent study EVs were the cheapest form of car ownership in all regions studied, namely the UK, Japan, Texas and California (K. Palmer, Tate, Wadud, & Nellthorp, 2018). Looking forward, Bloomberg analysis shows that if EVs continue on the trajectory they are currently on, "in five years a high performing all EV car with at least mid level autonomy will cost less than $20,000. Which means you'll have to pay more to own an ICE (which has an average price of $33,000)" (Price, 2017). These trends make it such that EVs could fundamentally reshape transportation within the next decade, provided they get the right policy, research, infrastructure, and financial support. Particularly important, EVs are not just about personal car ownership, but also about the potential for electrifying freight and public transportation, where similar cost curves are occurring such that electrifying bus, truck and ferry fleets is becoming an increasingly economic option which can vastly reduce transit costs as well as noise, air and water pollution from bus, truck and ferry fleets (D. Roberts, 2018c).

While the rapid developments in renewable energy are incredible news, it is important to keep in mind that simply allowing renewable energy to develop unaided, will not necessarily ensure we meet the Paris Agreements (Peters et al., 2017; Sussams & Leaton, 2017). Renewable energy is starting from a small baseline where it makes up only a small amount of the total energy production, such that even on current levels of growth it will not expand fast enough to keep warming to well below 2°C never mind 1.5°C. Instead even on somewhat optimistic forecasts, current levels of renewable energy expansion if continued into the future would take us to a deeply dangerous world of approximately 2.7°C above pre-industrial levels (Peters et al. 2017; Sussams and Leaton 2017).[36] Additionally, while I have highlighted a range of empirical points and studies showing how renewable energy is already affordable and increasingly undercutting fossil fuels beyond even some of the more optimistic past forecasts,

[36] Thanks to Karen Litfin for suggesting this point about renewable energy starting from a small baseline.

we should be careful of assuming that such trends will continue into the future, as political interference, financial limitations, and technological obstacles may slow such developments.[37] Thus, to really ensure that renewable energy does proliferate at the rate required to meet the Paris Agreements, much further policy, financial, development, deployment, and research support will be needed.

One of the major difficulties in transitioning to a renewable energy future is that renewable energy typically has high upfront investment costs (although as we have already discussed, those upfront investment costs will be more than made up for through future savings). While renewable energy is increasingly beating fossil fuels when it comes to average lifetime costs, there still needs to be significant upfront investment costs relative to existing fossil fuel infrastructure at least for the next few years. This points to the need to find funding mechanisms to try and cover these upfront costs, particularly for low income families who may not be able to shoulder the additional upfront costs. Recognizing this reality, several authors have argued that we have a responsibility to raise long-term financing tools to help fund renewable energy investments. Focusing on the private sector, World Bank President Jim Yong Kim (2015) and Jeffrey Sachs (2016), the Director of Columbia University's Earth Institute, have argued that the financial sector must step up and direct financial flows toward green projects. Sachs calls on multilateral lenders, including the World Bank, to "raise vastly more long-term debt from the capital markets at the prevailing low interest rates." These institutions, he writes, "should then lend those funds to governments and public-private investment entities."[38] Such funding mechanisms provides an alternative means to raising

[37] Thanks to Michael Lazarus for highlighting that we should be careful about overly optimistic forecasts and recognize the need for stronger support and policies to move towards a clean energy future.

[38] Similarly, Aaron Malthais argues that "Recognizing that GHG emissions produce negative economic externalities that play out over generations, there has been increasing attention on the idea that the current generation can finance emissions reductions by borrowing from the future. Using debt financing for mitigation investments and shifting costs to future taxpayers is thought to produce better outcomes for future generations, while the present incurs no net costs" (Maltais, 2016, p. 54). Malthais recognizes that the debt incurs no net cost, which is very different from saying that it incurs no sacrifices as Broome frames it. What his analysis misses is that if renewable energy actually saves on fuel costs in the long run, then we won't necessarily be shifting additional costs into the future,

funding than carbon prices and market mechanism which have proven difficult to pass in a number of jurisdictions, particularly in the U.S. (Meyer, 2018).[39] Such financing mechanisms also point to ways that we can fund what is increasingly being referred to as a Green New Deal, a stimulus package based on the New Deal that aims to address economic and environmental issues.

In the United States, a Green New Deal has been championed, by the youth-led Sunrise Movement and Justice Democrats, and is gaining the endorsement of an increasing number of Democrats (D. Roberts, 2018b). Most notably, Democratic Representative-Elect Alexandria Ocasio-Cortez, who will be youngest woman to serve in the U.S. Congress, has put forward a draft resolution for a Green New Deal, "a detailed, national, industrial, economic mobilization plan for the transition of the United States economy to become carbon neutral and to significantly draw down and capture greenhouse gases from the atmosphere and oceans and to promote economic and environmental justice and equality" (Ocasio-Cortez, 2018). It proposes funding the plan "using a combination of the Federal Reserve, a new public bank or system of regional and specialized public banks, public venture funds and such other vehicles or structures that the select committee deems appropriate, in order to ensure that interest and other investment returns generated from public investments made in connection with the Plan will be returned to the treasury, reduce taxpayer burden and allow for more investment".

Importantly, the Green New Deal proposed by Ocasio-Cortez provides a number of important and highly ambitious equity provisions which center addressing inequality economic, racial, gender, regional and environmental justice (D. Roberts, 2018d). It also has several provisions to ensure that fossil fuel workers and other workers negatively impacted by the transition away from fossil fuels are not left behind in the transition to a renewable energy economy, and are instead deeply involved in the designing of and implementing of job training and worker

rather we will just be more evenly spreading the cost savings we will reap by investing in a clean energy future.

[39] While a global carbon price would be the most capital efficient method to decarbonize the global economy, it I s deeply unlikely to occur and would not necessarily be the most equitable pathway either.

deployment programs which guarantee employment to workers as part of a job guarantee program tied to the Green New Deal. The proposal is still vague on several policy details, but that is because it is only in the phase of a proposal to form a committee, which would have to work out specifics and details. However, its vision is a model for comprehensive, equitable climate policy that is at the scale and speed of what is required to move developed country economies to a low carbon future in time to meet the Paris Climate Agreement targets.

However, what the Green New Deal Proposal in its current form doesn't address is international climate justice. More specifically, it does not act on the responsibility of rich, historical polluting nations like the United States to contribute to finance for developing countries. Similarly, much of the U.S. sub-national climate movement that has arisen in the wake of Trump pulling out of the Paris Climate Agreement has neglected this element of international climate justice (G. A. Lenferna, 2018d). As I will argue in more detail in Part C, given the significant upfront costs needed to enable a low carbon transition, rich nations who have used up more than their fair share of the carbon budget have a responsibility to help developing countries invest in renewable energy and pursue a transition to a resilient low carbon future. Thus while, renewable energy has advanced rapidly, there is a deep need to raise funding through a lens of equity and justice both domestically and internationally to ensure that we can unlock the significant economic and social benefits that it can bring.

While the rapid developments in renewable technology alone do not guarantee that we will meet the Paris Agreements, nonetheless, they do show that if we get things right, a rapid renewable energy transition in line with the Paris Agreements is not only possible, but also more affordable and prosperous than the fossil-fueled status quo. Even before many of the latest rapid, ahead of projection developments in renewable energy, researchers from NOAA and University of Colorado modelled that "a transition to a reliable, low-carbon, electrical generation and transmission system can be accomplished with commercially available technology and within fifteen years" (MacDonald et al., 2016). More ambitiously, energy experts like Benjamin Sovacool (2016), argue that with the right shifts in technology, political regulations, tariffs and pricing regimes, and changes in behavior of users and adopters, a renewable energy transition could be completed within the space of a decade.

Taking into account some of the rapid development in renewable energy, a study by researchers at Lappeenranta University of Technology showed that “a global transition to 100% renewable electricity is feasible… and more cost effective than the existing system, which is largely based on fossil fuels and nuclear energy” (Ram et al., 2017) . Their report demonstrated that a renewable energy transition “is no longer a question of technical feasibility or economic viability, but of political will”, and with the right support could be achieved before 2050. The transition would reduce emissions from the power sector to virtually zero, reduce losses in power generation, and result in 36 million jobs in power generation by 2050, compared to the 19 million in 2015. Additionally, due to the rapidly falling costs of solar, wind and storage, they projected the total electricity mix in 2050 globally to be: solar PV with 69%; wind energy 18%; hydropower 8% (compared to 16% today); and bioenergy at just 2%. Such a mix is good news, given the worries raised earlier about over-reliance on hydropower and bioenergy.

What the historic rapid development in renewable energy, and modelling of pathways to a predominately renewable energy future show, is that contrary to what outdated and conservative analyses of renewable energy demonstrate, a renewable energy future is possible, profitable and prosperous. Recognizing this, the world must move fast if it is to transition to a renewable energy future in time to avert truly catastrophic climate change. Already, forty-seven of the world’s least developed countries have already committed to reach 100 percent renewable energy between 2030 and 2050, providing the rest of the world little excuse not to act (Hrala, 2016). The longer we delay, then the steeper, faster, more disruptive, and expensive the transition will have to be if we are to meet the temperature targets agreed to under the Paris Agreements (cf. Figueres et al., 2017a). In the words of Fatih Briol, the head of the conservative IEA, delaying is “a false economy”, “for every US$1 of investment avoided before

2020 an additional US$4.30 would need to be spent after 2020 to compensate for the increased emissions."

A Not So Perfect Moral Storm

If we combine the critiques of greenhouse gas parochialism and outdated and conservative renewable energy, we can see that the Intergenerational Sacrifice Camp is inaccurate in claiming that climate action is something we do just for or predominately for future generations and not for the interests of the current generation. Recognizing this should also lead us to rethink the metaphors and frames that philosophers use to describe the nature of the climate problem, as they may reflect and entrench assumptions grounded in greenhouse gas parochialism and outdated and conservative renewable energy analysis. Two such frame or metaphors I aim to challenge are the tragedy of the commons and the perfect moral storm framing of climate change. In this section, I introduce both concepts and show how they are related to each other. I then go on to critique the Perfect Moral Storm Analysis in this section. In the following chapter, I go on to critique some of the problems with framing climate change as a tragedy of the commons.

The common underpinning thought behind both the tragedy of the commons and Perfect Moral Storm analyses is that there is a contradiction between individual self-interest and collective interest. Depending on the analysis, it is argued that it is in every individual person, community, nation, and/or generation's self-interest to emit greenhouse gases, whereas it is in the collective interest of each of those entities to cooperate and collectively limit their greenhouse gas emissions. The tragedy comes in from the fact that the individual agents' interests conflict with the collective interest, such that if every agent acts in their individual interest, then the collective good is undermined. The perfect storm analysis holds that this contradiction between individual and collective self-interest holds at the level of individuals, nations, and generations when it comes to climate change, such that it poses an even more severe challenge to action than a typical tragedy of the commons (Gardiner, 2006, 2011b).

A typical tragedy of the commons revolves around a shared resource whose cooperative challenges are relatively immediate in time and space. Consider, for instance, the paradigmatic example of a tragedy of the commons put forward by Garrett Hardin, one of the primary proponents of the tragedy of the commons analysis. Hardin asks us to imagine a shared pasture where animals come to graze. As the example is typically presented, it is in the individual herder's interests to introduce as many animals onto the pasture as possible so as to maximize their herd. However, if everyone did that the pasture would collapse. Thus, it is in every herder's collective interests, for each herder to take as much as would be sustainable for each herder to do. However, because each herder is tempted to act on their own self-interest, the analysis holds that the commons will be over-exploited as each herder fails to act in the common interest. In the words of Garrett Hardin, "Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons" (Hardin, 1968, p. 1244).

In Hardin's pasture example, we see that the impacts are relatively local, visible, and immediate, and the actors are connected relatively closely in space and in time. The problem of climate change is different, particularly if we focus only on GHGs and climate change. On the perfect moral storm analysis, the nature of the climate problem makes it even more intractable to address than a paradigmatic tragedy of the commons. Some of the factors that contribute to making climate change a perfect moral storm, according to Gardiner, are:

- the spatial dispersion of causes and effects - greenhouse gas emissions are emitted all over the world and their effects in turn play out all over the world, lasting 100s if not 1000s of years;
- skewed vulnerabilities: those who emit the most – mostly rich developed nations, and the rich the world over – are least impacted by the problem, whereas those most impacted, typically emit the least – the global poor, future generations, communities of color and indigenous peoples;

- the spatial and temporal fragmentation of agency – unlike a typical tragedy of commons where you might be able to coordinate local actors, the agents involved in climate change are fragmented across the globe and across generations, making it even more difficult to coordinate action;
- institutional inadequacy: the institutions we have set up to deal with these sorts of problems have much shorter time horizons than the nature of the climate problem – think four-year election cycles or a focus on quarterly profits on the stock exchange.

These factors combine to create two storms that are like tragedies of the commons, although only insofar as at their core there is a conflict between individual and collective interest. First, the Global Storm holds that it is *collectively rational* for most nations to cooperate: (almost) every nation prefers the outcome produced by everyone restricting pollution over the outcome produced by everyone overpolluting. However, it is *individually rational* for all nations not to cooperate: when each nation has the power to decide whether or not it will overpollute, each nation (rationally) prefers to overpollute, whatever the others do. Second, the intergenerational storm holds that it is *collectively rational* for most generations to cooperate: (almost) every generation [except the present one, perhaps] prefers the outcome produced by everyone restricting pollution over the outcome produced by everyone over polluting. However, it is "*individually rational* for all generations not to cooperate, so when each generation has the power to decide whether or not it will overpollute, each generation (rationally) prefers to overpollute, whatever the others do".

Compounding the two storms, is a third storm, which Gardiner titles the Theoretical Storm, which refers to the worrying lack of adequate theoretical frameworks to understand a moral problem of this unprecedented nature. Climate change deals with questions of scientific uncertainty, of how to deal with a shared atmospheric common, of how we value nature and non-human animals, and what is the right way to think about intergenerational and global justice. All of these are thoroughly under-theorized or contested areas, which together pose a significant challenge to our theoretical frameworks and to developing a shared understanding.

The deeply undertheorized and/or contested nature of much the questions of value and ethics that underpin the problem climate change pose a significant obstacle to us properly responding to climate change, according to Gardiner, and thus constitutes the third moral storm, the Theoretical Storm.

The combination of the global, intergenerational and theoretical storms is why Gardiner holds we are in a Perfect Moral Storm. It is a reference to the boat in Sebastian Junger's book *A Perfect Storm,* which gets caught in three independently powerful storms, which combine to create a perfect storm. Likewise the combination of the global, intergenerational, and theoretical storm for Gardiner "creates an unusual and perhaps unprecedented challenge" (Gardiner, 2011b, p. 7). The intersection of these three storms makes climate change incredibly difficult to address, tempting the current generation and individual nations to distort their moral sensibilities to facilitate the exploitation of their global and intergenerational position, engaging in what Gardiner refers to as moral corruption, which involves focusing selectively on certain elements and difficulties of the climate change problem in ways that facilitate inaction, and the passing the costs of climate change onto others.

Gardiner explores the nature of the perfect moral storm to help expose how difficult and challenging the climate problem might be, and to show how morally significant the problem is and why we need to take it seriously. While the perfect storm analysis is very helpful in promoting understanding about the nature of certain elements of the climate problem, as I have hoped to show in this chapter, its focus on greenhouse gasses and climate change also obscures some of the broader benefits that come with reducing our dependence on fossil fuels and acting on climate change. What I have hoped to show in the previous two sections, is that if we view the climate problem from a lens that broadens beyond just greenhouse gas emissions and which recognizes the incredible advances in renewable energy, then climate change is not as intractable as a focus on just greenhouse gases suggests. Thus, it may not quite be as vicious of a challenge as the perfect moral storm analysis makes it out to be. Instead, acting on climate change and reducing our dependency on fossil fuels is significantly in the interests of many communities, nations, and the current generation, as well as in the interest of future generations. Recognizing this significantly weakens the global and intergenerational storms which are central to the Perfect Storm analysis.

I am not the only one who has challenged the idea that climate change involves a conflict between the interests of the individual interests of nations and collective interest. Fergus Green and Nicholas Stern have both written extensively on this topic. Fergus Green for instance, challenges the traditional assumption, central to tragedy of the commons analyses, that “climate change mitigation actions are net-costly for an individual state [as] they impose significant, immediate costs domestically, while the benefits (a marginal reduction in global climate impacts) accrue globally to all states and in the distant future, so the net-present value of those actions to the state is (inevitably) negative” (F. Green, 2015, p. 2). Green provides a wealth of evidence to demonstrate that “there is at least a *prima facie* case that the majority of the global climate mitigation task — decarbonizing the global economy within the present century — can be done through actions that are nationally net-beneficial for states” (ibid, p.4). Likewise, world-renowned climate economist Nicolas Stern wrote an entire book demonstrating “investments and actions [which] significantly reduce the carbon in economies but do so at the same time as delivering positive economic and social benefits to nations, even if one puts aside the value of the emissions reductions” (Stern, 2015, p. 85). As Stern argues, “most of what is necessary for emissions reductions over the next two decades is in the self-interest of the individual nations” (ibid).

Gardiner (2017) has responded to attempts to frame climate change in ways which emphasize how co-benefits and renewable energy costs make it more broadly in the interest of the present generation and individual nations. He argues that the problem with such “win-win” approaches are that they are “hostage to fortune”, such that if it turns out going green is not in the short-term interests of people, then a strategy which appeals only to short-term economic interests, will not be able to motivate action (Gardiner, 2017a, p. 28). We can respond to this in three ways, firstly to point out that we are indeed rather fortunate when it comes to renewable energy, insofar as it does allow us to transition in ways that also serve broader economic and societal interests of the current generation and individual nations. Secondly, we can argue that such co-benefits are not just fortunate side benefits of a climate analysis but are rather central to understanding the injustices that the current fossil fuel regime poses, and climate change is one symptom, and not the only one. Thirdly, we can point out that Gardiner's objection targets only those who appeal to co-benefits and renewable energy to argue that we should only take action if it is in our short-term economic interest. However, while it may increasingly be in our own interest to use renewable energy, my approach is not just to say that we should act only because short-term economic interest says we should. Rather my approach aims to recognize the full range of moral reasons why we need to act, in addition to simply those based on greenhouse gas emissions. Greenhouse gas emissions and intergenerational justice should be a major motivating factor and should suffice by itself to get us to act. However, recognizing the broader benefits that a renewable energy, low carbon transition can bring will deepen the moral, economic and societal case for transitioning away from fossil fuels beyond the need to sacrifice for future generations, and it will also show that the case for action is much less bleak than Gardiner makes it out to be.

In his book *A Perfect Moral Storm,* Gardiner also countenances the possibility that climate action might be significantly in our current generation's interests as I have argued in this chapter. He allows that "perhaps action in climate change is good for humanity as a whole, but not for the vested interests" such as the fossil fuel industry (Gardiner, 2011a, p. 65). He argues that if this is the case, then "the perfect storm analysis may offer a persuasive account of what is going on, even if the green revolutionaries [a camp my argument would fall into] are technically correct about the possibility of a win-win scenario" (ibid). It still offers a persuasive account, he argues, because it can reveal that "the perfect storm may actually be morally worse than is initially apparent" as our behaviors are even going against our own interests and we are acting in short-term ways which undermine our interests (Gardiner, 2011a). In, *Accepting Collective Responsibility* Gardiner (2017a) expands on this saying that perhaps what drives the tyranny of the contemporary central to the Perfect Moral Storm is a combination of shallowness, generational self-interestedness, and most importantly an institutional gap, where institutions fail to adequately register or are hostile to citizens' intergenerational interests, perhaps because other interests swamp them, such as those of vested fossil fuel interests.

In response, I would argue that two central elements of the Perfect Storm Analysis do not still hold if it is the case that acting on climate change is mostly in the current generation and individual nations' interests but is being held back by vested interests. Central to the perfect moral storm analysis is the global and intergenerational storms, but under the picture I have painted, those storms are deeply weakened and are not as insurmountable as the perfect storm analysis suggests as the interests of individual nations and generations align with the collective interest to tackle climate change. As such, it seems that unless we want to claim that the global and intergenerational storm are not part of the perfect storm, then the perfect storm is not quite the right description of the problem. Rather than being caught in the tyranny of the contemporary generation as the perfect storm analysis suggests, it seems that we are caught to a significant extent in the tyranny of vested interests. We could call it the tyranny of elite vested interests, following an Oxfam report which highlights how those who benefit from climate inaction is mostly a small wealthy elite with vested interests in the continuation of a high carbon and deeply unequal global economy (Oxfam, 2015). Perhaps, following political scientist Robyn Eckersley (2017), we can refer to it as the tyranny of the minority, as it is a relatively small minority of actors that is especially responsible for blocking action on her analysis. Shifting the framing and our understanding accordingly, can help motivate a broader populace who can recognize that climate action is not against their own interests.

As sociology professor and labor activist Kevin MacKay (2017) argues in his book *Radical Transformation: Oligarchy, Collapse, and the Crisis of Civilization*, historically oligarchy has been a more fundamental cause of the collapse of civilizations than social complexity or energy demand. Control by oligarchs, he argues, thwarts rational decision-making, because the short-term interests of the elite are radically different to the long-term interests of society. To quote

Mackay, "To create a sustainable future, we must first learn the lessons of the past, and what archaeological research shows is that throughout history, civilizations that have been captive to the interests of an oligarchic elite have all collapsed.[22] Today's industrial, capitalist civilization is trapped in this same deadly cycle… Citizens in countries such as Canada, the United States, Australia, or the Eurozone members, would generally consider themselves to be living in democratic societies. However, when the political systems of Western democracies are scrutinized, clear and pervasive signs of oligarchy emerge" (Mackay, 2018).

Likewise, the world's largest polluters are captured by elite interests or oligarchic in their nature, such as Saudi Arabia's Oil Sheik Royal Family, Russia's oil and gas-powered oligarchs, America's Fossil Fueled Corporatocracy, Australia's COALition Government, Canada's Tar Sands Trudeau, Venezuela's Petrostate, Nigeria's long history of oil-industry funded oppression, and the latest rising fossil fuel star, Brazil's mining and logging industry-backed Bolsanaro. When it comes to the climate crisis, we need to realize that what is largely thwarting action is oligarchic or elite interests which are holding back action and corrupting democracy in the name of their narrow interests which conflict with the collective interests of current generations, nations and communities. Drawing on Mackay's analysis, George Monbiot argues that: "The oligarchic control of wealth, politics, media and public discourse explains the comprehensive institutional failure now pushing us towards disaster. Because we cannot save ourselves without contesting oligarchic control, the fight for democracy and justice and the fight against environmental breakdown are one and the same." (Monbiot, 2018). While overcoming oligarchic and/or elite control is not an easy task, it would be much more difficult if the oligarchy was acting in our collective interests, as there would not be much reason to push back against oligarchic control or elite interests. Recognizing that the elites interest conflict with the interests of broader society can serve as a unifying and motivating framework.

A shift in analysis away from the perfect moral storm metaphor is also important when we consider the role of hope in addressing climate change. If we use the metaphor of being caught in a perfect storm, this does not inspire hope that we can address the problem, and makes the problem seem intractable. Indeed, the perfect storm was precisely about how each of the storms by themselves could be too much too handle, and how together they become a perfect storm. Such a metaphor may well give the impression that the task is simply insurmountable. However, if the problem is instead understood as one of overcoming entrenched interests to unlock a better future for both the current and future generations, this is a more tractable task, which can unite more common interests across the current generation. It can arguably inspire more hope that we can address the problem and help build power and coalitions across society.

Apart from the clear capture of governments across the world, there are perhaps few examples that demonstrate quite as vividly as what occurred surrounding Washington State's attempts to pass Initiative 1631 – a proposed fee on carbon pollution, which would have invested in a Green New Deal for Washington State, including investments a just transition away from fossil fuels, in clean air and water, forest protection, and towards a more vibrant and equitable renewable energy future. Initiative 1631 was supported by the largest coalition in Washington State's history and was crafted through a deeply inclusive participatory process that included groups as diverse as labor, faith leaders, communities of color, indigenous tribal nations, environmental, social and racial justice organizations, health organizations, immigrant justice groups, local businesses, low-income advocates and conservation groups. Over 400 local organizations, communities, and businesses supported 1631 representing the broadest initiative coalition in Washington State's history. The measure was polling positively commanding a majority of voter support, as opposed to thirty-six percent against the initiative, and 14 percent undecided. Then a no campaign coordinated by the Western States Petroleum Association and funded 99,5% by out-of-state oil and gas companies flooded the state with over $32 million in misleading adverts and propaganda, which was effective in eroding support and resulted in the ballot measure losing. While there are many complex factors which went into this fight, it clearly demonstrates the role of undermining demagoguery/fossil fuel industry propaganda in scuppering climate action. As Senior Policy Adviser at Climate Solutions' KC Golden (2018) convincingly argues, it shows how the fossil fuel industry is isolated in defending their interests, which speaks to their oligarchic control, but also potentially to their weakness: "Oil's most obvious liability is their growing isolation".

Knowing that we are not caught in a perfect moral storm, and that instead our task is to take on an increasingly isolated and oligarchic fossil fuel industry, can provide us with motivation and optimism to action. And in the words of Alex Steffen, *"Optimism is a political act. Those who benefit from the status quo are perfectly happy for us to think nothing is going to get any better…these days, cynicism is obedience.*" Hope, as environmental philosopher Byron Williston (2012, p. 183) points out, "can cause us to turn our energies aggressively" to bringing about the desired outcome. My worry about holding on to the perfect storm metaphor, when the picture may be more hopeful than it suggests, is that it breeds unnecessary cynicism and stunts potential action. On my analysis, instead of a perfect moral storm, climate change is an awesome moral opportunity to transform a deeply harmful fossil fueled status quo into a more prosperous, equitable and sustainable future both for current and for future generation.

Nonetheless, even with climate action increasingly in our own interests, to enable many of these benefits we will need to act collectively to enact policies, ensure public investment, and put in place needed regulation to speed up the transition away from fossil fuels and towards a renewable energy future. This is particularly the case if we want to try and ensure that the transition away from fossil fuels is a just one which does not leave behind fossil fuel dependent people and communities. Thus, even if climate change is not as severe a problem as the Perfect Moral Storm Metaphor or Intergenerational Sacrifice Camp might suggest, the question of how we go about spurring on collective action does not dissipate even if we remove greenhouse gas parochialism and dispense of outdated and conservative analyses of the renewable energy. This, as the following chapter will explore, is where the tragedy of the commons analysis raises its head again, and where the neoliberal imaginary pervades how we understand the problem we face and muddies how feasible action actually is.

Chapter 3: The Neo-Liberal Imaginary

The way that we imagine and frame action on reducing fossil fuel dependence and tackling climate change has, to a significant extent, inhibited necessary action towards a renewable energy future. The pervasiveness of an individualistic neoliberal imaginary, which frames narrow economic individual self-interest as rational without taking into account broader structural factors, has led to limited conceptions of the nature of the problem we face, and of what is possible and appropriate in response to climate change. Furthermore, it has driven analyses of the problem which distort the costs and benefits of action; and obscures the structures and policies that keep fossil fuels in place. The neoliberal imaginary relates back to the intergenerational sacrifice camp, for by framing the issue as a matter of individual competitive choice within a fossil fueled structure, it does make it seem as if it would cost us dearly as individual agents to act. However, if we shift the framing to a more collective and structural level, then we see that it is not necessarily outside the interests of individuals in the current generation to act, rather if we transform the structures, policies and regulations which support fossil fuels, we can, to a significant extent, make climate action both in the collective and individual interests of the current generation.

I refer to this as the problem of neoliberal imaginary for several different reasons. [40] Firstly, because neoliberal policies are partly, but not wholly, responsible for inhibiting climate action – a neoliberal policy is one that is intended to promote laissez faire economic liberalism

[40] I use the word imaginary here in a somewhat different sense to Sheila Jasanoff who coined the phrase along with Sang-Hyun Kim. According to Jasanoff's more refined later definition, sociotechnical imaginaries are 'collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology' (Jasanoff, 2015, p. 4). Jasanoff's definition holds that the idea of an imaginary is an inherently positive vision aimed at a desirable future, but what I aim to show is that the socio-technical imaginary that holds fossil fuels in place is a perverse imaginary that holds back our ability to enact a more positive sociotechnical imaginary in line with a most just clean energy and low-carbon future. To better enable a clean energy future, we need to expose the fossil fueled neoliberal imaginary as false and pernicious, and the clean energy imaginary as being one that is less costly, more prosperous and environmentally much more benign than the fossil fueled imaginary.

through policies such as privatization, austerity, deregulation, free trade and reduction in government spending.[41] Secondly, it is because it is a neo-liberal sort of worldview which shapes not only our policies, but the way we understand issues like climate and imagine solutions to them. The neoliberal imaginary permeates societies, particularly in America, obscuring the true nature of both the problem and the solutions, while limiting what we perceive to be possible, thus shackling society to impoverished conceptions of what can be achieved. Finally, I also refer to it as the neoliberal imaginary, rather than simply neoliberalism, because sometimes fossil fuel apologists wield neoliberal free market ideas to defend the fossil fuel industry, even though the fossil fuel industry itself violates those ideals, adhering instead to a form of fossil fuel welfarism, where society foots a massive bill to support the industry's costs, and subsidizes the industry greatly.

By falsely claiming that they are defenders of neoliberalism, the fossil fuel industry has been able to gain support from those who claim to adhere to such an ideology. Furthermore, it has allowed them to hide the significant support that society gives them and the huge costs they foist upon the public, thus obscuring that a renewable energy future may in fact be more affordable than sticking with the fossil fueled status quo. Unfortunately, as this chapter will discuss, even some of the climate movement's critiques of the fossil fuel industry reinforces the claims of the fossil fuel industry to be defenders of the free market, and by doing so climate activists may at times deepen the resistance to a transition away from fossil fuels. My view challenges the claim that the climate crisis is driven primarily by neoliberalism and argues that it is driven in large part by a form of fossil fuel welfarism which violates neoliberal free market ideals, skewing markets and regulations in favor of fossil fuels.

[41] Defining neoliberalism is a tricky affair, for as Kean Birch (2017) highlights, it is a concept which has been used in many different ways in public discourse. In this paper, I follow its common use as defined by Birch to refer "to an economic system in which the "free" market is extended to every part of our public and personal worlds. The transformation of the state from a provider of public welfare to a promoter of markets and competition helps to enable this shift". The central idea is that neoliberalism is about creating supposedly "free" markets and protecting them from government interference. Of course, no market is truly "free" as all require some level of regulation and governance.

The Neoliberal Imaginary and the Tragedy of the Commons

To begin to understand the role of the neoliberal imaginary, we can turn to how it underpins the tragedy of the commons analysis of the climate problem. Recall again that the underpinning thought behind a tragedy of the commons is that there is a contradiction between individual self-interest and collective interest. It is supposedly in every individual person, community, nation, or generation's self-interest to emit greenhouse gases, whereas it is in the collective interest of each of those entities to cooperate and collectively limit their greenhouse gas emissions. Another way to understand the tragedy of the commons analysis, as both Ostrom (1990) and Gardiner (2011a) highlight, is through the following generic way of framing the problem as one of two competing decision points:

"*PD1*: It is *collectively rational* to cooperate: each agent prefers the outcome produced by everyone cooperating over the outcome produced by no one cooperating.

PD2: It is *individually rational* not to cooperate: when each individual agent has the power to decide whether or not she will cooperate each agent (rationally) prefers not to cooperate, whatever the others do" (Gardiner, 2011b, p. 104).

Translating the more generic framing of the tragedy of the commons into the more specific example of climate change, is often represented as such:

"CC1*: It is collectively rational for all agents to cooperate: (almost) every agent prefers the outcome produced by everyone restricting greenhouse gas pollution over the outcome produced by everyone overpolluting*.

CC2: It is individually rational for all agents not to cooperate: when each agent has the power to decide whether or not it will overpollute, each agent (rationally) prefers to overpollute, whatever the others do" (Gardiner, 2011a).

Under the tragedy of the commons analysis, if everyone follows what is deemed to be "individually rational", then we will jeopardize the collective interest, thus succumbing to the tragedy of the commons. There are two major critiques of this framing that I will put forward.

First, it accepts narrow self-interest as individually rational, thus framing selfishness as rationality. Questioning what we deem as rational, and not accepting such a framing is key to making the sort of collective changes needed to address climate change. Secondly, even if we accept such a narrow idea of rationality, it is often only in our narrow self-interest to pollute because of the fossil fuel and pollution favoring infrastructure, subsidies and regulations we have in place, which are themselves deeply costly. As I will argue, transforming those structures can ensure that it is often even in the narrow self-interest of individuals not to pollute, thus aligning even narrow self-interest with the collective interest.

Let us begin with looking at the problematic nature of framing narrow self-interest as rational. By starting our analysis with such a framing, we set up narrow self-interest as the norm of rationality, and deviations from it as abnormal and irrational. To do so is to accept notions of rationality that are central to neo-classical economics, notions which have helped undermine action needed to address the climate crisis, as they have pushed back against broader notions of self-interest, inter-connectedness and collective interest, which are needed to support the sorts of collective action needed to address the problem of climate change. As author Amitav Ghosh (2016) has argued, such narrow notions of self-interest have become part of an individualistic cultural narrative which has prevented requisite collective action to address climate change, especially across the Western Anglosphere. In Ghosh's words, "at exactly the time when it has become clear that global warming is in every sense a collective predicament, humanity finds itself in the thrall of a dominant culture in which the idea of the collective has been exiled from politics, economics, and literature alike" (Ghosh, 2016, p. 81).[42]

Ghosh argues that the "the dominant secular paradigms of ethics in the United States… are also founded upon assumptions about individual rationality that are borrowed from neoclassical economics" (Ghosh, 2016, p. 134). The role that this self-interested notion of

[42] Theorists such as Gardiner set up the climate problem using the tragedy of the commons and perfect storm analysis precisely to argue that it requires us to look beyond narrow self-interest if we are to tackle the climate problem. According to Gardiner, tackling climate change requires overcoming narrow conceptions of self-interest, acting in the collective interest, and avoiding moral corruption.

rationality has played within neo-classical economics is to prop up the idea that the role of the government is not to ensure the public good, but instead to protect the free working of markets so that each individual can pursue their own narrow self-interest on the market. The central idea is that each individual can rationally pursue their own self-interest. Thus, because markets are supposedly "free", each time an individual trade on the market they are acting rationally and in their own interests. As such, each trade will make them better off, and likewise with every individual that trades on the market. The sum total of trading will make everyone better off as everyone is acting in their own self-interest within a "free" market, or so the story goes.

Narrow self-interest on the market place is thus held up as a virtue or at least as the norm. Such thinking has underpinned the rise of the neo-liberal paradigm, which argues against government intervening in the market for fear of ruining the supposedly efficient running of the market. As Ghosh goes on to argue, "the fact that laissez-faire ideas are still dominant within the Anglosphere is therefore itself central to the climate crisis. In that global warming poses a powerful challenge to the idea that the free pursuit of individual interests always leads to the general good, it also challenges a set of beliefs that underlies a deeply rooted cultural identity, one that has enjoyed unparalleled success over the last two centuries. Much of the resistance to climate science comes exactly from this, which is probably why the rates of climate change denial tend to be unusually high throughout the Anglosphere" (Ghosh, 2016, p. 136)

Ghosh is close to the mark when he points out that the resistance to attacks on laissez-faire ideology are central to why the Anglosphere has been resisting climate action. However, he would be more accurate if he said that it was resistance to *the perception* of attacks on the ideal of laissez-fair that sparked such resistance. Within the Anglosphere and beyond, corporate fossil fuel interests have used propaganda to construct the perception that attacks on their interests, and the corporate socialism they receive, are attacks on the ideology of free markets and neo-liberalism. In the words of David Roberts (2017c), "well before Trump, it was clear that ‘free markets’ are, in political practice, a *slogan*, not a core value. The slogan is a weapon to be deployed against policies that favor conservatives’ enemies, but never against their friends”, like the fossil fuel industry. Similarly, Australia Institute’s Chief Economist Richard Denniss (2018) points out that the implementation of neoliberalism and free markets has most often not been about ideology but about protecting special interests. Denniss argues that “the clearest proof of that claim is that neoliberal ideas such as deregulation were never aimed at powerful interest groups like the pharmacists or the gambling industry. And savage spending cuts were never aimed at subsidies for the fossil-fuel industry or private health insurers”. Denniss’ point, that neoliberal ideology is hypocritically and unevenly applied, is central to the climate crisis, where we have generous big government support for the fossil fuel industry, and harsh neoliberalism and austerity for people, renewable energy, and the planet. Indeed, while fossil fuel apologists claim to be the defenders of the free market, the industry they defend is one of the greatest violators of the very ideals they claim to uphold.

The fossil fuel industry works to rig markets, gaining huge subsidies and state support to favor their own interests, while often falsely claiming that anyone who challenges them is challenging laissez-faire ideology. As I will detail in the following section, through lobbying and corruption, the fossil fuel industry has tilted the playing field in their favor, constructing market rules, subsidies, and regulations which deeply favor them, allow them to harm others, to dump their pollution freely on communities often without much consequence, and even to corrupt governments without the need for transparency about how they are doing so (Conway & Oreskes, 2010; G. A. Lenferna, 2017a; McKinnon, 2016; Westervelt, 2018a). Far from being the competitive winners in some elusive free market, the fossil fuel industry has rigged economies, capital markets and governments in their favor, while (directly and indirectly) employing militaries to secure their interests. In addition, the industry has had decades worth of public support and funding, and that support has been immense. The words of Michael Liebrich (2015), Advisory Board Chair at Bloomberg New Energy Finance, eloquently demonstrate just how far from a free market ideal the fossil fuel industry is:

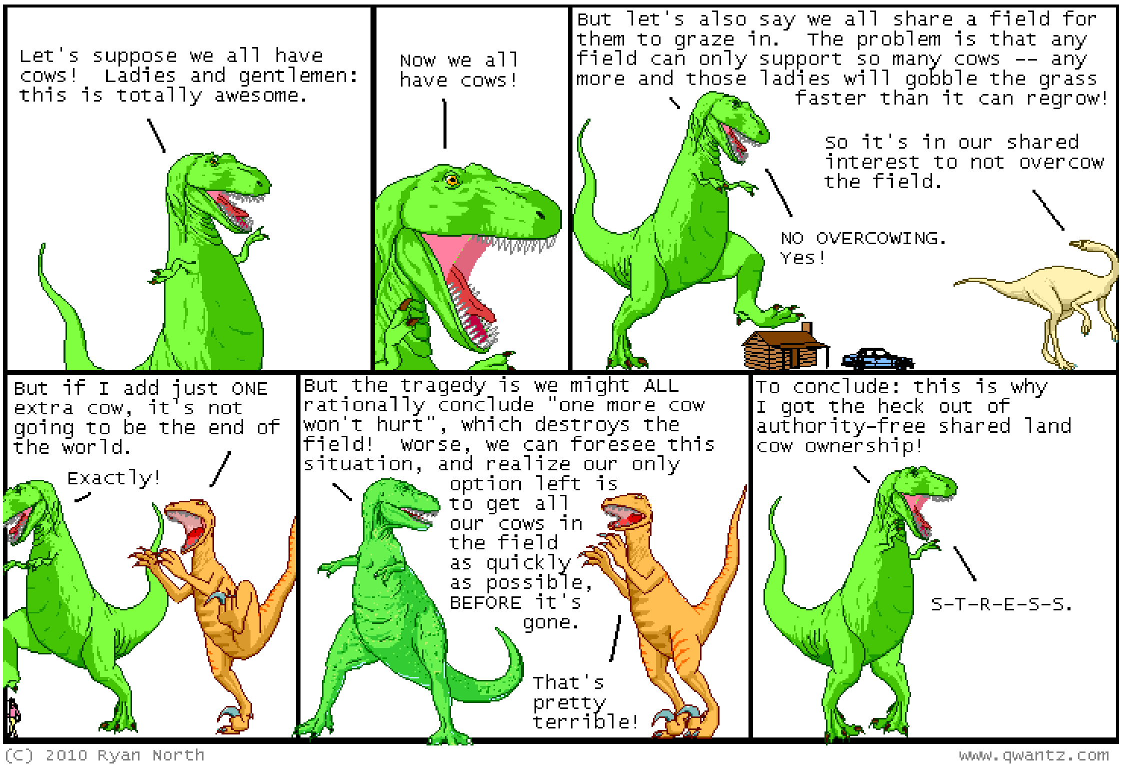
> If asked to describe the world's energy system, there are two diagrams you can draw. The first would be a Sankey diagram, showing where fuels are extracted, where they are refined and converted, where most of the energy is lost as waste heat, and where the remainder is consumed as useful power. The second depiction, equally valid and comprehensive, would be a systems dynamics diagram. One of the main "causal loops" in this diagram would show the fossil fuel industry gorging on subsidies and externalizing substantial costs onto others, helping it to generate massive profits, of which it spends a meaningful proportion on lobbying, physical protection, community compensation and even – as history has repeatedly shown – downright bribery. These actions, in turn, help protect political access and entrenched economic advantage. This is as much a part of the old energy system as any pipeline or power station.

Claims that the fossil fuel industry is somehow held up by the free market fail to consider the entire second part of the world's energy system picture depicted by Liebrich. It fails to see how the fossil fuel industry is propped up by much, much more than some illusory free market. If we recognize the rigged system that props up the fossil fuel industry, we can begin to unpack problems with the tragedy of the commons framing of climate change, which holds that it is in our own self-interest to pollute. What recognition of the fossil fuel industry's rigged market system can help to illuminate is that it is because of such a rigged system that that our narrow self-interest seems to align with polluting. Our individual choices are not free-floating choices that happen in a vacuum but are rather shaped by the rules of the system, the infrastructure, and the institutions within we operate.

Consider, for instance, the practice of driving a car. In an article entitled *Motorists Prime Beneficiaries of Socialism,* James Schwartz (2011b) details how in North America driving a car is arguably one of the most subsidized and state-supported forms of transport around, given how much the general public subsidizes that activity to make it artificially cheap. In addition to the general public giving over large swathes of land and paying billions of dollars in taxes to construct the roads and parking spaces used by car drivers, Schwartz details a wide range of ways in which the general public including non-motorists pay for motorists to be able to drive around:

> "From subsidies given to oil companies to produce cheap oil, to government bailouts/ownership of auto manufacturers, to road construction and maintenance on streets that cost nothing to use, to highly subsidized parking spaces, to government health care costs associated with pollution from automobiles, to the detrimental health that results from sedentary lifestyle that cars promote, to the vast government policing forces required to enforce our streets: it is undeniable that driving places enormous costs on our society, and this cost is highly subsidized by our government. Unlike other forms of socialism that benefit society as a whole, the benefits of motorist socialism are outweighed by our roads being overly congested, our air polluted and the growth of alternative modes of transportation are stifled.

As Schwartz (2011a) highlights in another article, despite the artificially low cost of driving created by the general public subsidizing driving, the average American still spends about 2 hours a day working to pay for their cars. Thus, despite major public subsidization, driving is not really that cheap, indeed, it is deeply expensive. To apply the lesson of artificially cheap driving to the tragedy of the commons, we can turn to the comic strip below.



What the comic strip serves to demonstrate is that even the paradigmatic example of a tragedy of the commons is reflective not of some inevitable fact about human nature operating in the commons. Rather it is an artificially constructed scenario, which assumes a particular form of governance or market structure, namely, an "authority-free shared land cow ownership". Just as such a governance system is a human artefact, a construct which shapes our choices, so the current system in which most pollution is freely emitted, and huge subsidies are given to the fossil fuel industry, is a constructed market and governance system that shapes the nature of the choices we make as individuals. Thus, to simply claim that our individual self-interest prefers polluting is to assume such a background system as the natural background of our choices, whereas such a market and governance system is more of a recent human artefact, and one which has been constructed in large part thanks to the oft corrupt dealings of the fossil fuel industry and related interests. Polluting being in the narrow self-interest of individuals is not a fact of nature, but rather significantly a product of the complex interplay of rigged markets, governance systems, infrastructure and broader structures. Recognizing these structural factors is not meant to completely deny individual responsibility for profligate carbon emissions, particularly from the affluent. However, it does reframe the context of those individual choices as part of a broader structural landscape. In the words of Richard Heede, “I as a consumer bear some responsibility for my own car.... But we're living an illusion if we think we're making choices, because the infrastructure pretty much makes those choices for us” (Starr, 2016).

The point I am making speaks to a critique of the tragedy of the commons framing put forward by Elinor Ostrom (1990). She argued that what makes the tragedy of the commons models “so dangerous when they are used metaphorically as the foundation for policy - is that the constraints that are assumed to be fixed for the purpose of analysis are taken on faith as being fixed in empirical settings” (1990, p. 6). However, the constraints that make polluting supposedly in our own interests are not necessarily fixed and are rather in large part constructed and shaped by policy. Ostrom further warned, that the reason why a group might appear to be in a tragedy of the commons, is not because of the nature of the actual resource they are using, but rather because of a “perverse incentive systems that are themselves the results of policies pursued by central authorities” (1990, p. 21). Such an insight applies with force to the context of fossil fuels and climate change, given how many subsidies and incentives the fossil fuel industry receives as will be detailed more thoroughly in the following section.

This connects to a feminist critique of individualistic notions of “autonomy”. As Susan Sherwin (2012) argues, the notion of the autonomous self which is central to neo-classical economic is often used to invoke an ideal of human independence and self-interested rationality - an ideal that conjures up the metaphor of "rugged individualism". As Sherwin argues, such notions of individualism “tend to mask the workings of privilege and power by making invisible the ways *in* which the efforts of others are generally part of the background conditions that enable ‘autonomous choices’ on the part of the most advantaged, such as by creating and maintaining infrastructure that' supports their personal projects” (ibid, p.14). Sherwin goes on to argue that based on feminist relational theory, “we need to look not only at the choices of various agents but also at the background conditions that structure those choices" (ibid, p.23) Doing so, she argues, can help us "to understand how it is that as individuals, and as members of collectives, we continue to participate in practices that serve powerful interests but are, ultimately, contrary to our own deepest interests" (ibid, p.27). Likewise, we can see how policies and infrastructure props up fossil fuel interests, making it in many people's short term narrow economic interests to participate in, but which runs contrary to our own deepest interests and values, for who would truly want their everyday lives to contribute to the destabilization of the climate and grave harms across the world, if they could have in place structures that would allow them do otherwise?

Recognizing that the rules that govern a tragedy of the commons are typically not fixed, and may in fact perversely incentivize the very behaviors that undermine the commons, Ostrom argued that we should attempt to "address the question of how to enhance the capabilities of those involved to change the constraining rules of the game to lead to outcomes other than remorseless tragedies" (Ostrom, 1990, p. 7). She warned though, that "some participants do not have the autonomy to change their own situational structures and are prevented from making constructive changes by external authorities who are indifferent to the perversities of the commons dilemma, or may even stand to gain from it" (1990, p. 21). Following Ostrom, rather than simply accepting the tragedy of the commons analysis as an accurate description of reality, we should look to what structures are driving the tragedy and what perverse incentives might encourage polluting behavior thus leading us headlong into tragedy. The neoliberal imaginary fails to adequately account for these broader structures and to countenance how they shape the nature of our individual choices. As such, if we are to reduce our dependence on fossil fuels, we must understand the nature of the structures which hold that dependence in place, rather than framing the problem simply in terms of narrow self-interested individual choices which fail to take into account the background structures which shape those choices. When we really reckon with the scale of the welfare and support the fossil fuel industry receives, as I will do in the following section, we will see that if we were to offer a similar level of support to renewable energy it would often be deeply in our interest not to pollute, both in a narrow economic sense of self-interest and in a deeper sense of self-interest where we value the broader well-being of our communities and ecosystems as part of our own self-interest.

Fossil Fuel Welfare v The Climate

The neoliberal imaginary is so pervasive that it has shaped how even climate justice activists frame the problem of climate change. That even the fossil fuel industry's seeming opponents have unwittingly internalized such a framing speaks to a point put forward by Jason Stanley (2015) in his book on propaganda, where he says that truly successful propaganda occurs when your opponents internalize the propaganda without knowing that they are using it. On one end of the spectrum we have those who argue that acting on climate change is predominately about individual choice, such as recycling, driving less, and other green behavior. As Martin Lukacs (2017) argues, and I will explore in more detail in the following chapter, such exhortations to individual action have bought into the neoliberal framing of climate change as about individual choices, thus failing to grapple with the importance of transforming structural factors which drive the climate crisis, and which require more collective action. While individual action can help, if it does not address the structural factors that shape our choices it only deals with a small and inadequate part of the picture.

On the other end of the spectrum, we have those who argue that guilt for the problem of climate change can be laid squarely at the feet of free market capitalism or neoliberalism. One of the most popular recent books on climate justice, by Naomi Klein (2014), was subtitled *Capitalism v the Climate*. Similarly, in the pages of the New York Times, Benjamin Fong wrote a piece entitled: *The Climate Crisis? It's Capitalism, Stupid,* decrying how "it should be stated plainly: It's *capitalism* that is at fault" for climate change (Fong, 2017). This framing of capitalism vs the climate has become rather pervasive in the climate change discourse, and while it does better to recognize the structural factors driving the climate crisis than those who focus only on individual action, nonetheless, it too often succumbs to the neoliberal imaginary, albeit in a different way, by making invisible or backgrounding the vast welfare the fossil fuel industry receives.

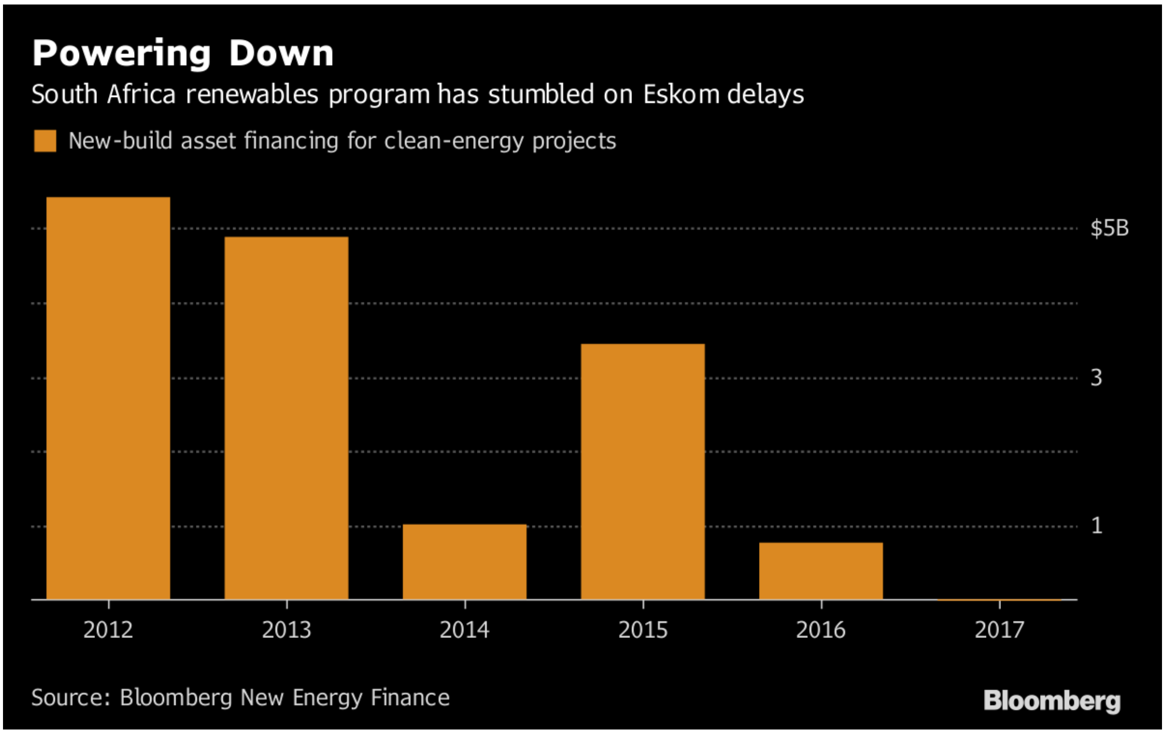
There's no doubt that the business model of rapacious corporations driven largely by quarterly profit are a significant mismatch for a climate problem whose devastating effects could persist and magnify for thousands of years to come. However, while it is true that the way that capital currently functions is undermining the climate, the framing that it is capitalism versus the climate often obscures the fact that it is not simply the machinations of some illusory free market that is driving the climate crisis. Rather, the climate crisis would not be where it is without a staggering level of government support and welfare handed out to the fossil fuel industry and other polluting interests. What we have is not so much free market capitalism versus the climate, rather it is fossil fuel welfare versus the climate.

Indeed, far from being defenders of capitalism and the competitive winners in the free market, the fossil fuel industry is perhaps one of the biggest beneficiaries of an egregious amount of government welfare, which makes the public foot the bill for their harmful and increasingly uncompetitive industry. Governments the world over favor fossil fuel interests through rigged capital markets, public financing, financial subsidies, bailouts and corrupt governance systems. To hide this system of corporate welfare, the fossil fuel industry has invested in a wide-scale public relations scheme (read: propaganda campaign) to paint themselves as the defenders of the free market (Conway & Oreskes, 2010; McKinnon, 2016).

While many are aware of the multiple investigations revealing the fossil fuel industry's decades-long climate science misinformation campaign, less attention has been paid to how fossil fuel interests have used propaganda to successfully spread the lie that attacks on the fossil fuel industry are attacks on capitalism itself (Banerjee, 2017). Climate science misinformation is deeply intertwined with ideological misinformation, where fossil fuel apologists falsely paint themselves as the defenders of freedom and capitalism. Fossil fuel propagandists have even, quite successfully, tried to dupe Evangelicals into associating the fossil fuel industry with the free market, and the free market with God's will (O'Connor, 2017).

Thus, attacks on the fossil fuel industry become attacks on God's will itself. But if God's will was really aligned with the free market, then the fossil fuel industry would be doing the devil's work. To see this better, we can go on a global tour of the world's worst polluters.

Consider, for instance, my home country of South Africa, Africa's biggest greenhouse gas emitter. As the diagram below shows, South Africa used to be home to the world's fastest growing renewable energy sector – thanks to an innovative private sector investment program (Burkhardt, 2018). However, Eskom, our country's *public* utility, sabotaged the renewables boom, and the government actively intervened to slow down the uptake of renewable energy (Sharife, 2010). A corrupted desire to pursue uncompetitive nuclear power and protect coal interests ground the renewables investment program to a halt. Our government did that despite the fact that renewables were greatly outcompeting fossil fuels, saving us billions every year (Calitz et al., 2015). Far from capitalism versus the climate, in South Africa it has been government cronyism versus capital interests that aligned with the climate. Fortunately, with a recent change of government leadership, the renewable energy program is beginning to take off again, although it still faces challenges in the face of government support for coal.



Next on our major polluter tour is Saudi Arabia and Russia, respectively the world's largest oil and gas exporters. Both countries have long blocked progress on climate change within the UN climate negotiations, and form part of a handful of the worst polluters whose climate actions are ranked as "critically insufficient" (Climate Action Tracker, 2018). Saudi Arabia and Russia both have lavish government support and subsidies for their state-owned oil and gas companies, an arrangement that can hardly be described as adhering to free market economics. Seemingly inspired by Putin and the Saudi Royal Family, Canada, the world's dirtiest oil producer, is moving to nationalize tar sands oil pipelines. More specifically, Prime Minister Justin Trudeau has instructed the Canadian government to step in to buy and nationalize the Trans Mountain tar sands pipeline. Trudeau did so despite widespread public resistance and despite the fact that oil and gas pipeline company, Kinder Morgan, who initially owned the project, thought the project was too risky to proceed with (McKibben, 2018).

Our next major polluter is down under, Australia, the world's largest coal exporter and one of the highest per capita carbon polluters, ranked last in the world on climate action out of all nations, according to the Sustainable Development Goals Index (A. Lenferna, 2018). Alongside the over $10 billion in tax-based fossil fuel subsidies Australia provides the fossil fuel industry, the government is increasingly attempting to prop up an uncompetitive fossil fuel industry (Market Forces, 2018). The federal government is moving to underwrite the coal industry to protect them from losses, making it such that the public would have to foot the bill for potentially billions worth of losses from the coal industry (K. Murphy, 2018). Australia's federal government is also working hard to provide major subsidies and state support to foreign multinational coal mining companies. In addition to virtually limitless water supply, the federal government is desperately trying to use taxpayer money to finance the opening of the largest coal mine in the Southern Hemisphere, the proposed Adani Carmichael coal mine, even though all major banks have declined to finance the project (Ritter, 2018; Slezak, 2017).

Of course, no global survey of polluters would be complete without mention of the world's biggest current polluter, China, whose unparalleled fossil fuel boom was driven by a mix of capitalism and communism with the state playing a major driving role in the build out of the most rapid expansion of fossil fuel infrastructure the world has seen (R. Smith, 2015). Now, in an attempt to turn that massive economy around, a similar mix of capitalism and communism is playing out in China's dramatic state-led U-turn towards renewable energy (Orvis, 2014). To help fathom the scale of their shift we can reflect on the fact that China will build enough renewable energy to meet the equivalent of all of America's energy needs within just two decades.

Even in America, the world's largest historical polluter, often slated as the defender of capitalism, it would be a stretch to argue that the fossil fuel industry is thriving because of its competitive capitalist edge. Rather, as Noam Chomsky argues, America has "never had capitalism, so it can't end" (2013, pp. 77–8). Instead, America has a variety of state capitalism, where the government actively props up and supports certain industries. This holds especially true in relation to the fossil fuel industry where state capitalism is increasingly descending into corrupt crony capitalism. Consider a recent report revealing that American tax payers foot the bill for $20 billion in fossil fuel subsidies each year, with 80% going to oil and gas, and coal receiving the other 20% (Redman, 2017). Studies show that without such subsidies half of future oil production in the U.S. would be unprofitable (Erickson, Down, Lazarus, & Koplow, 2017). As for coal, even the Wall Street Journal admits that coal simply "can't compete on a true level playing field", and is losing out despite its major subsidies (Resesz, 2017). A recent study showed that without regulation to shield them from market forces, about half of the coal plants in the United States would be heading towards bankruptcy, as they did not earn enough revenue last year to even cover their operating expenses (Ryan, 2018).

These examples demonstrate what is in some ways a rather simple point, that it is not simply capitalism v the climate, rather both capitalist and non-capitalist policies and systems of governance can favor fossil fuel interests. It is not just a neo-liberal ideology that drives the climate crisis.[43] Rather rigged markets which favor pollution and fossil fuels are one of the dominant driving factors behind the climate crisis, regardless of whether they are neoliberal, socialist, communist or otherwise. One of our most important tasks, if we are to address climate change at the scale needed, is to re-rig markets, regulations, and governance that favor pollution, so that instead they favor the public interest or the common good, working for people and planet not fossil fuel corporations, billionaires and executives.

Globally, the scale of the fossil fuel industry's welfare is astounding. Even if we do not take into account the trillions of dollars' worth of harmful externalities that the industry foists onto the public each year, the International Monetary Fund estimates that eliminating fossil fuel subsidies could free up US$2.9 trillion in government revenue annually (Clements et al., 2013). That is more than double the US$1.25 trillion in estimated annual investment needed in renewable energy and energy efficiency that would be needed globally by 2035 to keep warming to 2°C, according to the IEA (Evans, 2014). If all fossil fuel subsidies were re-invested in a low-carbon future, we would have more than enough money to meet the much safer and more just target of keeping warming to 1.5°C, which only requires an additional $460 billion per year according to a study in *Nature Energy* (Mccollum et al., 2018).

Remarkably, while the fossil fuel industry receives astronomical amounts of welfare, fossil fuel industry lobbyists and talking heads hypocritically demand renewable energy pull itself up from its bootstraps (Lacey, 2012). They decry subsidies for renewable energy as the government picking winners and losers, conveniently glossing over the fact that the fossil fuel industry's corporate socialism wildly outnumbers the meagre subsidies the renewable energy

[43] Brian Elliot also recognizes this point in his recent book on climate change and neoliberalism. He claims that "taking climate change as a symptom of neoliberal governance does not imply that alternative forms of governance guarantee better, environmental results. As is commonly known, the former Soviet bloc had a far worse environmental track record than wealthy liberal democracies in the latter half of the twentieth century. That the environment could be handled worse than it currently is under neoliberalism is not in question. What is at issue here is whether environmental neoliberal governance… is capable of reversing climate change. My argument that, due to the intrinsic nature of neoliberal capitalism, it is not" (Elliott, 2016, p. 55). This seems to me to be a fairer critique of neoliberalism, as being inadequate to solve the problem, rather than the sole cause of the problem. Particularly when it come to making large collective investments such as shifting large scale infrastructure, and ensuring a just transition, the neoliberal governance model will not allow us to take the requisite action.

sector gets. Studies by the International Energy Agency point out that global subsidies for fossil fuels outstrip those for renewable energy nearly 10-fold, and if we include their environmental externalities, we can add at least another 10-fold (Parkinson, 2016).

And while the fossil fuel industry is given a huge hand up by the government, the innovative and entrepreneurial spirit of citizens who want to produce their own renewable energy and sell it back to others is often being stifled by utilities and governments. Net metering policies allowed citizens to sell their energy back to the grid. However, rather than cheering on this entrepreneurial spirit, the remarkable growth in renewables that such policies created has come to "a shuddering halt" due to "a concerted and well-funded lobbying campaign by traditional utilities" to kill net metering policies (Tabuchi, 2017). In response, libertarian free market advocates, who see through fossil fuel industry propaganda, are starting to rail against utilities and big governments' attempts to kill solar (S. Smith, 2013). What these libertarians are recognizing is that instead of simply capitalism vs the climate, a more accurate descriptor would be fossil fuel welfare versus the climate, for it is government interference which is playing a major role in holding back needed progress on climate change and renewable energy.

It is this deeply unlevel playing field that keeps the fossil fuel industry afloat and renewable energy from taking off. In the words of Amory Lovins (2016), the world-renowned energy expert who helped engineer China's renewable energy revolution, "worldwide, renewables in fair competition (no subsidies and no corruption) generally cost less than any other new electricity source and many existing ones" – an economic reality the fossil fuel industry's propaganda machine has also been trying desperately to obscure (Krugman, 2015). Despite all the roadblocks it faces, renewable energy is still getting out ahead of fossil fuels, such that two Australian engineering researchers recently calculated that if renewable energy continues growing at current rates it could put the *entire* world on track "to reach 100% renewable electricity by 2032" (Blakers & Stocks, 2018). The only thing holding us back from this, they argued, would be politics, and the political obstacles are substantial.

It is a sign of our Orwellian times, a remarkable display of double think, that Republicans who claim to be adherents of the free market and conservativism are the one's defending the fossil fuel industry's grotesque corporate socialism and shielding them from competition. It should be no surprise though, for if we follow the money we see that the fossil fuel industry has given 91 percent of their immense campaign contributions to Republicans (Lavelle, 2016). The campaign contributions seem to have caused an acute form of politician-Amnesia, for just 10 years ago the Republican party accepted climate science and claimed to support climate action. Then the Citizens United ruling lifted the limits on campaign spending and fossil fuel money flowed, corrupting an entire political party (Whitehouse, 2018). Indeed, the partisan divide on climate change did not simply arise out of the cultural milieu or derive from some principled ideological commitment. Rather, it was largely created, funded, and stoked by the propaganda and corruption arms of vested fossil fuel interests.

Part of the danger of the capitalism vs the climate framing is that by failing to name the public welfare underpinning the fossil fuel industry, it plays into the hands of the fossil fuel industry propaganda machine. Alternatively, if we insist on the framing of capitalism vs the climate, let's name the sort of capitalism that we're fighting – a corrupt crony capitalism which makes the public foot the bill for massive corporate welfare handouts to the richest and most destructive industry on earth, while often applying neoliberal austerity to fossil fuel workers and the renewable energy industry. Perhaps some would argue that that is exactly what they mean when they say capitalism vs the climate, but if so, let's say so more explicitly, because to those surrounded by fossil fuel industry propaganda, capitalism may sound more like markets free of corrupt government intervention, when in reality that is the opposite of what the fossil fuel industry is defending. To be clear, I am not arguing that if we just fix distorting subsidies and return to a free market, we can fix the climate crisis. Rather, I am arguing that we need to dismantle the welfare that the fossil fuel industry is receiving, and instead invest it in the sort of future we actually want.

No Time for Socialism?

There is also an additional problem with the idea that capitalism is the problem and, what is often taken to be the correlate, that socialism is the answer. The problem is there simply is not enough time or the requisite social base to institute wide-scale socialism in time to address the climate crisis, at least not of the full-blown Marxist-Leninist version where we transform the economy from where it is now to one where we have social ownership of the means of production. In the words of Noam Chomsky, "If we're talking about feasible objectives in the short term, it's kind of meaningless to talk about socialism. There isn't a popular base for it. There isn't an understanding of it" (2013, p. 170). Similarly, Jacobin magazine, one of the leading socialist press outlets, warns against thinking that the way to solve climate change is to enact socialism:

> If capitalism is driving climate change, does that mean we need a revolution to stop it? We should hope not. The Left's vision of radical transformation can seem like an obvious match for the climate challenge. But the Left remains historically weak and a return to real power on the scale required isn't likely anytime soon — certainly not on the timescale we need to start taking serious action. We can't shortcut the long-term project of building socialism — but nor can we side line climate action along the way. Otherwise, even in the best-case scenario, the Left will win power only to manage a state of increasing climate breakdown. So no matter how necessary a break with capitalism is, for now we'll have to settle for addressing climate change as best we can within it (Battistoni, 2017, p. 9).

While Chomsky and Battistoni both advocate for a form of socialism in the long-run, they provide needed caution against thinking that a full-blown socialist revolution is the short-term answer to climate change given the incredibly short time remaining to tackle the climate crisis. However, while we may not have time to enact a Marxist utopia and to reclaim all the means of production, an all-or-nothing approach to socialism is arguably not a particularly helpful way of framing our response to climate change. As philosopher Ann Ferguson (2018) argues, socialism from a feminist perspective is not an all or nothing blueprint, but rather a vision of degrees of power/freedom that people in a particular society have in economic, political, social and personal relations.

Taking Ferguson's spectrum view of socialism into account, what we have now is a deeply impoverished form of corrupted corporate socialism which empowers the fossil fuel industry, using the big hand of government to subsidize them, shield them from competition, and give them the freedom to pollute and harm, while actively constraining and failing to give anything near similar support to their competitors and alternative energy producers who are much more socially beneficial. We might not have time to implement a robust full-blown socialism, where one seizes and nationalizes private corporations. However, it is long past time we dismantled the fossil fuel industry's corporate socialism. In its place, one can implement social democracy where, within the current liberal democratic and capitalist polities that exist, the state engages in economic and social interventions, but instead of doing so to benefit the fossil fuel industry, we are directing it to social goals that are beneficial such as creating a Green New Deal which invests in creating a just transition towards a renewable energy future.

Once we recognize the extent of fossil fuel welfare, then we can see that often we may not necessarily need to grow government but rather to redirect government so that its hand is there to help people and planet not fossil fuel corporations. That is the vision of many advocates of social democracy and is a vision that is realized to varying degrees in countries such as Denmark, Germany, the Netherlands and Spain. Instead of public subsidies and government support for a polluting activities putting the entire planet at risk, we urgently need to redirect the immense government support given to the fossil fuel industry to the sort of future we actually want: a just transition to a more equitable and prosperous renewable energy future, which puts the interests of people and planet over that of fossil fuel corporations. If we do so, we might have a fighting chance to avert the worst ravages of climate change and create a much better world while doing so.

Even in the United States, the heart of climate disinformation, fossil fuel propaganda, and the supposed home of capitalism, polling shows widespread support for policies associated with a Green New Deal (Kaufman, 2018). The surging popularity of politicians such as Alexandria Ocasio-Cortez, Bernie Sanders and Jeremy Corbyn also demonstrate growing openness to social democracy operated to benefit people not protect corporate profit. Similarly, as George Monbiot (2017) convincingly argues in his book *Out of the Wreckage, e*nergized campaigns around social democracy may also provide one of the few robust enough visions to counter the rising waves of right-wing fascist politics which themselves have deep ties to the corporate interests which benefit from the fossil fueled status quo. Thus, moving away from fossil fuel welfare and corporate socialism, it is long time past time we reclaimed our governments and used them to support the sort of future we actually want, before it's too late.

Given the entrenched interests of the fossil fuel industry, if we are to ensure that we undo the fossil fuel welfare system and redirect it to the sort of future that we want, that will require significant efforts from society to challenge the power of the fossil fuel industry. In the next part of the dissertation I will explore the question of what moral responsibilities individuals have given this, and argue that given the need fulfil the Fossil Free Moral Imperative and rapidly end the fossil fuel era, especially, but not only affluent individuals who benefits significantly from pollution, have highly demanding moral responsibilities not only to reduce their own emissions, but also to challenge, undermine, and reform the structures which hold in place the fossil fuel industry's corrupted hold on global energy systems. As I will argue, the deep urgency of the climate crisis and the immense harms of the fossil fuel industry means that morality may ask a demanding amount of those willing to fully answer its call to ensure we rapidly yet equitably end the fossil fuel era.

Part B:

Moral Responsibility in a Climate Emergency

"The generations alive now therefore bear distinctively awesome responsibilities, but for the same reasons we also hold in our hands the power to launch an historic transformative transition into a far less dangerous world than the fossil- fuel– fed nightmare that energy-business- as- usual will otherwise yield. We now can create an invaluable legacy for the far future. And only we—later will be too late. Time is short"
(Henry Shue 2016, 63)

"Speed, you see, means everything. Speed means planetary sanity. Speed means justice. Speed means prosperity. Speed means a future for our kids. For potentially hundreds of millions of people, speed means survival itself... We are about to begin the last decade. The time has come to become the people who can first re-imagine and then remake the world in the time we have left. The time is now to seize the future"
Alex Steffen (A. Steffen, 2017b). – *Planetary Futurist*

"Our planet, with its remarkable array of life, is in imminent danger of crashing. Yet our politicians are not dashing forward... Therefore it is up to you. You will need to be a protector of your children and grandchildren... Civil resistance may be our best hope."
– James Hansen (2009, 276-77),
Professor, Columbia University,
Former Head of NASA Goddard Institute for Space Studies

"If there is no struggle, there is no progress. Those who profess to favor freedom and yet depreciate agitation are men who want crops without plowing up the ground, they want rain without thunder and lightning.
They want the ocean without the awful roar of its many waters"
– Frederick Douglass,
African-American social reformer, abolitionist, orator, writer, & statesman.

In Part A, we identified how action in line with the Paris Agreements is in the collective interests of present and future generations and could lead to a more prosperous and equitable future, which would avoid grave, substantial and unnecessary harm associated with maintaining the fossil fueled status quo. Based on this, Part A defended the Fossil Free Moral Imperative. In Part B we consider that despite it being in our collective interests to end the fossil fuel era, due to a lack of collective action, structural barriers, and entrenched interests pushing back against needed progress, we are not taking adequate action to transition away from fossil fuels at the speed needed to hopefully avert a possible climate catastrophe. Given this reality, in Part B I argue, based on a structural analysis of the fossil fuel economy, that those who understand the nature of the climate crisis and who are able to act, have significant and demanding moral responsibilities to: reduce their own unnecessary emissions; promote collective action on climate change; shift structures and policies to effectively reduce emissions at the scale and speed required; and overcome vested interests that hold back the needed transition.

I begin in chapter 4 by arguing that we are in a state of relative moral emergency. I show that we only have a few years left to significantly shift our global trajectory and transition away from fossil fuels, if we are to stand a reasonable chance of meeting the Paris Agreement targets. Many have been warning of a state of relative emergency for several years. That emergency has only become more pressing as years of delayed action have made our available carbon budget incredibly tight, requiring us to take more dramatic and disruptive changes to meet the Paris Targets. The longer we delay the more deeply disruptive the changes needed to meet those targets will become, until they eventually become virtually unachievable. As such, further delays increasingly lock us onto a trajectory where the harms of fossil fuels and climate change create catastrophic impacts and risks the lives of hundreds of millions. The precarious nature of our climate system, our tightly constrained carbon budget, our rapidly closing window of opportunity to avert climate catastrophe, the growing harms of climate change, and the broader harms of fossil fuels, combine to suggest that we are in a state of emergency, and a rather dire state too. This forms the backbone of the Fossil Free and Climate Emergency

Imperative (FFCEI): to avoid grave, substantial and widespread harm associated with catastrophic climate change and the broader harms of fossil fuels, we need to rapidly take broad and sweeping action to reduce fossil fuel use and greenhouse gas emissions. I argue that this state of relative emergency should shape and augment how we view our moral responsibilities to act on ending the fossil fuel era.

In Chapter 5, I then move on to consider what moral responsibility the FFCEI demands of us. I begin by examining the typical frame for questions of moral responsibility for climate change, namely, individual responsibilities to reduce our own emissions and consumption. I argue that individual emission reductions are not sufficient to fully address our moral responsibility to act. I make this argument based on what Chris Cuomo terms the Insufficiency Problem, which, in her words, refers to the fact that the "reductions that average consumers can control, such as household emissions and personal transportation, are insufficient to bring greenhouse gas concentrations down to safer levels, because household consumption and personal transportation account for a significant but minority slice of total greenhouse gas emissions worldwide" (2011, p. 702).

I then argue, however, that just because individual emissions are insufficient to the task of addressing climate change, does not mean that they are unimportant. Rather, given the harms of burning fossil fuels, and the limited carbon budget left to stay within the Paris Agreement targets, individuals have a prima facie moral responsibility to reduce their own unnecessary, profligate and/or personal emissions. This applies particularly but not only to affluent and high-consumption individuals. That is because, unnecessarily profligate emissions particularly of affluent individuals, takes up more than one's fair share of the carbon budget, contributes to harm, and wastes precious resources. My argument responds to arguments such as that provided by Baylor Johnson and Walter Sinnott-Armstrong, who argue that we do not have a moral responsibility to reduce our individual emissions as it is not effective, does not cause harm, and is not morally significant.

I base the responsibility to reduce emissions on what I term the Anti-Pollution Principle (APP), which states that: We should not use resources, especially limited resources, whose use contributes to the harms of others, unless there are sufficiently strong moral reasons for doing so. Applying this principle, in Chapter 6 I argue that if reducing individual emissions conflicts with the ability to pursue more effective climate action, or other more morally significant endeavors, then such considerations should typically outweigh the responsibility to reduce one's own emissions. While the APP provides a prima facie duty to reduce emissions, given the speed and scale at which we need to reduce emissions to meet the Paris Agreement goals, much broader and sweeping structural changes will be required than individual emission reductions alone can provide for. Given this reality, I argue, based on a structural analysis of the fossil fuel economy, that those who understand the nature of the climate crisis and who are able to act, have significant and demanding moral responsibilities to: promote collective action on climate change; transform structures and policies to effectively reduce emissions at the scale and speed required; and overcome vested interests that hold back the needed transition. Given the FFCEI, these responsibilities may often outweigh the moral responsibility to reduce personal emissions. In sum, I argue that we have responsibilities to effectively push for and ensure as best as possible, a broad, comprehensive, just, and rapid transition away from fossil fuels.

In Chapter 7, I then consider how, given the inertia and vested interests in the status quo, ensuring such a transition will demand significant amounts of many of us acting in many different roles, whether it is activism, policy work, engineering, education and more. I argue furthermore, that the crisis we are in will demand more than would be a fair amount to ask people under more ideal circumstances. While the roles we may have to take on to address this crisis may be demanding of us, I argue that this is what it means to act morally and virtuously in a time of crisis, it is us stepping up to our moral responsibilities to help avert catastrophe. These are the last few years we have left to get a handle on the climate crisis, and as such it calls on us to take on relatively awesome levels of responsibility to adequately respond to the profound magnitude of the crisis we are in.

I deal with an objection to my argument, which says that is not fair of us to have to take on such demanding duties, as doing so asks of us more than is our fair share, at least in an ideal world (Fragnière, 2018; L. Murphy, 1993). I draw on Simon Caney's (2014) work to argue that in order for us to act justly we may need to prioritize the need to avoid harm over the need to equitably share burdens. As such we may be called on to take on more than what might be our fair share of responsibilities under more ideal conditions. I disagree with Caney, however, that prioritizing the need to avoid harm means that we should take on responsibilities solely relative to our power to act. Firstly, I argue that more ideally, following Iris Marion Young, those responsibilities should be allotted according to power, privilege, interest and collective ability. Secondly, I argue that Caney's argument fails to countenance how the powerful are often least likely to take action, given that they most benefit from the current structures. I argue that therefore to avoid grave injustices responsibility may fall on to the relatively unpowerful and underprivileged.

While the situation we are in calls for a far from an ideally just distribution of responsibility, it is a responsibility morality asks us to take on given the deeply non-ideal circumstances we are in, as the harms, unfairness, and injustices that would result from not taking on such responsibilities would be significantly graver than what is being asked of us. I end Chapter 6 by drawing on virtue ethics to support such demanding moral responsibilities, by examining how in the face of other injustices, those we take to be moral exemplars are often those willing to shoulder significant sacrifices and burdens in the struggle against injustice, even though they themselves may not have been among the powerful, privileged and well-off. To be clear, I am not arguing against advocating for an equitable distribution of responsibilities to act on climate and reduce fossil fuel dependence, but given that we are not acting collectively up to the scale of the task, those responding to the crisis we are in may need to take on significant demanding responsibilities in the short term to avert potentially catastrophic harms, and to push for a more equitable response to climate change in the long run.

Chapter 4: The Fossil Free and Climate Emergency Imperative

In 1992, more than 1700 independent scientists, including the majority of living Nobel laureates in the sciences, penned the "World Scientists' Warning to Humanity". In a warning that used atypically emotive language, they argued that "a great change in our stewardship of the Earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated" (Kendall, 1992). They expressed concern about current, impending, or potential damage involving ozone depletion, freshwater availability, marine life depletion, ocean dead zones, forest loss, biodiversity destruction, human population growth, and, of course, climate change. Among other changes, they implored that world needed to cut greenhouse gas emissions and phase out fossil fuels, reduce deforestation, and reverse the trend of collapsing biodiversity. The same year that scientists issued their "Warning to Humanity" the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Earth Summit in Rio De Janeiro with the objective to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

In an ideal world, governments around the world would have heeded the warning of scientists in 1992, or the warnings that had come well before it, and begun implementing the necessarily policies to facilitate a just transition to a renewable energy future and avoid dangerous climate change in line with the UNFCCC, along with several other ecological crises. However, the quarter-century since the issuing of the World Scientists' Warning to Humanity saw the global community exceed even some of the worst-case scenarios for greenhouse gas emissions growth, as Figure 6 below demonstrates. The trajectory we were on, put the world on a path that could result in close on 5°C by 2100, barring major action to change that trajectory (Borenstein, 2011; Sanford, Frumhoff, Luers, & Gulledge, 2014). Decades worth of previous accumulating emissions and our failure to act during that quarter century, put us on an incredibly dangerous trajectory where we were making changes at a geological scale, in the blink of a geological eye, changing the climate 170 times faster than natural changes typically occur (Gaffney & Steffen, 2017). The rate at which we are emitting CO_2 is estimated to be 10 times faster than it was during the End-Permian – also called the Great Dying - an era of mass extinction that killed 90 percent of life in the ocean and 75 percent of on land (Brannen, 2017). Year after year governments, particularly the world's biggest polluters, failed to put in place the necessary policies and actions to combat climate change. Even when the international community finally managed to negotiate the Paris Climate Agreement, the collective emissions reduction pledges of the world's nations put us on track to a world of 2.7-3.3°C or higher, far out of line with the Paris Agreement target of keeping warming well below 2°C and about double the much safer aspirational target of 1.5°C (Climate Action Tracker, 2016).

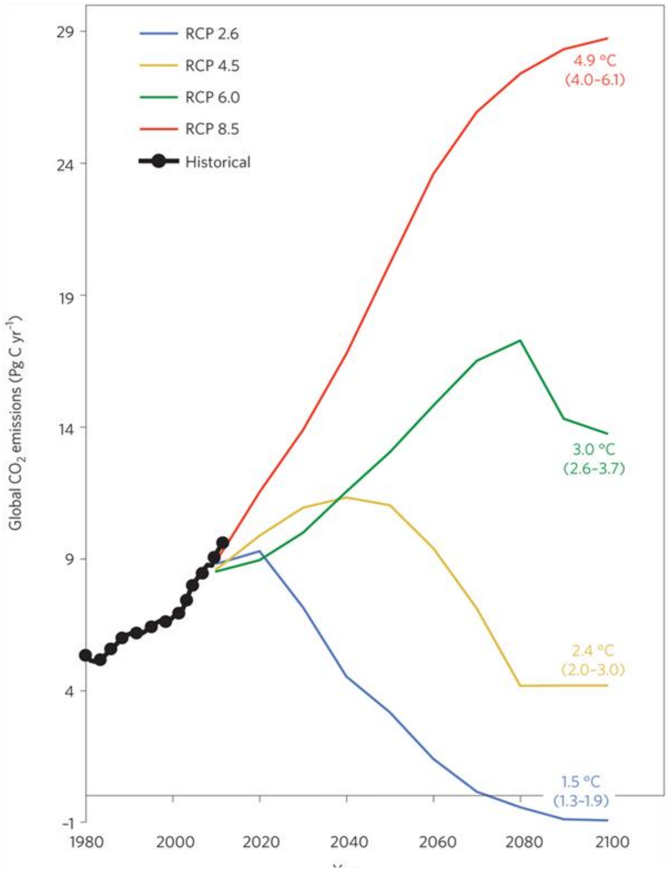


Figure 6 – We are emitting more than some of our worst-case scenarios suggested we would emit. Source: Sandford, T., et al. (2014) The climate policy narrative for a dangerously warming world, Nature Climate Change, http://dx.doi.org/10.1038/nclimate2148

The result is that in 2017, a quarter of a century after the first World Scientists' Warning to Humanity, 15,000 scientists from 184 countries – the most scientists to ever co-sign and formally support a published journal article – issued another direr warning to humanity. They warned that "since 1992, with the exception of stabilizing the stratospheric ozone layer, humanity has failed to make sufficient progress in generally solving these foreseen environmental challenges, and alarmingly, most of them are getting far worse", such that they threatened "widespread misery and catastrophic biodiversity loss" (Ripple et al., 2017, p. 1026). What they deemed "especially troubling" was "the current trajectory of potentially catastrophic climate change" (Ripple et al., 2017, p. 1026). They warned that "soon it will be too late to shift course away from our failing trajectory… time is running out." (Ripple et al., 2017, p. 1027). That same year, leaders and scientists from across the globe made it strikingly clear that time was indeed running out (Figueres et al., 2017a). In a research paper in *Nature* entitled *Three Years to Safeguard our Climate* they showed that the world had until about 2020 to peak and then rapidly reduce emissions to stand a reasonable chance of averting catastrophic climate change in line with the Paris Agreements. A year later, the IPCC Special Report on 1.5°C warned that the world must take "rapid, far-reaching and unprecedented changes in all aspects of society" with global emissions needing to fall by 45% from 2010 levels by 2030 and reach "net zero" around 2050 in order to keep warming around 1.5°C.

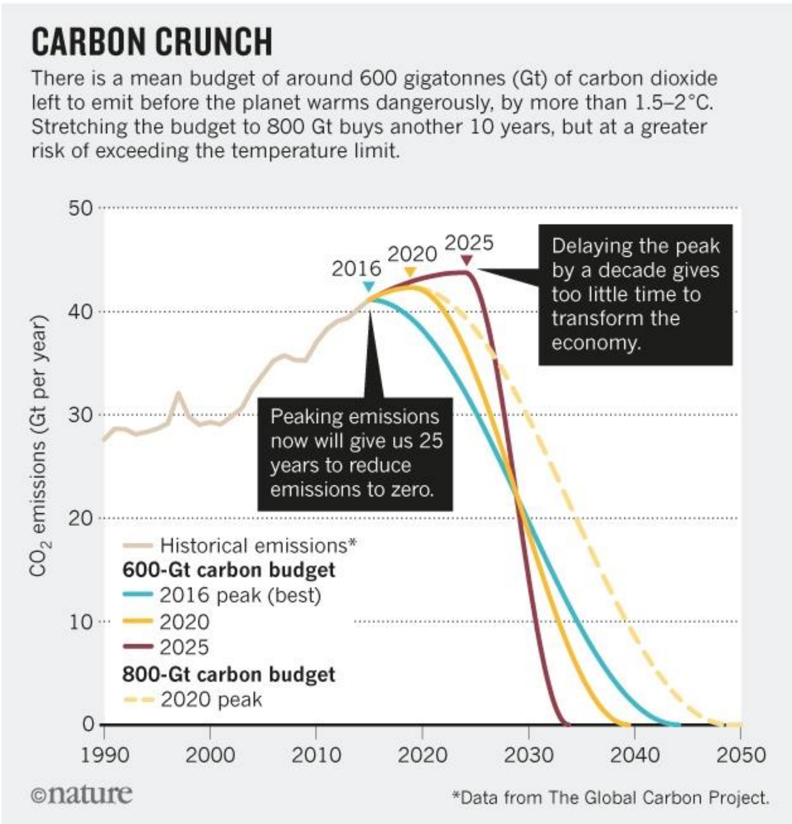


Figure 7 - Time is running out before the speed of emissions reductions becomes too fast to meet the Paris Climate Targets (Figueres et al, 2017)

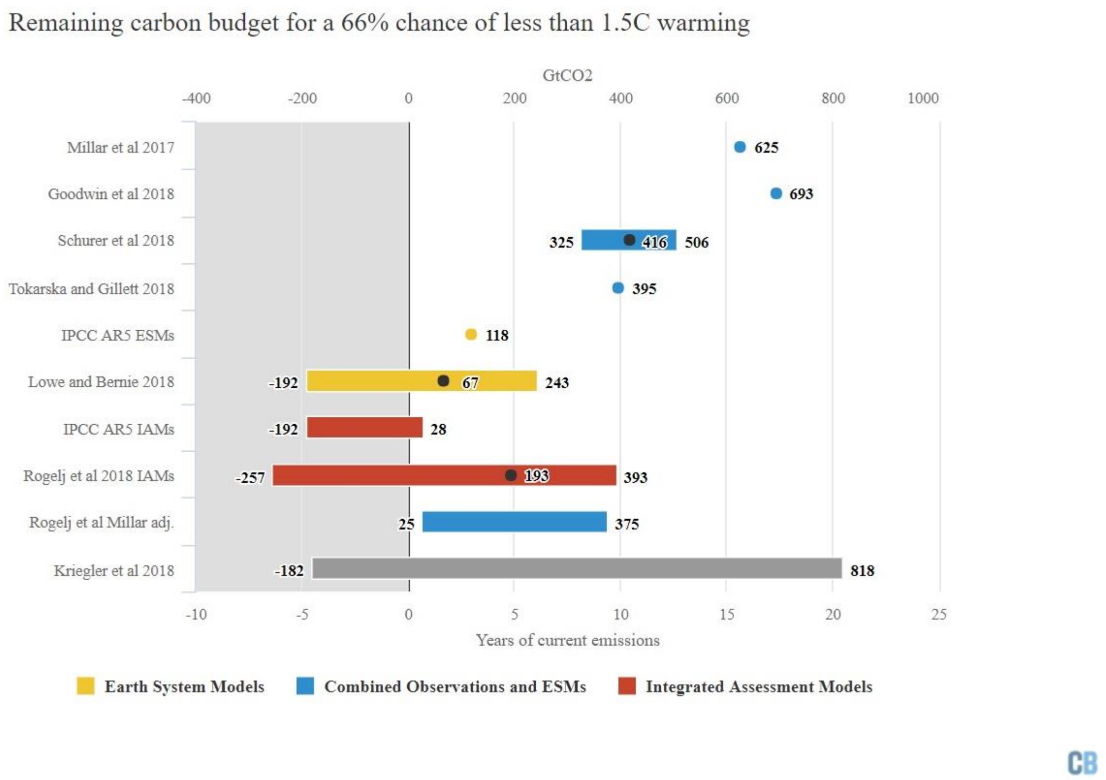
The longer we wait to peak, the more difficult and drastic future measures to reduce emissions would have to be, and/or the higher the chance that we will overshoot the Paris Agreements, and lock in potentially catastrophic climate change. As Bill McKibben (2017) highlights, if governments had started acting over a quarter century ago, they would only have needed to reduce global emissions at the speed of about half a percent per year – a relatively slow and gradual transition. Indeed, if we had started acting back when fossil fuel companies were made aware of the problem in the 1950 and 60s, we would have had a very easy and gradual transition to make (A. Steffen, 2017b). Instead, thanks in large part to fossil fuel industry misinformation and resistance helping to spur on the inactions of much of the global community and governments, we face the need to reduce emissions at an incredibly fast pace, ranging from 3.5%-8% per year globally, depending both on whether we want to meet 1.5°C or 2°C and on what likelihood we want of hitting those targets (Figueres et al., 2017a).

A more recent study by Tanaka and O'Neill showed that avoiding having to rely on negative emissions technologies would necessitate cutting emissions 80% by 2033 to meet the 1.5°C target or about 66 percent by 2060 to hit 2°C (Tanaka & O'Neill, 2018). In order to make hitting the 1.5°C feasible, Tanaka and O'Neill had to relax constraints on how fast mitigation can occur, allowing for a reduction of emissions of 8% per year, and even that relies on the climate being somewhat insensitive to greenhouse gas emissions.[44] Even meeting the 2°C target requires pretty unprecedented levels of emission reductions, at about 4% per year. Inaction, clearly, has come at a grave price, necessitating rapid and deep emission cuts to avoid catastrophic climate change. It is for this reason that, as Alex Steffen points out, one of "the most important criteria for climate strategies now is how fast they can scale [as] the 2020s may well be the deciding moment for humanity's future, for millennia to come. We are about to enter the Last Decade. That is when we are." (A. Steffen, 2017b).

Another way of thinking about our closing window of opportunity, is to recognize that we now live within a tightly constrained carbon budget, as we can only afford to emit so much

[44] It assumes a climate sensitive of 2.2°C or less per doubling of CO_2 emissions.

greenhouse gas emissions into the atmosphere to stand a reasonable chance of meeting the Paris Climate Agreement. While there are significant uncertainties in estimating carbon budgets, if we look at the spread of models for a likely chance of meeting the 1.5°C target, as represented in the below graph from Hausfather (2018a), we see that on some models we have already blown our budget and others only give us a tiny remaining budget. At the time of writing, even the 2°C budget has only about 700GtCO2 remaining, assuming a medium climate sensitivity (Mercator Research Institute on Global Commons on Climate Change, 2018). That only gives us about 18 years' worth of current emissions before we blow past our carbon budget and move into the risky territory of having to rely on negative emissions to get us back even to 2°C never mind 1.5°C - Chapter 3 discusses negative emissions.



Remaining carbon budgets in gigatonnes CO2 (GtCO2) from various studies that limit warming to a 66% chance of staying below 1.5C (see links at end of article), as well as equivalent years of current emissions using data from the Global Carbon Project. Ranges reflect reported budget uncertainties, while points show best-estimates. All studies have been normalised based on observed emissions to show the remaining budget as of January 2018. Integrated assessment models limit warming to well below 1.5C warming in the year 2100, while other approaches avoid any exceedance within the next century. Chart by Carbon Brief using Highcharts.

Things are clearly looking bleak. However, as Figueres et al (2017b) highlight, even despite our past inaction, there are reasons to be defiantly optimistic that if the global community began to really push we could still hit the Paris Climate Agreement targets. Among those reasons was the fact that global emissions had peaked for three years starting in 2014, even while global economic growth continued, demonstrating the possibility of decoupling growth from emissions, a possibility made ever more real by the incredibly rapid developments in renewable energy as I highlighted in more detail in the previous chapters. However, the subsequent re-uptick of emissions in 2017, shows that we cannot rely on progress in renewable energy technology alone to achieve decoupling, rather we need robust and comprehensive policies to get us there (Business Leader, 2018). Providing limited amounts of hope that we might be able to implement such policies, the growing climate justice movement, the Paris Agreement and other political progress on climate change, showed elements of the global community are increasingly willing to move forward and act on climate, although not yet at the scale and speed required, and with some worrying steps backwards such as the election of presidents opposed to meaningful climate action in the USA, Australia and Brazil. As Chapter 2 highlighted, we have many of the technological and social tools needed to transition to 100% renewable energy and reduce emissions more broadly, the pivotal question though is whether we have the political and social will needed to scale them up fast enough to meet the Paris Agreement targets.

Of course, while meeting the Paris Agreement targets is incredibly important, it is not the case that if we do not meet these targets, we then throw up our hands, and say that we have lost the fight. To do so is to mistake the nature of the 1.5°C/2°C targets. They are not some magical line which if crossed will suddenly plunge us into misery. Rather, the more we exceed those targets, generally the higher the harms will face, and the higher the risk of moving towards irreversible deeply catastrophic tipping points within the climate system. Thus, if we exceed the carbon budget for those targets, then action does not become meaningless, instead it becomes more urgent to reduce emissions in order to avoid the increased harms and risks (especially of irreversible tipping points) that are associated with each bit of warming above the 1.5/2°C targets, and especially to avoid the horrors that are associated with a world above 4°C (Anderson & Bows, 2011; The World Bank, 2012).

It is also not the case that emissions that are emitted before we breach the carbon budget are harmless. Far from it, to borrow the words of renowned climatologist Michael Mann: "Every bit of additional warming at this point is perilous".[45] That is because, as Mann points out, we are moving dangerously close to tipping points in the climate, from the collapse of the West Antarctic and Greenland ice sheets, to the drying out of the Amazon, the slowing down of the Atlantic conveyor belt, and more. There is a lot of uncertainty as to just when we will hit those tipping points, but the more we emit, the higher the risk that we will tip the world into a dramatically different climate regime, and on to "a planet abruptly and disastrously altered" (McKibben, 2017). The risk of breaching such tipping points has led philosophers such as Lauren Hartzell-Nichols (2017) to persuasively argue that our goal for acting on climate should not be to simply meet the Paris Agreement targets, but rather following a precautionary approach to potential catastrophe, we should be "mitigating climate change to the greatest extent possible given other moral demands" (Hartzell-Nichols, 2017, p. 123).[46]

Apart from the risk of tipping points, we are already experiencing dangerous climate change, with a report by *The Lancet Countdown* finding that hundreds of millions of people around the globe are already being affected by the health consequences of rising temperatures, ranging from crop failures and undernourishment to heatstroke and the spread of infectious diseases (N. Watts et al., 2017). Additionally, another reason to reduce emissions before blowing the carbon budget, is because, as chapter 2 highlighted, the harms of fossil fuels are much more than just greenhouse gas emissions, and so the more we burn, the more we contribute to those broader harms, harms which would lead to the premature deaths of hundreds of millions just when considering air pollution effects alone (Shindell et al., 2018). Thus, to avoid making dangerous climate change much worse and to avoid as much of the

[45] Quoted in McKibben (2017)
[46] I return to Hartzell-Nichol's argument in Part C.

harms of fossil fuels as possible, we should be acting to transition away from fossil fuels and act on climate change to the greatest extent possible given other moral demands.

The precarious nature of our climate system, our tightly constrained carbon budget, our rapidly closing window of opportunity to avert climate catastrophe, the growing harms of climate change, and the broader harms of fossil fuels, combine to suggest that we are in a state of emergency, and a rather dire state too. We need to act rapidly to shift global society away from dependence on burning fossil fuels "if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated" to borrow the words of the first World Scientists' Warning to Humanity (Kendall, 1992). We are already too late to stop much devastation, but we still have a small window of opportunity to potentially avert the more catastrophic climate impacts, as well as to save hundreds of millions of lives that would be lost and/or prematurely shortened by the broader pollution and harms associated with continuing on the fossil fueled status quo. This gives rise to what I term the Fossil Free and Climate Emergency Imperative (FFCEI), which holds that given the limited time available to avoid grave, substantial and widespread harm associated with catastrophic climate change and the broader harms of fossil fuels, we are in a relative state of emergency which demands rapid, comprehensive, and sweeping action to deeply reduce fossil fuel use and greenhouse gas emissions.

Being in an emergency augments the nature of people's moral responsibilities. Things we might not otherwise be called on to do under normal circumstances become part of the purview of what can be morally asked of us. Our moral responsibilities shift in proportion to the scale and nature of the emergencies that we face, and the climate and fossil fuel emergency we face is immense in scale and deeply urgent in terms of the rapidly closing window of opportunity we have left to undertake the wide-scale transformation required. Of course, we should be appropriately wary of appeals to emergency and how they can be problematically used, as they have at times been used to grant authorities undue power, and in the climate case they may be abused to justify problematic interventions such as morally questionable climate engineering interventions (cf. Gardiner 2010, and Part C, Chapter 10). In our case, however, the emergency is real, and we must respond appropriately and reconceptualize what it means to act morally in relation to this emergency – a task the next three chapters aims to take on.

With this context of relative emergency in mind, we can now turn to the more philosophical task of asking just what the nature of people's moral responsibility is in the face of this crisis. In this deeply non-ideal world we are living in, in the face of a climate emergency, what moral responsibility do people have to act on climate change and to reduce our fossil fuel dependence? The task of reducing dependence on fossil fuels and tackling climate change is a problem that is global in scale, involving the acts of billions of people, the complex interplay of individuals, states, corporations, communities, infrastructure, policies, laws, norms, and culture. Acting can seem overwhelming, complex and intractable, so what moral responsibility do individuals have to address the problem? Who has what responsibilities and to what extent? While many recognize a broad moral responsibility to reduce fossil fuel dependence, and address climate change, what does that responsibility entail in terms of what individuals should do to act morally remains a point of significant dispute. And if we are in a time of emergency, how much can morality ask of us? How do we discharge this awesome moral responsibility to act in the face of the climate crisis?

Chapter 5 will discuss how the emergency we face changes the nature of our personal responsibilities to reduce or augment the resources we consume. It argues that we have a prima facie moral responsibility not to unnecessarily use limited resources whose use contributes to the harms of others, unless there are sufficiently strong moral reasons for doing so. One sufficiently strong reason to do so, is to push for broader more wide-scale action of the sort needed if we are to properly act on the Fossil Free Climate Emergency Imperative. Chapter 6 discusses how we can balance the need to push for broader structural transformation with the need to reduce our personal contribution to the problem. It argues that if reducing individual emissions conflicts with the ability to pursue more effective climate action, or other more morally significant endeavors, then such considerations should typically outweigh the responsibility to reduce one's own emissions. Chapter 7 then discusses the deeply demanding nature of the moral responsibilities we called to take on, responsibilities that may seem unfairly demanding, but are part of what it means to act virtuously and morally in the face of climate emergency.

Chapter 5: The Insufficiency and Importance of Individual Emissions

As Augustin Fragnière's (2016) overview of the philosophical literature on individual responsibility for action on climate change shows, most writers agree on the fact that individuals have at least some duties to take action against climate change, but disagreement remains about the exact nature and extent of these duties. Fragnière highlights that the literature has had a strong focus on individual action to reduce personal emissions and spent a significant amount of time debating the extent of those responsibilities. Similarly, in the popular discourse around climate change, calls to action on climate change often translate into exhortations to reduce one's personal emissions, to buy green, drive less, buy efficient light bulbs, be a green consumer, etc. Similar exhortations populated the back-cover of Al Gore's *Inconvenient Truth* DVD, and over a decade later, at the beginning of 2018, the New York Times provided a list of New Year's resolutions for people interested in making a difference on climate change, which consisted only of ways of reducing personal emissions and waste, without mentioning the need for regulation or political action (Pierre-Louis, 2018). According to the New York Times, how one can reduce their personal emissions is the most asked question their climate change team gets, revealing how prevalent an individualistic framing is.

The prominence of such individualistic thinking can also be traced to a decades long fossil fuel industry PR/propaganda campaign which tried to ensure that the problem of climate change was framed as a question of individual responsibility, rather than as a structural problem driven by industry lobbying, misinformation and pushback against climate legislation (Westervelt, 2018b). Through doing so, the fossil fuel industry and other polluting industries predominately responsible for causing climate change and blocking solutions, would be able to avoid responsibility for climate change, and paint themselves as just meeting demand, rather than as the major underlying cause of the problem. Like a drug dealer, the fossil fuel industry and their allies told us that they are just supplying the product, and we, like addicts, are the ones demanding their product. Instead of allowing us to get clean though, they worked to block all meaningful policy aimed at moving us off from their polluting product, and they spread enough doubt and misinformation in places like the United States to ensure such a strategy worked.

In addition to obscuring the responsibility of the fossil fuel industry and their polluting allies, the problem with the dominance of such an individualistic consumption driven line of thinking is that it obscures how individuals are embedded within a complex structural landscape that promotes fossil fuel use, and how structures, policies and regulations shape the choice landscape available to individuals. Focusing only on individual consumption often reduces individuals to green consumers, asked to display our virtue by buying green and reducing our own emissions, thus pinning the failure to address climate change on our lack of virtue as environmental consumers, while rendering invisible the structures that shapes those choices. We are told we are the sinners and that the problem is us as individuals, rather than placing blame on the structures within which we are embedded and the policies which enforce fossil fuel addiction.[47] As Martin Lukacs (2017) argues, such limited exhortations to individual action have bought into a problematic framing of climate change, which frames the problem in individualistic and consumerist frames, thus failing to grapple with the importance of shifting the structural factors which drive the climate crisis, and which require more collective action.[48]

While individual action to reduce emissions can help address climate change, if we do not simultaneously address the structural factors that shape such choices, then we only deal with a small and inadequate part of the picture. In the rest of the chapter, I examine both the importance and the insufficiency of individual emissions, arguing that while reducing personal emissions is insufficient in itself to fully meet our moral responsibility to act on the FFCEI, that reducing emissions is nonetheless morally important, especially for affluent individuals,

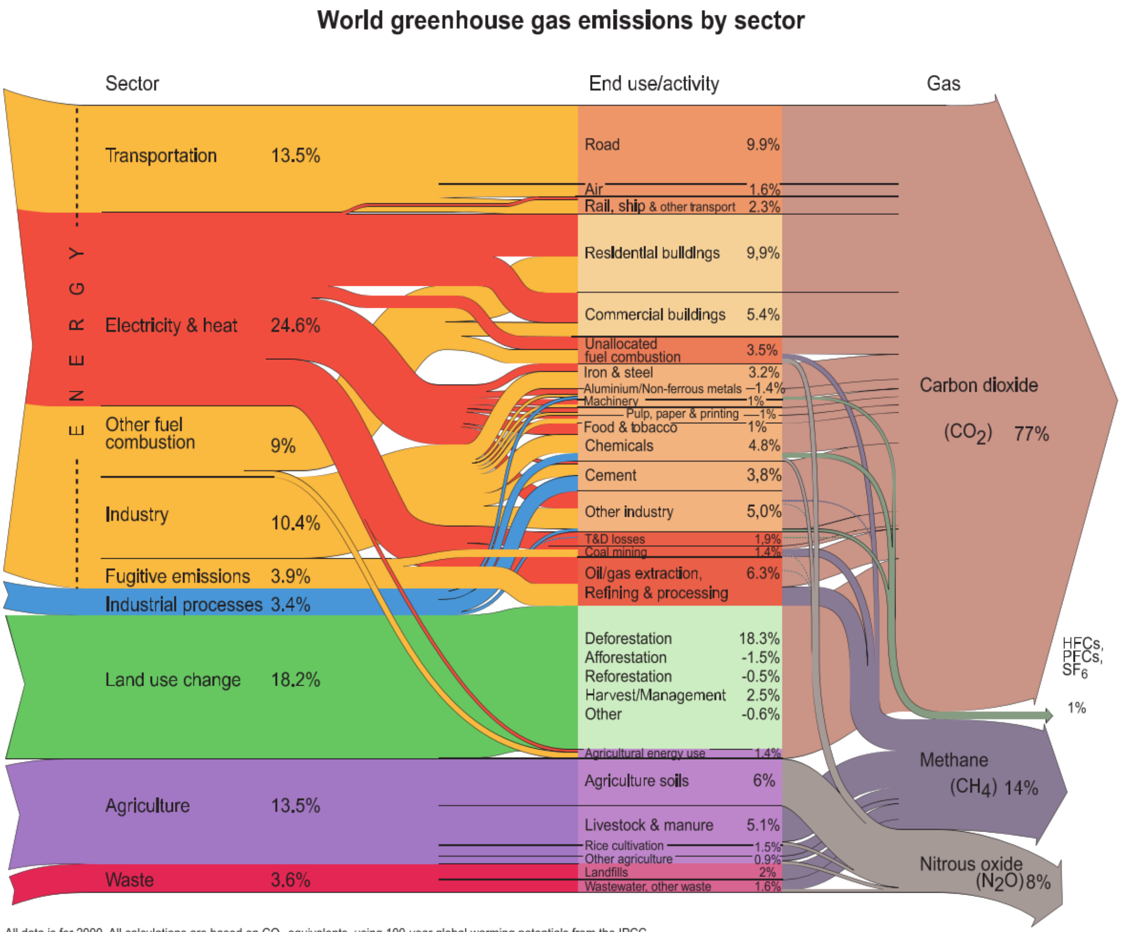
[47] A similar point could perhaps be made for the role of sin as an institution of the church working in partnership with the government. The notion of sin helped control and placate individuals by making them believe that their bad lot in life was as a result of their own evil doing rather than as a result of the structures and policies in place which were significantly responsible for causing their bad lot.
[48] I use the word 'structures' following Iris Marion Young, who defines them as "the confluence of institutional rules and interactive routines, mobilization of resources, as well as physical structures such as buildings and roads." Structures provide "background conditions for individual actions by presenting actors with options; they provide 'channels' that both enable action and constrain" agency.

as unnecessarily profligate emissions particularly of affluent individuals, takes up more than their fair share of the carbon budget, contributes to harm, and wastes precious resources, thus potentially reflecting moderate greed, callousness and apathy on behalf of the unnecessarily profligate emitter.

The Insufficiency Problem

In the BBC Blue Planet's final episode, wherein they focus on humanity's impact on our planet, they ring off the episode with a penultimate quote from scientist John Copley who says that: "It comes down I think to us each taking responsibility for the personal choices in our everyday lives, that's all any of us can be expected to do, and it is those every day choices that add up" (BBC, 2017 Season II, Episode 7, 48min). The problem with Copley's quote, as I will show throughout this section, is that while our personal choices do of course add up, they add up to too little. As such, if we are to tackle climate change, we will need to ask and expect people to do more than simply take responsibility for their own personal everyday choices.

To give a more quantitative sense of the importance and inadequacy of individual emission reductions, we can turn to the work of Chris Cuomo (2011, p. 701). As Cuomo highlights, reducing only personal emissions in our role as individual consumers simply will not suffice to reduce fossil fuel use at the scale and pace required. Drawing on data from the below graph from the World Resources Institute, Cuomo says that the emissions that the average consumer directly controls, their household and personal transport emissions, make up less than 20% of global emissions. This is a problem Cuomo terms the insufficiency problem, which, in her words, refers to the fact that the "reductions that average consumers can control, such as household emissions and personal transportation, are insufficient to bring greenhouse gas concentrations down to safer levels, because household consumption and personal transportation account for a significant but minority slice of total greenhouse gas emissions worldwide" (2011, p. 702).



All data is for 2000. All calculations are based on CO_2 equivalents, using 100-year global warming potentials from the IPCC (1996), based on a total global estimate of 41 755 $MtCO_2$ equivalent. Land use change includes both emissions and absorptions. Dotted lines represent flows of less than 0.1% percent of total GHG emissions.

Source: World Resources Institute, Climate Analysis Indicator Tool (CAIT), Navigating the Numbers: Greenhouse Gas Data and International Climate Policy, December 2005; Intergovernmental Panel on Climate Change, 1996 (data for 2000).

Compounding the insufficiency problem, Cuomo highlights that there is a problem of disempowerment that arises from the fact that many of the emissions tied to an individual's actions are largely outside of their individual control: "The options that most individuals are able to consider regarding energy and technology use are determined externally, and fossil-fuel use is woven into any household routine or local culture in ways that are very difficult to change without causing other problems" (Cuomo, 2011, p. 702). As a result of the problem of disempowerment, it is often difficult for individuals to reduce their own personal emissions, as many of the required changes to facilitate them being able to do so, rest outside of their direct control as individuals. Similarly, Monica Aufrecht (2011, p. 202) draws from the notion of "structural violence" to argue that infrastructures in the U.S., such as food distribution and housing, leave limited room for personal choice when it comes to emissions, and that as such the predominant focus of our climate advocacy should be on shifting those structures.

The personal choices we have control over in our everyday lives make up only a small part of total emissions, and for the average person reducing our emissions footprint can be difficult, given that they are often out of the direct control of individuals. As such the effort put into reducing our individual emissions may under certain circumstances be a less effective method of reducing overall emissions than broader collective action. This has led some to conclude that reducing personal emissions is not the most important element of our moral response to climate change, and that instead we should focus on broader collective action (Aufrecht, 2011; Cripps, 2013). Even more strongly, some theorists argue that we have no moral obligation to reduce individual emissions, and instead our moral responsibility is only to push for collective solutions (B. Johnson, 2003; Kingston & Sinnott-Armstrong, 2018; Sinnott-Armstrong, 2010).

While the position that it is not our moral responsibility to reduce emissions as individuals is tempting, especially given the problem of overly individualistic moralizing around climate change, such a position goes too far and is problematic. If taken to an extreme, it seems to excuse unnecessary profligate individual emissions and consumption. For if we do not have a moral responsibility to reduce individual emissions, does that then give us carte blanche to emit or consume as much as we want? We should hope not, for as the next section aims to show, even though addressing individual consumption alone will not fully address the climate crisis, nonetheless individual emissions contribute rather significantly to the problem, especially for the rich and affluent. While we can accept the problem of insufficiency and hold that addressing individual emissions is insufficient to address the problem, that does not mean that individual emissions are not significant. Insufficient does not entail insignificant, for particularly when it comes to the rich and the affluent of the world, their emissions are contributing rather significantly to the problem.

The Rapaciousness of the Rich

When discussing statistics about individual emissions, Cuomo focuses on the "average consumer" to suggest that the problems of disempowerment and insufficiency make individual emissions reductions less morally important (2011, p. 704). Focusing on the problems of insufficiency and disempowerment, seems appropriate when we are focusing on average families that might be trying to effectively tackle climate change while making ends meet. However, the notion of the "average consumer" obscures the fact that for the affluent, the reality is much different, and by the affluent I mean high income, high consuming individuals the world over. For the average family, a significant portion of their emissions might be attached to their efforts just to get by and embedded within the structures around them that make reducing emissions difficult. For the affluent, however, that is much less the case, with much of their emissions being associated with unnecessary luxury emissions that are much more within their control.

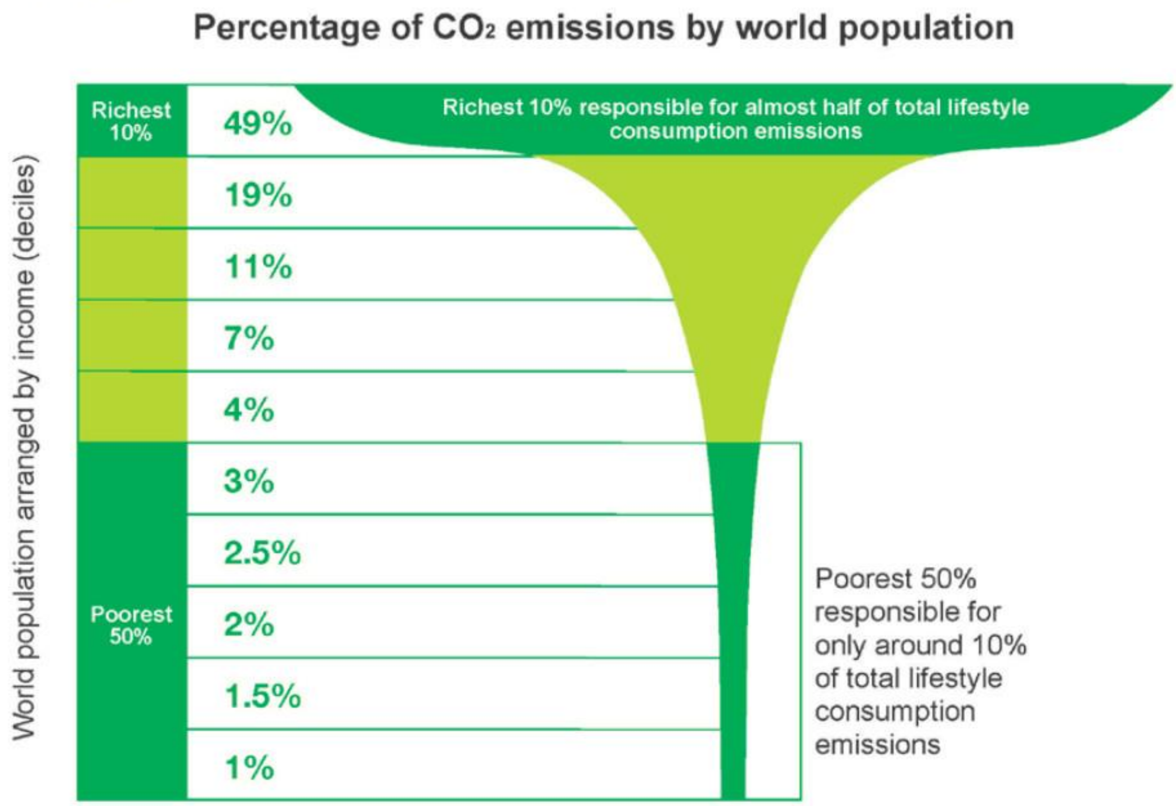
The emissions of the affluent are much larger than those of your 'average' person.[49] As such, while there are structural factors that make it difficult for people in societies like the U.S. to reduce their personal emissions, when it comes to the affluent, the problem of disempowerment and insufficiency has less sting, as they have much higher individual emissions and more control over reducing their consumption. Many of the emissions that the rich will have control over are luxury emissions, something which they could more easily remove from their lives, and also something that the climate ethics literature has long deemed less ethically defensible than emissions tied to more substantive needs (Shue, 1993).

An Oxfam (2015) report entitled *Extreme Carbon Inequality* shows that the world's affluent are the predominant drivers of consumption emissions, and that their individual emissions are far from negligible. Oxfam's analysis broadens the scope of the emissions individuals are

[49] I do not follow Cuomo in referring to the average person as the average "consumer", as I feel that defining people by their consumption and relatedly a society's progress by their GDP are part of a problematic cultural frame that contributes to climate change, inequality and environmental degradation by embedding perverse notions of identity as attached to one's consumption.

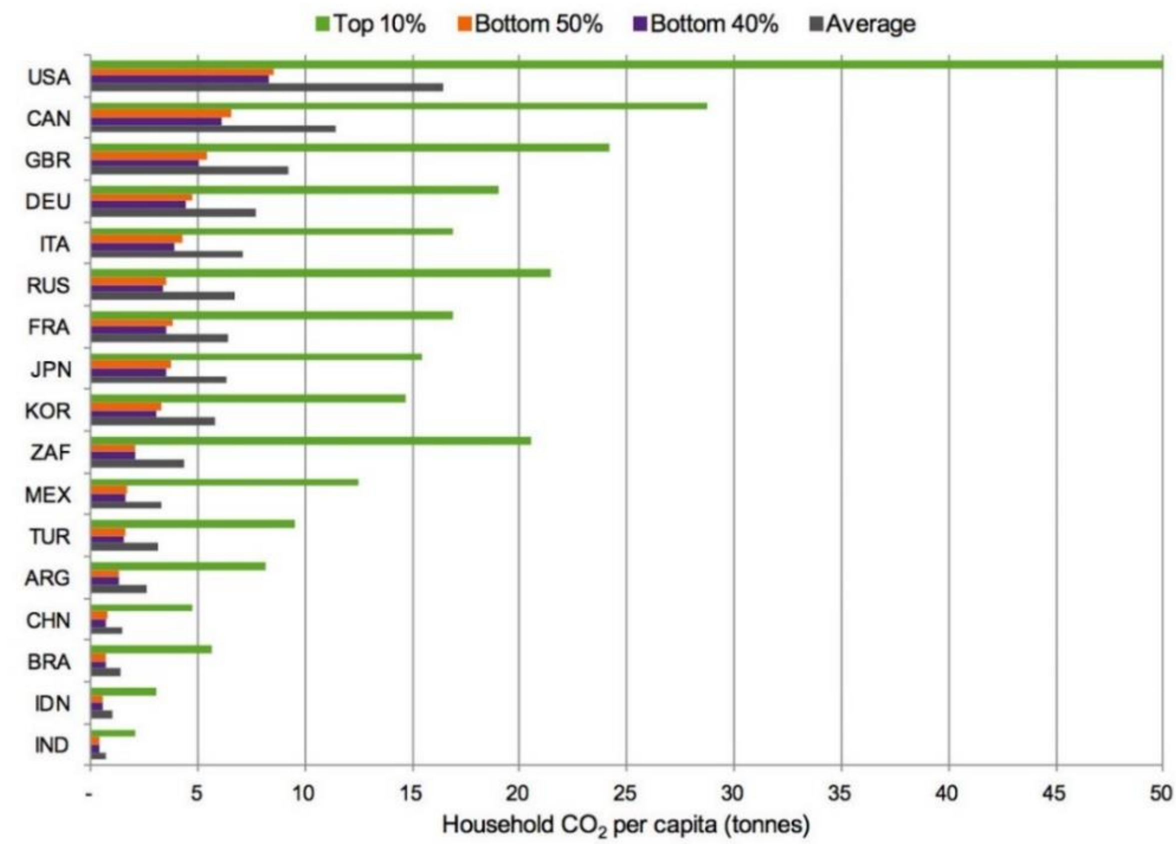
responsible for creating not only to household and personal transport emissions as Cuomo does, but also those tied to what are consumed as part of our lifestyle emissions. Such broadened estimates shows that lifestyle emissions globally account for 64% of total emissions.[50] Importantly, as the figures below show, the richest 10% of the global population are responsible for almost half of global lifestyle related emissions, whereas the poorest 50% - around 3.5 billion people - are responsible for just 10% (Oxfam, 2015). At the same time, the world's 3.5 billion poorest adults who account for 70% of the world's working age population, account for just 9% of global income, compared to the richest 1% who have over 20% of the world's income, or the richest 10% of the global population who own the majority of the world's wealth (Alvaredo, Chancel, Piketty, Saez, & Zucman, 2018). Thus, not only are the world's richest disproportionately responsible for causing climate change, they can also most afford to pay for the transition to a renewable energy future.

Figure 1: Global income deciles and associated lifestyle consumption emissions



[50] There is a technical note available which explores the methodology that Oxfam employed: https://policy-practice.oxfam.org.uk/publications/extreme-carbon-inequality-why-the-paris-climate-deal-must-put-the-poorest-lowes-582545

Figure 4: Per capita lifestyle consumption emissions in G20 countries for which data is available



While the affluent the world over disproportionately contribute to the problem, there is a significant difference between the lifestyle emissions of the affluent in the developed world and those of the developing world, as Oxfam's figure 4 above highlights. For example, the richest 10% in China still emit less carbon per person than people on the bottom 50% of the US wealth distribution, and many times less than the richest 10% in the USA. Some of the emission of affluent individuals in the United States may be due to structural factors which prevent them from reducing their personal emissions beyond a certain level, as the infrastructure they are embedded in does not provide them with much alternative choice. However, for America's affluent, many of those emissions may be tied more to high consuming lifestyles which are tied to luxuries and are not necessarily associated with trying to get by in a carbon intensive infrastructure.

For non-luxury emissions and non-affluent individuals facing structural problems of insufficiency and disempowerment, it seems appropriate to apply Theresa Scavenius' (2018) argument that people should not be held morally responsible for failing to act on climate change when there are external constraints which prevent them from being able to do so. However, for the world's affluent, their failure to reduce emissions often stems less from external constraints and more from high personal consumption. The profligate emissions of the affluent are many times those of the rest of the world, and are the largest contributors to the problem, with the world's richest 10% contributing to 49% of total lifestyle consumption emissions, which in turn make up 69% of overall emissions. Thus, the richest 10% of the world's population's lifestyle consumption choices are responsible for close on 35% of global emissions. [51]

Given the scale of emissions that rich individuals create through lifestyle consumption emissions, their individual emissions are far from inconsequential and contribute significantly to the cumulative harms of climate change. However, some, philosophers such as Walter Sinnott-Armstrong argue that while cumulatively our emissions contribute to climate change, any individual personal contribution is too small to make a difference in itself to climate change and is thus not morally problematic. Sinnott-Armstrong argues that while one does have obligations to urge larger institutions such as governments to limit total emissions, one has no obligations to change one's personal life to limit one's own emissions. According to Sinnott-Armstrong we are free to pollute as we want in our personal lives.

In both Sinnott-Armstrong's original article, and a more recent article re-defending Sinnott-Armstrong's position against critiques, written by Ewan Kingston and Sinnott-Armstrong (2018), Kingston and Sinnott-Armstrong (hereafter referred to as K&S), attempt to defend the

[51] Looking forward a significant concern is whether the [stick to Global North and South] developing follows a similarly polluting path as the developed world, and whether individuals in the developing world adopt similar sorts of high consuming lifestyles. This points to a further importance of individual emissions to a certain extent, but also to the need to ensure broader structural changes which ensure a more sustainable development path for the developing world. This is a topic I will revisit in Chapter 3.

practice of wasteful driving and other profligate emission use as not violating any moral requirement. They say that one can perfectly well, without meriting negative moral sanction, go on a long joy ride in a gas guzzling SUV not because you have to, or because you don't have other transport options, like a hybrid or less polluting vehicle, but simply because you enjoy the power and feel of gas guzzlers. They refer to this as 'joyguzzling' and say that it, like any other form of personal emissions use does not merit moral sanction. Joyguzzling serves as an extreme example upon which to justify by extension that we have no moral obligation to reduce personal emissions, even if we have alternative less polluting options available to us.

K&S' position has gained significant prominence and controversy in the climate ethics literature, and problematically so, in my opinion. I aim to show that their conclusion relies on three problematic ideas. Firstly, K&S use a rather fuzzy definition of what is a moral requirement that leaves undefined what is considered reasonable uses of greenhouse gases or what constitutes an adequate justification for doing so. Secondly, K&S argue that if you cannot show a direct causal link between an act and a harm, that we therefore do not have a moral requirement to reduce emissions. This, I will argue is too narrow a notion of moral responsibility in the face of structural, complex and multi-causal problems. Finally, to support their arguments, K&S rely on a problematic empirical claim that an individual's emissions are too small to make a difference to climate change and/or to cause harm. I will argue that this too is a problematic claim, for it fails to recognize that we are already in a territory of dangerous climate change, where each individual amount we emit reduces the available carbon budget and contributes, however minutely, to increased risks of harms from climate change and also the broader harms of fossil fuels.

First, let us turn to the question of whether reducing our personal emissions is a moral requirement. K&S say we do not have a moral requirement to refrain from emitting "reasonable amounts of greenhouse gases (GHGs) solely in order to enjoy oneself", and that someone who violates a moral requirement "without adequate justification" is liable to "some negative sanction (including moral condemnation, anger, or guilt)" (Kingston & Sinnott-

Armstrong, 2018, p. 170). Unfortunately, K&S use terms like "adequate justification" or "reasonable amounts of greenhouse gases" without defining what is reasonable or adequate or showing what moral significance such terms have in their definition. Such fuzziness and indeterminacy makes their philosophical position hard to pry apart, especially as what we should consider "reasonable use" or an "adequate justification" for emitting seem to be precisely what is at stake in considering if and when we are morally justified in burning fossil fuels and when doing so deserves negative moral sanction. Part of the problem of their paper, is that they seem to problematically presume without defense that joyguzzling is reasonable and having fun is an adequate justification, but that is precisely what we need to question.[52]

Bearing the fuzziness of K&S' definition in mind, let us run with the definition, that a moral requirement is an action which if someone fails to follow through on without any adequate justification or excuse, they are then liable to some form of negative sanction. I aim to argue that there are good moral reasons to refrain from joyguzzling and other similar acts of profligate emissions use by the affluent. I argue that joyguzzling and other acts of profligate emitting which are done solely for the sake of fun and not because there aren't reasonable alternatives, do merit to a certain extent moral condemnation, anger, and guilt. Indeed, feelings of moral condemnation and anger are especially justified by the young, the global poor (and, if they could express such feelings, also nature and future generations) who will be disproportionately impacted by the profligate emissions of the current generation. I argue that such actions should be subject to negative sanctions not only morally but also policy-wise, as

[52] K&S at times appeal to the everyday practices of people in relation to acts of emitting to say that because we not typically see acts like joyguzzling as unreasonable that they therefore are not. On the face of it, when viewing every day practices in the rich and developed world it seems that many typically do not morally condemn or get angry at people for joyguzzling or other acts of profligate emissions use, and many who joyguzzle do not feel guilty about it. So, if we were taking a public opinion poll of the affluent to decide what is reasonable, then K&S would be right that refraining from joyguzzling is not typically considered unreasonable. However, morality is different from conventional norms of the rich and powerful. Just because something is taken to be the case, or is typically viewed in a particular way, does not mean that those views are justified. To determine morality simply on the basis of what people generally believe, would be to violate Hume's Law, which holds that just because something is the case, does not necessarily mean that it ought to be the case i.e. "is" does not equal "ought". As such, we need to ask whether such a view is morally justified.

is already occurring in many parts of the world through carbon taxes, and gradual bans on fossil fuel use in power plants and internal combustion engines.

To make my argument, let us begin by considering the idea that our emissions do in fact contribute to harm, suffering and death. Sinnott-Armstrong rejects such a claim by arguing that our individual emissions do not matter, as any individual act of emitting will not cause harm. He makes such a claim by appealing to what Monica Aufrecht (2011), in commenting on his view, refers to as a Threshold Model of climate change, whereby the harms of climate change only occur when we have exceeded a certain threshold of emissions. Once that threshold level of emissions is reached, then the resulting sudden rise in global temperatures would begin to cause negatives effects on climate. However, according to K&S, no one individual act of emissions is necessary or sufficient to cross that threshold, so therefore it is not morally problematic.

The problem with K&S' threshold models is that it based on an inaccurate view of climate change, and it fails to recognize that we have already crossed the threshold of dangerous climate change and are making climate change more and more dangerous, such that, to recall the words of renowned climate scientist Michael Mann, "Every bit of additional warming at this point is perilous" (McKibben, 2017). And with every emission contributing, even if minutely, to increasing warming, then each of our emissions add to the risks and harms of climate change; and potentially to irreversible tipping points. And, for joyguzzlers, they are doing this just for the fun of it.

K&S object that no individual emission in itself is sufficient to cause harm, and Sinnott-Armstrong says that "Greenhouse gases (such as carbon dioxide and water vapor) are perfectly fine in small quantities. They help plants grow. The problem emerges only when there is too much of them" (Sinnott-Armstrong, 2010, p. 335). Thus, because greenhouse gas emissions in small quantities would be fine, supposedly we meant to believe that emitting in small quantities now is also fine. However, it seems perversely abstract to view our actions in isolation from the world within which they actually take place, for in the world we are actually living in, there are already far too much greenhouse gas emissions and we are barreling towards catastrophic climate change. It is in this context that we must see our actions and recognize that they are contributing to the increased risks of climate change, even if minutely so when seen individually.

In the words of Derek Parfit, it is a "mistake in moral mathematics" to assume that because an act has an imperceptible effect or makes only a tiny contribution to a cumulative harm, that it therefore cannot be wrong (Parfit, 1984, p. 77) . Augustin Fragnière (2016, p. 799) refers to this as the 'paradox of small effects,' which holds that in problems like climate change, a set of seemingly morally insignificant actions can bring about morally significant harm. In response to the paradox, as Chris Cuomo points out, "if one knows her actions are part of a set of collective actions that together result in great harm, she must evaluate the rightness or wrongness of her contributions in light of the knowledge that others are also engaging in the activity, and together they create a cumulative effect. To make an anonymous contribution to a mob action is not to be blameless in relation to the cumulative harm caused. Even regarding individual actions that seem imperceptible, we therefore have duties to cease acting if we are contributing to serious harm" (Cuomo, 2011, p. 701).[53]

To address K&S' skepticism that individual actions cannot make a difference to climate change, we can turn to calculations from another renowned climate scientist Ken Caldeira (2018) who showed that on average every pound of carbon released to the atmosphere

[53] Another way of thinking about this, is to highlight that K&S seem to be stuck on a very narrow conception of direct harm. As Judith Lichtenberg highlights, "central to the classical picture of harm on which the primacy of negative duties depends is 'the idea that individuals are primarily responsible for the harm which their actions are sufficient to produce without the intervention of others or of extraordinary natural events'… Two elements are important. One is that an individual's action is sufficient, without the acts or interventions of other people, to cause harm. The other is that the harmful effects a person's action produces are generally near and immediate. My fist comes into contact with your nose (and breaks it); my car runs you over (and crushes your leg). This causal picture less accurately reflects the mode of individual agency increasingly prevalent in the world today than it does to classic torts, for example. In the cases I am concerned with here—what I call the New Harms—no individual's action is the cause of harm; it would be more accurate to say that an individual's action makes a causal contribution to an overall effect that may be very large and significant" (Lichtenberg, 2010, pp. 561–2). The changing nature of the harms does not mean we have no moral responsibility, but rather new harms comes with new and different responsibilities, such as the Anti-Pollution Principle.

as CO_2 is likely to end up melting more than a ton of glacial ice. That in turn works out to about more than a ton of Antarctic ice loss for each hour of CO_2 emissions from an "average" American - for the richest American, we can likely quintuple that number. Similarly, we could turn to John Nolt's (2011a) calculation that the "average" American, over their lifespan emits enough, such that if we averaged out the harm caused by America's emissions, each individual would emit enough to cause on average the suffering and/or death of two people through their emissions – again a number we can likely quintuple for the richest Americans. Additionally, if we consider the broader harms of fossil fuels, such as air and water pollution, then our harms become both more direct and immediate, and even less like a threshold model, and more like a cumulative model, where the more we contribute the more harmful the problem becomes.

Apart from contributing to the cumulative harms of climate change and fossil fuels more broadly, profligate individual emissions and consumption is also problematic given that we have a very tightly constrained carbon budget, such that individuals who profligately use emissions are both reducing our chances of meeting the Paris Agreements and to a significant extent robbing others of the possibility to emit, and potentially for more morally important purposes. The carbon budget shows that we have a limited cumulative amount of emissions that we can afford to emit if we want to avert catastrophic climate change, so whenever we emit we are reducing the budget left over for others. As Kriegler et al highlight in their overview of whether we can still meet 1.5°C target, "limiting warming to 1.5°C is an enormous challenge. To tackle this challenge, every tonne of CO2 that is not emitted into the atmosphere counts" (2018, p. 14). As such, we face what Henry Shue calls a 'shrinking zero-sum' (2014a, p. 100). And following the logic of a tightly constrained zero-sum shrinking budget, it seems that some thrift and frugality would be in order and some priority given to those who most need to emit to meet their basic needs. Instead, we have professional climate ethicists defending the freedom of the affluent to burn up what's left of the budget just for the fun of it, to engage in lifestyles filled with frivolous and profligate luxury emissions. The disconnect is astounding.

By way of analogy, imagine you lived in a relatively poor community who had a small budget with which it needed to address pretty much most of its needs, and that the budget was entrusted to all individuals to use responsibly. You and a small group of friends, in turn, abused your free access to the budget and splurged it on unnecessary goods, such that the rest of the community could not use it to meet their basic needs. Your actions made it such that in order to meet their needs your community had to steal from and harm other poor communities, or risk going hungry themselves. The community would have every right to be angry at and condemn those who wasted their budget frivolously, and those who did so should rightfully feel guilt.

Similarly, the poor and younger generations who will be most impacted by climate change, and who share the limited carbon budget with the wealthy, have every right to be angry and to morally condemn the wealthy of the world for frivolously depleting the tightly constrained carbon budget, particularly if they do so for reasons as frivolous as joyguzzling, and other forms of unnecessary frivolity luxury that come at the expense of significant carbon emissions. As Byron Williston points out, “when resources are scarce and have multiple claimants, those who already have more than their fair share cannot be just without self-constraint” (2015, p. 89). Questions of justice and fairness are central to how we use our remaining carbon budget, yet instead of exercising constraint when using a scarce shared resource which others might need for morally important purposes, joyguzzlers are frivolously using it up, and through doing so are contributing to significant harms of climate change and fossil fuels and the increased risks of deeply catastrophic outcomes.

In sum, K&S are wrong to say that joyguzzling does not contribute to the problem of climate change, it does, as it uses up our limited carbon budget, and it does so for frivolous reasons. Additionally, it does contribute to increased risks and harms of climate change, given that we are already in a world where we have emitted more GHGs than is safe, such that “every additional bit of warming is perilous”. To be clear, I am not decrying as immoral all forms of emissions use, what I am suggesting is that wasteful and unnecessary emissions use is worthy of moral condemnation, as it contributes to the harms of climate change and broader pollution, and is not a reasonable use of the very limited remaining carbon budget. This brings me back to the question of reasonableness. K&S tacitly assume, without much defense, that joyguzzling falls into the category of “emitting reasonable amounts of greenhouse gases (GHGs) solely in order to enjoy oneself”. But why should we accept that as reasonable? Reasonable by whose standards?

Perhaps among a wealthy, developed world family, with plenty of money to splurge, using up resources like a joyguzzler seems reasonable, if you bracket out the social and environmental context. However, I imagine a poor family may be angry and condemn their son if he used what little fuel they had to joyguzzle, when their mother needed it to go to work and make a living for the family. And our situation, with regards to the carbon budget, is more analogous to that of the poor family living on a tight budget, except, of course, our family has over 7 billion human inhabitants, and our budget relates to the ability to keep an already dangerously perturbed shared atmosphere from pushing way beyond the conditions of relative stability that have allowed for human civilization and life as we know it. As such, we should reject the argument of K&S as out of line with our current context, a relic of moral thinking only suited to the context of the affluent and those with plentiful resources, the use of which does not harm others, a context far removed from our collective plight.

Byron Williston points out that “the age of oil *is* the age of frenzied consumption” (2015, p. 87). I would amend such a statement to say that it is an age of frenzied consumption mostly for the affluent, and K&S seem to be trying to defend some of the most conspicuous and frenzied elements of that consumption as somehow ethical. They are normalizing what is historically a deeply abnormal form of harmful wastefulness and consumption, namely, driving around a near tank-sized vehicle *merely* for fun, rapidly burning up oil resources that were likely secured through war, violence, intimidation and/or corruption, and whose effects include contributing to harmful air and water pollution, as well as the destabilization of the planet's climate. Meanwhile the global poor often struggle to get access to energy, at the same time that they feel the brunt of the impacts of pollution and the destabilization of the climate.

K&S' attempts to defend joyguzzling and similar actions as reasonable seems reflective of a problematic form of entitlement where the affluent of the world feel so entitled to luxuries and consumption, that they consume them almost regardless of the consequences. It is a peculiar Orwellian feature of our current times, particularly in the United States, that the poor often get scolded for being overly entitled if they expect enough resources to get by in return for what is often hard and long work days, whereas the wealthy, many of whom live a life of relative luxury and leisure, feel entitled to devour the world's resources, harm others, and even destabilize the earth's climate to meet their demands for luxury and entertainment, even if there are alternative less polluting means available for doing so, as K&S specified was the case for joyguzzlers. The real sense of problematic entitlement seems to lie with the unapologetic affluent, not the poor of the world.[54]

Now, to be clear, I am not arguing that joyguzzling merits being thrown in jail or is on the same moral level as killing or stealing, but, to return to K&S's definition of moral requirements, I do believe that if one is polluting "without any adequate justification or excuse they are then liable to some form of negative sanction (including moral condemnation, anger, or guilt)" (Kingston & Sinnott-Armstrong, 2018, p. 170). It seems quite problematic to suggest, as K&S' position implicitly does, that the global poor or young people are not justified in feeling angry or condemning the global rich for their harmful lifestyles. In turn, the global rich should feel at least some guilt, if not deep regret, that their lives of luxury are harming others, especially as the justification that they simply wanted to have fun, hardly seems an "adequate" justification, especially if there are other non-polluting alternatives available, as was specified to be the case for K&S' joyguzzlers.

[54] For those trickle-down economists who believe that these benefits for the wealthy actually trickle down and benefit everyone, in Part C I will show instead how this arrangement very much harms the global poor.

Recognizing that unnecessary and profligate fossil fuel use does indeed contribute to morally problematic harm and is worthy of sanction, many jurisdictions are already acting on this, and implementing policy measures such as carbon prices, and gradual bans, phase outs and managed declines of fossil fuel extraction and burning. For instance, far from seeing joyguzzling as a harmless act, India for both climate and air pollution reasons, will ban new internal combustion engine (ICE) sales, and only allow for the sale of hybrid and electric vehicles from 2030 onward. The Netherlands, Norway, France, the UK, Scotland, China are also implementing similar policies although on different timelines ranging from 2025 to 2040.[55]

Of course, if we are to be sensitive to structural factors and questions of justice, policies to ban and phaseout fossil fuels and ICEs should be implemented in ways that ensure that people have meaningful access to alternative means of getting around as we transition away from ICEs. They should also provide adequate assistance to those whose livelihoods may be negatively impacted by the shift away from ICEs such as auto-mobile workers and mechanics. However, we can recognize the need for a just transition, without being an apologist for profligate and unnecessary emissions, given their contribution to the harms of climate change and fossil fuels, and their use of the rapidly dwindling carbon budget.

The world faces an inter-connected set of ecological crises of which climate change is just one deeply urgent instantiation. Simultaneously, we live in a world where many individuals do not have access to enough to meet their basic needs. Consuming and polluting profligately in such a context, despite the harmful consequences of doing so, and doing so for reasons that are quite frivolous, seems to be not only ethically problematic, but also as Stephen Gardiner highlights in the following quote, such actions may be potentially reflective of vices such as recklessness, callousness, and shallowness.

[55]Pushing the deadline for phasing out ICEs earlier can play a major role in helping countries meet their climate targets. For instance, if the UK pushed its goal from 2040 to 2030, it could cut the current gap in its 2030 climate action pledge by 85% (A. Vaughan, 2018).

> "Three charges that could be made against the current generation of the world's affluent, each of which tends to both accommodate and extend the more standard criticisms [of harm and injustice]. The first charge is one of recklessness. [The affluent's] lack of appropriate action imposes risks on the vulnerable that are not just severe… but also at least seriously unjustified, and perhaps deeply thoughtless and wanton… The second charge… is one of callousness. The extent of our recklessness strongly suggests a profound indifference to the concerns of those who must reap the consequences of our behavior… The third charge is that we may be rebuked for our apparent shallowness… [T]he harms inflicted and injustices perpetrated by the present on the future are done out of narrow self-interest without any respect for ethical concerns. This may be damning enough. However, a further concern is in some ways even more disturbing. Perhaps the benefits whose pursuit brings on the threat of environmental catastrophe ultimately are at best relatively unimportant, and at worst close to trivial, *even to us*, and especially in comparison to the damage done." (Gardiner, 2012, pp. 244–5)

Gardiner's critique is targeted more broadly at the world's affluent, but personally I would apply it more narrowly and focus it on those who engage in unnecessary and profligate emissions such as joyguzzlers who pollute for relatively trivial reasons. The label of vice is trickier to apply in cases that are not instances of unnecessary or profligate emission done for relatively trivial reasons as it is difficult to judge what motivates a person for doing a particular thing, and whether we are being too quick to judge them as vicious when in fact the reasons for action may be deeper than we realize. Additionally, joyguzzlers unaware of the consequences of their actions and the emergency we face may not be acting viciously, although there is arguably a responsibility to become aware of how our actions impact others. As such, while the framework of virtue ethics can help us think about the moral character of those performing the action, I do not want to dwell on such judgments for long given the fraught nature of doing so. Rather, my focus is more on providing actioning guiding principles which can help us as we determine when it might be morally alright to emit and when it might be morally problematic to do so. In the next section I defend one such principle, which I term the Anti-Pollution Principle.

The Anti-Pollution Principle

Despite the problems of insufficiency and disempowerment, given the contribution to cumulative harm and the need to share a tightly constrained carbon budget, it is morally problematic to simply emit and consume with abandon and without meaningful justification, especially for more affluent individuals who are responsible for a much larger share of emissions and for whom the problems of disempowerment and insufficiency hold much less sway. To be clear, I am not arguing that emitting greenhouse gases and burning fossil fuels is morally impermissible. Instead, I am arguing that if we are to pollute, we need to weigh up the reasons for doing so and determine whether they are morally worthwhile in relation to other possible uses of those resources and given the contribution they make to the cumulative harm both of climate change and the broader harmful effects of fossil fuel use. We can cash out this sense of moral responsibility in terms of what philosophers refer to as a prima facie moral duty – a moral responsibility that holds unless there are other weightier moral considerations that outweigh that particular moral responsibility (Garrett, 2004). This I argue should be translated into a principle I call the Anti-Pollution Principle (APP), which states: We should not use resources, especially limited resources, whose use contributes to the harms of others[56], unless there are sufficiently strong moral reasons for doing so.

Joyguzzling hardly seems like a good moral reason to pollute and harm others or to use up the scarce resource that is our carbon budget, hence why on the Anti-Pollution Principle it deserves moral condemnation, even though the current social mores of many of the affluent do not typically condemn it. However, if my arguments in the previous section have been successful, then joyguzzling and other luxury emissions are rather easy cases to deal with under APP as they do not appear to be strong enough reasons to morally justify wantonly

[56] The term "others" in the anti-pollution principle can extend both to human and non-human others.

polluting given our context. Another category which seems relatively straight forward, and which has long been defended in the climate ethics literature (Shue, 1993), is subsistence emissions, where emissions are needed simply to meet one's basic needs. Meeting our basic subsistence needs seems like a reasonable justification to pollute if there are no viable alternatives to meet one's needs. Relatedly, the APP can and should accommodate the fact that there are often significant structural and social constraints on people's actions which do not provide them options other than to pollute to meet their basic needs or secure their livelihoods. Recall again, Theresa Scavenius' (2018) argument that people should not be held morally responsible for failing to act on climate change when there are external constraints which prevent them from being able to do so. Similarly, the APP must bear in mind these constraints, and be sensitive to when polluting may be a necessity for some to meet their basic needs or to secure their livelihoods.

A properly structural and context sensitive application of APP can apply both to thinking about individual responsibility, and also to how we design policy. Indeed, we would want to ensure that our policies are not unduly penalizing those whose social and structural circumstances do not readily afford them alternatives to emitting without significant hardship, and work instead to provide them access to alternatives. For instance, carbon pricing mechanisms that fund low-income family tax rebates and/or invest in alternatives to fossil fuels for those with little access to alternatives, could be seen as taking steps to be sensitive to context and structural constraints that individuals face. Likewise, we do not want our policies punishing those who have little choice but to make their livelihoods in polluting sectors under the current carbon intensive infrastructure, such as working-class people in the fossil fuel industry who cannot simply transition into another job. Just as we want to provide alternative energy sources for people to be able to meet their needs without polluting, so we want to provide meaningful alternatives to those with little present choice but to work in polluting sectors. Rather than simply condemning fossil fuel workers for defending their jobs, we should be sensitive to histories which have made communities dependent on fossil fuel employment, and work to provide meaningful alternatives for them in the transition. Doing so can be seen as an extension of the moral principle that underpins the case for subsistence emissions.

The more difficult cases for the APP both in the personal and policy spheres lie in between subsistence and luxury emissions. Therein lies a deeply contested space, where one needs to determine what holds sufficient moral weight to justify causing pollution and the harms that it contributes to, as well as to using up a bit of the remaining carbon budget. As much as the most affluent in the world are emitting disproportionately high amount of carbon pollution, this does not absolve the nonaffluent from considering how moral demands as reflected in the APP might mean changes in how they live their lives. There are many activities that the middle class engages in which may create unnecessary emissions or unnecessarily use up scarce resources, such as using disposable items on a daily basis when non-disposable alternatives are easily available, heating a house incredibly warm in the winter so you can wear a t-shirt inside, or eating meat-intensive diets when lower meat diets are healthier, less resource- and GHG-intensive and, in the case especially of industrial-scale farming, contribute less to potentially problematic treatment of animals.

The lifestyles of the middle class are indeed not off-limits in terms of the reach of the APP, but we must also be careful about problematic and context insensitive over-moralizing regarding emissions. In particular, I have in mind, philosopher Byron Williston (2015, Chapter 3), who has accused soccer moms of being greedy for emitting while they take their children to school and other activities. Williston rues their overconsumption and argues that the only real solution to the problem will involve significant sacrifice on the soccer mom's part and to radically alter their lifestyles. Williston's account is problematic as it places significant emphasis on the changing of lifestyles without distinguishing much between the affluent and the average person, or the different structural and socio-economic obstacles they face.

Rather than decrying a mother as being greedy for working hard to promote her children's well-being without paying attention to contextual considerations, we should be thinking about the structures which might make it such that the soccer mom has to spend her days driving around her children, when I am sure many would prefer not to spend their lives behind a wheel. We should be ruing the lack of safe transit and other socio-structural factors, and the gendered dynamics of labor in childcare, which make it such that a mother is expected to act as a personal chauffeur for her children. The emergence of the soccer mom is arguably more a product of the car-centered design of sprawling suburbia than it is a reflection of a greedy tendency of individual mothers. It is true that there is are cases of problematic over-use of resources by those raising children, especially by the affluent. Perhaps at times some child-rearing may verge on greed in the typical sense of the term if we are giving our children the world, when there's only one world that we need to share between all 7,6 billion of us. However, more typically, the word "greed" should be used with caution, especially if we do not also try and situate individuals within the contexts that shape what decisions are readily available to them.

A more appropriate term may often be Jason Kawall's notion of modest greed. According to Kawall, "agents who are modestly greedy do not long for material goods or wealth with intense desires [as the more straightforwardly greedy might]. Rather, they have quite modest desires, but ones whose satisfaction they pursue excessively relative to other goods" (2012, p. 223). Here we can think of those who place significant value on material goods and consumption, relative to other valuable pursuits. As Kawall highlights, the context we are currently facing shifts the way we might have to think about questions of greed, as "the cumulative impact of large numbers of people — billions of us — satisfying apparently mild desires for apparently modest goods can be devastating. What may not be greedy in other circumstances (of low overall consumption, low population, and enlightened technology) is now greedy, given current global conditions of growing populations and consumption" (2012, p. 230).

Kawall's points about modest greed should give pause to the global middle class, who may not be among the richest and most polluting of the world, but who nonetheless are relatively affluent by global standards and consume significant amounts. While I have spent much time criticizing the most affluent, it is important that we think critically about how the consumption patterns of more average people do also contribute to the problem. As Allen Thompson warns, "it is less common to recognize that the statistical norm of consumer society already involves excesses, and far more psychologically difficult to recognize that you yourself live closer to [a problematic] norm than justice may permit" (A. Thompson, 2010, p. 52). While the rich and affluent who most contribute to this problem are especially worthy of condemnation, recognizing this does not absolve the middle class of their responsibilities to avoid contributing to the problem, for they too deplete the carbon budget and contribute to harm, albeit at not quite the same extent as the world's most affluent. While the crisis we are in requires us to rein in the rapaciousness of the rich, it also calls on us to moderate the modest consumption and/or modest greed displayed by some of the middle class.

Applying the APP, it is not only up to the affluent to root out unnecessary emissions from their lives, the middle class also has a role to play and a moral responsibility too. The APP may even be applicable to certain elements of the lives of those living in poverty, although we should tread really carefully here lest we put heavy moral burdens on those struggling to meet their subsistence and basic needs, and who contribute minimally to the problem of climate change and resource use. Rather than moralizing about how those in poverty live, given the likely structural and socio-economic barriers they face, the more important moral response is for those who are affluent, who have contributed most to the problem of climate change, ecological degradation, and other injustices, to think about how we can work to ensure non-carbon and resource intensive pathways out of poverty. Helping develop low-carbon pathways out of poverty is a responsibility that arguably applies to affluent individuals, but perhaps more importantly it also applies in the context of domestic justice as communities and nations attempt to address climate change within their borders. Equally if not more importantly, it also applies globally where affluent, historically polluting nations that have contributed most to the problem of climate change have obligations of global justice to help the global south develop in ways that are not carbon intensive, given that it is primarily thanks to the global north that nations of the global south have to develop within a constrained carbon budget, as I explore in more detail in Part C (see also Holz et al., 2017; Okereke, 2011).

Apart from being applied to policy development and individual lives, the APP could also be applied in the world of business, where it would call on businesses to take on their social and moral responsibility and attempt to root out unnecessary resource use and pollution from their business models. Indeed, many businesses incorporate problematic resource overuse and wastefulness into their business models. Practices such as planned obsolescence, where products are designed to become obsolete relatively shortly after being bought would be condemned by the APP as would many other wasteful business practices. The APP would call on businesses to move towards a circular economy, which is "a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing energy and material loops; this can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, recycling, and upcycling" (Geissdoerfer, Savaget, Bocken, & Jan, 2017).

The exact extent and reach of the APP within the lives of individual agents will be a complex question to answer, as what will be sufficiently morally weighty to justify polluting will depend on one's context and a host of difficult moral questions about what is valuable – questions which I do not pretend to have resolved even for myself. What I do want to offer though, is a reminder of the context within which we need to make such determinations. We are in the middle of an emergency, a crisis, a planetary crisis whose effects could be devastating beyond any of my attempts to describe them can adequately convey. Yet, it seems that many, especially but not only the rich, are far too willing to pollute, to use up valuable resources, to contribute to harm, and to further close our tiny window of opportunity to avoid catastrophe, often in the name of relatively unimportant ends. The crisis that we are in merits a reconsideration of what we take to be important enough to justify doing that, if not a deep revision altogether. That is a task that we should all take on, both individually and collectively, and, if we do it honestly, the results may well lead to a somewhat revolutionary reconsideration of many of our current practices, including the need to rein in the rapaciousness of the rich.

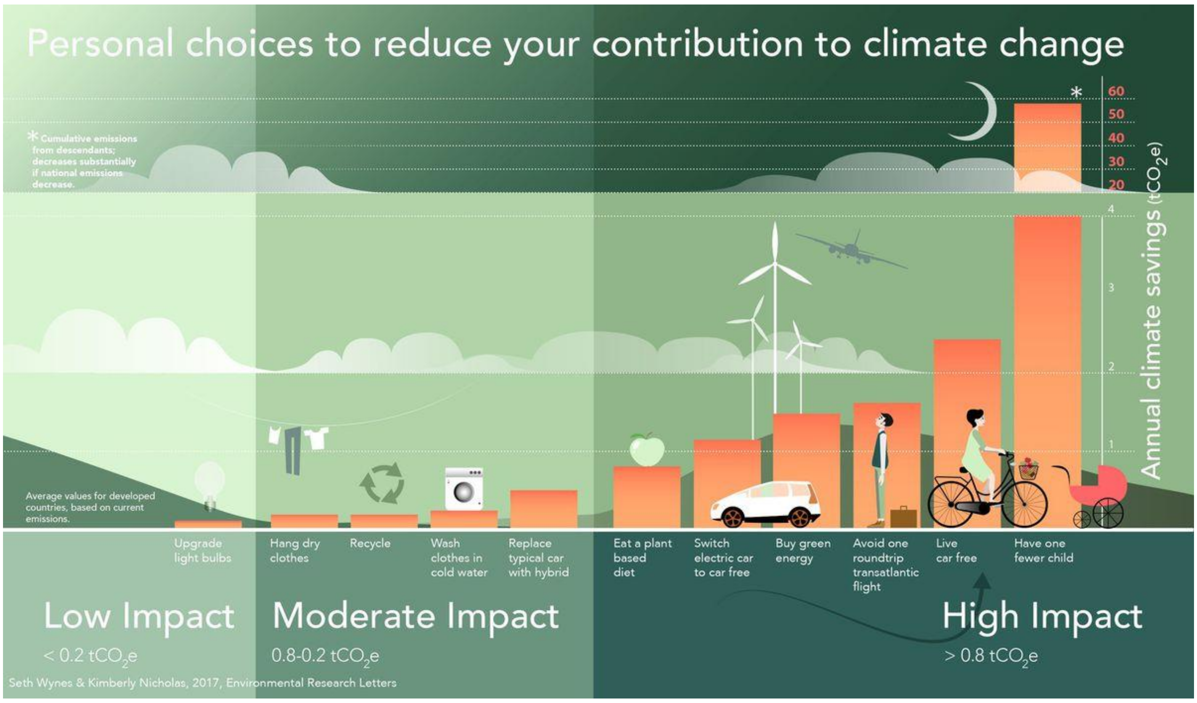
Chapter 6: From Individualistic Anarchy to Collective Transformation

After defending the Anti-Pollution Principle in the previous chapter, in this chapter, I will apply the APP and argue that if reducing individual emissions conflicts with the ability to pursue more effective climate action, or other more morally significant endeavors, then such considerations should typically outweigh the responsibility to reduce one's own emissions. While the APP provides a prima facie duty to reduce emissions, given the speed and scale at which we need to reduce emissions to meet the Paris Agreement goals, much broader and sweeping structural changes will be required than individual emission reductions alone can provide for. As such, while individual emissions are part of our moral responsibility, particularly for wealthy, high-consuming individuals, nonetheless, broader collective action may often be a more important moral obligation, such that we should not unduly inhibit our ability to push for broader collective action in order to reduce individual emissions. Recall that the APP says: "We should not use resources, especially limited resources, whose use contributes to the harms of others, unless there are sufficiently strong moral reasons for doing so". The argument I aim to develop is that using resources to push for collective action may often be a sufficiently strong moral reason to use resources, particularly in the face of the Fossil Free and Climate Emergency we face, where rapid, comprehensive structural change is needed if we are to avert catastrophic runaway impacts.

Balancing Personal Emissions Reduction and Collective Action

If personal emission reductions are insufficient yet important, then how are we to fit personal emissions reductions in the broader effort to tackle climate change? We could, following Marion Hourdequin (2010, 2011), argue that overcoming collective action problems like climate change requires the actions of many individuals acting in concert, both to reduce their own individual emissions, and to help promote broader collective action – the latter are what Elizabeth Cripps (2013) calls promotional duties. Hourdequin (2010) draws on Confucian philosophy to argue that because of the relational character of our communities, individual actions to reduce emissions help to shift norms and inspire broader action. As Hourdequin highlights, Confucian philosophy holds that "moral models have magnetic power, and virtuous individuals can effect moral reform through their actions by inspiring others to change themselves" (Hourdequin, 2010, p. 454). Likewise, more broadly within virtue ethics, it is held that virtuous individuals can help inspire others to action, and social science studies support such claims (Hackel & Sparkman, 2018). Based on this, Hourdequin argues that we have individual responsibility to reduce emissions, which can help inspire others to act, and simultaneously, we have responsibilities to push for collective action.

Something like Hourdequin's response seems right. We have a moral responsibility to undertake a combination of individual action to reduce emissions and broader efforts to promote collective action. However, a limitation of her account is that it is too vague, as it does not provide much by way of guidance in terms of the relative importance of individual action to reduce emissions, versus efforts to promote collective action. The first point in helping refine it, is to highlight that given the limited time we have left to address climate change, and the limited resources being devoted to address the problem, if and when we focus on individual emission reduction, then it is important that we place significant and proportionate focus on those strategies that are effective at reducing emissions. A recent study by Wynes and Nicholas (2017) attempted to quantify which choices would make a significant impact to a person's individual carbon footprint, particularly within the developed world. As the study showed, and is represented in the graph below, actions such as changing your lightbulbs and laundry did not have as significant impacts, whereas "high-impact" actions involved ditching your car, flying less, switching to a plant-based diet, and having fewer children.



While the Wynes and Nichols study points to relatively more effective ways to reduce emissions, a puritan focus on individual emission reductions, which inhibits our ability to take on actions to reduce emissions in a much more effective way does not seem to be the answer. For instance, Dale Jamieson (2010) argues that when addressing climate change, even Utilitarians should act like virtue ethicists and model green virtuous behavior where we reduce our consumption even regardless of what others are doing. He argues that when a conflict between reducing our individual emissions and the ability to engage in collective action arises, we should prioritize reducing our personal emissions so as to model green virtues. Such a view is problematic as it prioritizes our own purity over the need for broader transformational change. If skilled climate organizers are hobbling their ability to make change so as not to create personal emissions, thus inhibiting their ability to organize in much more consequential ways to enact broader change, then it seems as if a focus on individual emission reductions may be undermining our moral responsibility to effectively take action to tackle the problem of fossil fuel dependency and climate change more broadly. This would not be a proper application of the APP for it would fail to allow morally significant matters to justify the need to sometimes use resources.

Another problem with relying on voluntary individual emission reductions, is the fact that the affluent who are most responsible for individual emissions seem least likely to act on such moral motivations and have historically proven stubbornly unwilling to reduce their emissions. The same can be said of what Chris Cuomo refers to as metalevel emitters, who are most responsible for emissions, such as corporations in the energy and chemical sectors, and state and federal governments. As such, even when considering the importance of individual emissions reductions, a regulatory scheme is arguably more effective than solely relying on the voluntary actions of the affluent who are the predominate cause of individual lifestyle emissions or meta-level emitters who are the main drivers of greenhouse gas emissions.[57] It would thus be irresponsible, to simply rely on voluntary individual actions both of wealthy individuals and of businesses and corporations.

Similarly, Stephen Gardiner (2014, p. 308) has warned against such an approach as being equivalent to suggesting an anarchist approach to dealing with climate action, an approach rejected by political philosophers in addressing large-scale social problems, as it is informationally demanding, unduly motivationally optimistic, and vulnerable to defection. Gardiner warns that relying on voluntary actions, and framing matters in sharply individualistic and consumerist ways encourages severe abdication of responsibly and moral corruption. Such warnings date back even to Garrett Hardin who wrote in 1968 about the limitations of appeals to morality in sustainably managing the commons: “When we use the

[57] This also points to an irony in K&S’ approach. In their paper, one of the reasons they give against a moral obligation to refrain from joyguzzling is to defend “personal freedom”. They caution the reader that “Personal freedom needs to be protected against the encroachment of political obligations in order to allow personal expression and experimentation” (Kingston & Sinnott-Armstrong, 2018, p. 185). However, by arguing that people have little to no moral responsibility to reduce their emissions, they lay the grounds for an increased need for regulation to prevent people from emitting so much. By so many rich and affluent seemingly adhering to the views of K&S and abdicating personal responsibility to reduce their own emissions, this necessitates a shift to government intervention if we are to reduce greenhouse gas emissions sufficiently. Thus, a failure to take on personal responsibility to reduce emissions, particularly by the rich, leads to the government having to justifiably infringe upon the “personal freedom” of such profligate emitters. It is a justifiable intervention even under more liberal theories of the role of government. For instance, under John Stuart Mill’s liberal, small-government oriented Harm Principle, governments are justified in intervening in the affairs of others only in order to prevent harm. Such an intervention would also be justified under a broader conception of the role of government, such as that put forward by John Locke, who holds that one of the basic functions of the state is to secure for individuals political and social conditions in which they can live and flourish with dignity (McKinnon, 2016).

word responsibility in the absence of substantial sanctions are we not trying to browbeat a free man in a commons into acting against his own interest? Responsibility is a verbal counterfeit for a substantial *quid pro quo*. It is an attempt to get something for nothing" (Hardin, 1968, p. 1247).

Of course, particularly for affluent high-consuming individuals, reducing one's own emissions and pushing for broader collective action do not always compete against each other, and often they may enhance each other. For instance, when I was in Seattle, I was fortunate enough to live where infrastructure facilitated my riding my bicycle to work, which helped me stay fit and healthy, gives me time to think or catch up on the news via podcast, and also cuts my commute because I avoid traffic, allowing me to better focus on my climate work. Additionally, especially for prominent figures, an individual's efforts to reduce their emissions may make them a more effective advocate for collective action, lending them more moral authority. As Trevor Hedberg (2018) and Marion Hourdequin (2010) argue, there is a question of integrity involved in reducing our own emissions. Actors like Leonardo DiCaprio who argue for climate action, yet live high-flying lives of consumption with private jets, SUVs and yachts are rightfully seen as hypocritical (Battershill, 2016). Similarly, as Nives Dolsak and Aseem Prakash argue, focusing on the case for why academics should reduce their footprint, "their excellent research will be less effective in changing public policy and popular culture without their moral leadership. And moral authority comes when we are willing to forgo valuable things to serve the public purpose" (Dolsak & Prakash, 2018).

The question of integrity becomes more complicated if one is emitting in order to push for broader change. Here we need to be careful not to allow our quest for integrity in our emissions to descend into a problematic puritanism which dismisses as hypocritical those who use up emissions in the name of making change (cf. Coplan, 2016). Unfortunately, we are caught up in a fossil fuel intensive structure, and to transition away from fossil fuels at the scale and speed required will necessitate using up resources to make that shift. As Carol Booth (2012) argues, rather than simply focusing on reducing our own personal emissions, a more urgent moral priority and stronger moral duty will often be to take action to ensure systemic reforms. Along similar lines, Monica Aufrecht has put forward what she refers to as a Structural Emissions Model, which encourages both individual emission reductions and working for broader systemic change, but argues that when the two conflict "individuals should work toward big, systemic change, even if it means violating 'green virtues' in the short run" (2011, p. 209). The Structural Emissions Model is arguably in line with the Anti-Pollution Principle in the context of the Fossil Free and Climate Emergency Imperative, as the need for collective action to push for much more significant changes, may be morally significant enough to outweigh the need to directly reduce emissions through smaller individual changes.

At the same time, those using resources to push for collective action should remain critical as to whether and when their work really does justify using the resources it does. For example, flying half way around the world to preach to a handful of the choir about a topic they are familiar with, in the hope that it might lead to collective action, but without a meaningful sense of how it might do so, does not seem like the best use of resources and the limited carbon budget. In line with the Anti-Pollution Principle, the sorts of questions we should be asking ourselves is whether and when one's work to promote collective action justifies the use of resources and the harms they contribute to, and when those resources could be better used to support action elsewhere or some other worthy end. Additionally, to advance better representation and diversity within the efforts for climate justice, we should also ask whether those resources could be better used to support those who are not as well-resourced and who are disproportionately left out of or marginalized from these movements and discussions, especially those disproportionately impacted by the harms of fossil fuels and climate change, such as women, people of color, people of the global south, indigenous peoples, young people etc. As I will explore more in Chapter 9, elevating these voices is incredibly valuable and important as their perspectives may often lend insights into the nature of injustices and harms of climate change that the more privileged may not have sufficient knowledge about and/or epistemic access to. Additionally, empowering such individuals and communities is key to ensuring climate justice.

Answering questions of where resources are best used is of course complex and difficult, often involving speculation about difficult to predict change based on incomplete information in the face of deeply complex and hard to shift systems. As such, we should be cautious of being frozen into inaction by the complexity of answering those questions. For we will need to act despite uncertainty about what will make the most difference. However, despite that uncertainty, there remains a responsibility to attempt, as best as possible and within reason, to try and use resources effectively. The responsibility to use resources effectively is heightened by the urgent timeframe and rapidly closing window of opportunity we face to avert catastrophic climate change. This urgent reality shapes the nature of the moral responsibility that we have to address climate change and underscores the importance of weighing our possible actions to address climate change through the lens of potential efficacy. Additionally, while efficacy and efficiency is important and key given the emergency we face, as the next section will explore, when applying the Anti-Pollution Principle, efficacy will have to be counterbalanced against other questions of justice, morality and equity.

Speed, Efficiency and Structural Transformation

A range of climate ethicists have tried to address the need to push for effective action, although not necessarily through a lens of a climate emergency as this chapter aims to do. Elizabeth Cripps, Augustin Fragnière, Kok Chor Tan, Christian Baatz and Konrad Ott all argue that an institutionalist approach, whereby we focus our efforts on reforming our institutions, is the more effective approach to climate action, as it can ensure broader compliance, make individual emission reductions easier to achieve, and more efficiently reduce emissions. For instance, Baatz and Ott, argue that "institutional solutions are both more effective and more efficient compared to a situation in which each agent is expected to reduce its contribution unilaterally" (2016, p. 94). Institutionalist approaches are important in their recognition of the central roles that institutions can play in facilitating the transition away from fossil fuels. However, some approaches, such as Tan's, become a little too extreme in calling only for action to push for just basic institutions.

For Tan, an institutionalist view deals only with what philosophers call the basic institutions of society which typically refer mostly to government institutions – let us call it a basic institutionalist approach.[58] Put another way, his account is suggesting that our primary duty of justice is to push for government action to ensure fair and just climate action. The first problem with Tan's approach is that at times taking an institutional approach is not the most effective approach to take, as actions not aimed at institutions may be more effective. While it is true that for some individuals the most effective way of discharging their responsibility for climate action will be a basic institutionalist approach which pushes for government action, that is not always the case, and adhering to a strict basic institutionalist view obscures the need for much broader action to effectively push for change.

Consider, for instance, a brilliant researcher and engineer who could perfect a battery technology which could help unlock the potential for a rapid and disruptive roll out of renewable energy in line with needed action. The researcher would arguably better use their time by working to develop those solutions, rather than attempting to push for governmental change in a political space they might little understand and be ineffective at shifting. At the same time, the researcher does not exist in a vacuum, and we need those who will demand just institutions that will fund such research and deploy those technologies. If the researcher can both do their research and effectively push for government action, then power to them, but if they are detracting from their research in order to dedicate time to engaging relatively ineffectively to advocate for government action, then it seems it may not be the best use of their time.

The second problem is that Tan's institutional approach is limited to government institutions, so that even when we should indeed be focused on pushing institutions to change it is not

[58] Tan does not explicitly define what he means by institutions, although he takes it to refer to the basic institutions of society and consistent with broader institutionalist views this refers to the basic institutions of government (cf. Scheffler, 2006; Young, 2011). As Scheffler highlights, it does not apply to private groups or associations, the customs and conventions of everyday life, the law of nations, or voluntary cooperative agreements in general, all of which are arguably important spheres within which we may also want to push for climate action.

necessarily only government institutions we should be changing. For instance, in the face of significant political gridlock at the government level, increasingly climate justice advocates have been doing powerful work pushing other institutions to shift their practices. For example, powerful campaigns calling on banks to stop investing in the fossil fuel industry have led to restrictive lending and financing practices which have cut off funding to fossil fuel projects. A powerful example of this comes from the proposed Adani Carmichael Coal mine project in Australia, which if constructed would be the largest coal mine in the Southern Hemisphere. Climate justice activists were successful in convincing every major bank not to fund the project, and in doing so have put in place major obstacles which have prevented the mine from being built for years. Importantly, activists also coupled this with direct action against the project and actions targeted at the government, which were successful in cutting proposed government funding and in creating significant controversy around the project.

Tan claims that his account is grounded in efficacy, but his basic institutionalist view does not accommodate the point that to push for effective change to a problem as complex and multi-faceted as climate change, we will need more than just those who can push for government action. For many, the actions that will be most effective may be different to those pushing for just institutions. That is not to say that we do not need many more people pushing for government action, but that is just one among many possible ways of effectively pushing for climate action. Tan's view also problematically elevates the government as being the main and most efficient actor in this space, and while it is true that government has significant power which it can use to ensure effective and efficient action, there are many other areas of influence and possible change that can also be effective and efficient levers for change, including in community spaces and the private sector. Thus, rather than taking a narrow basic institutionalist view, we can broaden our analysis to a structural analysis as Aufrecht (2011), Young (2011), Lu (2011), Caney (2016b), Eckersley, and others have done, whereby we focus not just on government institutions, but also more broadly on the various different other institutions, social connections, and structures in society.

Rather than taking Tan's problematically narrowly focused approach, it would arguably be best to adopt something like Simon Caney's view which provides a "more thorough-going proactive approach" that aims to ensure that states and citizens are complying with their duty to act on climate change, by seeking "to induce greater compliance by influencing the opportunities, constraints, and incentives facing duty-bearers" (Caney, 2016b, p. 33). Rather than just focusing on government institutions, Caney attempts to influence "the social, economic, and political context within which actors make decisions so as to induce greater compliance" with climate justice. Caney provides a list of some possible actions which agents could undertake to ensure this, which I abbreviate here: (i) Creating sanctions for non-compliance; (ii) Fostering and maintaining norms of environmental sustainability; (iii) Lowering the cost of renewable energy; iv) Increasing the cost of fossil fuels; (v) Designing urban infrastructure and the built environment; (vi) Civil Disobedience; (vii) Creating new institutions and reforming existing ones." (Caney, 2016b, p. 33) [59]

The divestment movement's push to get institutions to remove their investments in the fossil fuel industry can be seen as an action which fulfils much of what Caney highlights, and aims to influence "the social, economic, and political context within which actors make decisions so as to induce greater compliance". As I have argued in more detail in a chapter about weighing the power of fossil fuel divestment (G. A. Lenferna, 2018c), fossil fuel divestment fulfils to a

---

[59] Tan (2015, p. 135) claims that those who argue as I do that we should take on such a broad sense of doing close on all one personally can are problematic, because such views do not allow for a plurality of values and make justice the one and only defining value. However, that seems like a strawman argument, for one can argue that we should be doing much more than simply pushing for just institutions and that we should be acting in ways that are demanding, while also recognizing that there is more of value than just the pursuit of justice. What we can say is that in the case of climate change and fossil fuel pollution, the potential injustices of continued fossil fuel reliance are so immense that even though other values are important, the moral imperative to act is incredibly strong, such that other values would have to have significant weight if they are to outweigh the anti-pollution principle. That is not to say that there are no such values that might at times counter-veil against acting. It is, however, to suggest that there is a high bar that they should meet.

On a more meta-ethical note, institutionalist views are not the only views that can admit of pluralism. It is possible to adopt other ethical standpoints that are pluralist, and which admit that justice is just one value among many others. Indeed, having the APP not specify any particular moral theory and leaving open what constitutes something morally significant enough to justify polluting, allows it to be a value pluralist account that is somewhat agnostic in relation to what is of fundamental value, and to argue from this position that we have strong moral reasons to go fossil free, which can be supported by multiple different moral theories. The anti-pollution principle does not specify a specific moral theory and allows for both value pluralism and monism.

certain extent every one of the list of aims laid out by Caney. Firstly, by pressuring leading institutions to divest from fossil fuels, divestment (i) fosters and maintains norms of environmental sustainability, instilling the norms of the need to move past fossil fuels and challenging the legitimacy of the fossil fuel industry (Ansar et al., 2013; Ayling, 2017; Grady-Benson & Sarathy, 2016; D. Roberts, 2015b). By asking major institutions to remove their investments in companies that do not comply with needed climate action, it can also (ii) create sanctions for non-compliance (G. A. Lenferna, 2018b). Through shifting financial norms and capital away from fossil fuels and towards renewable energy, divestment can also help (iii) lower the cost of renewable energy and (iv) increase the cost of fossil fuels, thus making it more expensive and difficult to leverage funding for fossil fuels, and increasingly attractive to do so for renewable energy (Ansar et al., 2013; Paun, Night, & Chan, 2015). Much of the divestment movement is also a reinvestment movement which is aimed at investing a just transition away from fossil fuels and community-based solutions. Through doing so it aims at investing in and designing different more sustainable and equitable (v) urban infrastructure and the built environment (Coronel et al., 2016; Ressler & Schellentrager, 2011). The divestment movement has also engaged in a range of (vi) civil disobedience actions both to push for divestment, and also in solidarity with broader climate justice struggles (Howard, 2015). Finally, in line with (vii) the fossil fuel divestment movement and offshoots from it, are increasingly working to reform financial and other institutions (Franta, 2017). For instance, in the United States, the Sunrise Movement, which grew significantly out of the divestment movement, is pushing politicians to reject fossil fuel industry campaign contributions, working to reform the problematic influence of fossil fuel money on politics, and is pushing for a Green New Deal.

On a moral note, as I have argued in more detail elsewhere in an essay I wrote on the moral case for divestment, fossil fuel divestment is grounded in the moral case not to contribute to grave, widespread, and unnecessary harm given that it is asking people not to invest in, and thus contribute to, fossil fuel companies whose business models are out of line with the Paris Climate Agreements and who create many other harms (G. A. Lenferna, 2018b). Thus, divestment can be seen to be calling for alignment with the Fossil Free Moral Imperative. Divestment is also helping fulfil promotional duties, as the aim of divestment is to spur on broader collective action, which it has arguably done to a significant extent, as I argue in Lenferna (2018b). Finally, divestment can be grounded in the moral virtue of integrity, for investing in companies whose actions are out of line with the Paris Climate Agreements would be hypocritical or inconsistent for those who claim to be committed to climate justice. Divestment is thus consistent with a number of moral principles and duties and contributes in some way to all of the aims on Caney's list.

When it comes to effectively meeting the FFCEI at the requisite scale and speed, the fossil fuel divestment movement sits at an interesting point in its trajectory for it has had significant successes helping convince investors who collectively own trillions of dollars' worth of capital to shift away from fossil fuels. It has also helped build a powerful movement which has challenged the political power and legitimacy of the fossil fuel industry. However, the challenge for the movement, as I raise in Lenferna (2018b) is to ask when and whether continuing to push for fossil fuel divestment is still the most effective lever available to activists to make change. This is not an easy or simple question for a social movement, for to quote environmental journalist David Roberts (2015b): "Social change is nonlinear and devilishly hard to predict. But it seems far from futile or pointless. It seems like an important part of the most important fight in the world." However, while social change is indeed devilishly hard to predict, part of our responsibilities if we are to fulfil the Fossil Free and Climate Emergency Imperative is to do our best to determine which actions will be most effective in making that change.

Relatedly, Caney's list is important in helping begin to catalogue a range of possible and important actions that we can take to effectively address climate change. However, in the face of climate change, and the rapidly closing window we have left, it is not enough to simply look at a list of possible actions and ways of effecting change. Rather the emergency we face means we need to put significant priority on those actions which will be most effective and jointly up to the task of making the requisite change on the time scale required. A similar point can be made about the question of which levels of decision making we should focus on. In the face of the problem of climate change, many have argued that what is required is broad action at all levels. Some such as Nobel Prize winning economist Elinor Ostrom (2010) argue that we need action at multiple levels of society, calling for a polycentric approach, rather than a limited focus on action at the global level. This is an important element of understanding the nature of needed climate action, as there are multiple, mutually reinforcing centers of decision making at which we can and should be pushing for collective action. However, a crude interpretation of such a view holds that we need to do everything we can to address climate change, and that all efforts are important. Such a crude interpretation is represented in the idea that every little contribution matters, and while this is true, to a certain extent, given the scale and urgency of the problem of climate change, we need not just any actions at all scales, but rather contributions that matter enough to affect meaningful change up to the scale and speed of needed action. [60]

[60] A similar worry about urgency can be put forward with regard to a proposal for an intergenerational constitutional convention by Stephen Gardiner (2017a). Gardiner puts forward a model of political responsibility for climate change he terms the delegated model of responsibility. Gardiner holds that while many of our responsibilities can be discharged by individual action, a large number of our responsibilities can only be adequately discharged collectively, typically by delegating authority to collectively-sanctioned institutions. I am in agreement with Gardiner's delegated model of responsibility and the need to push for collectively sanctioned institutions to make broader changes than just individuals can achieve. However, in terms of the most effective ways to achieve that, I am not convinced by Gardiner's (2014) proposal that we should put in place an intergenerational convention. While the idea is a noble one, and is definitely worth aspiring to, it seems unlikely, given the current state of global politics, that we could, in the small window of time left to address climate change, arrive at an intergenerational convention which would have enough strength to rapidly move us off fossil fuels. As such, I argue that we should focus on socio-economic leverage points which can more effectively create change in the limited time frame available.

Gardiner responds to the objection about time frame along four lines: a) the convention might have an important purpose even if it does not address climate change; b) it is not necessarily antagonistic to other activities aimed at addressing climate change and might help bolster them; c) other global political processes to address climate change have also taken very long, and as such it's not clear they are better placed to address the urgency question; and d) it's not clear why putting in place the convention should take such a long time given that, for instance, the U.S. constitutional convention took place over just a few months. I respond by acknowledging that the convention may indeed play a broader important purpose, and is for that reason valuable and worth pursuing. However, I do think, contrary to b), that pushing for a global constitutional convention may not necessarily be complimentary to other efforts and may instead use up significant amounts of political capital, which might be better used to push for the sorts of changes and policies which would more directly address climate change. After decades of hard work and much political capital, the current framework under the UNFCCC seems to be finally producing results even despite the actions of the

The Fossil Free and Climate Emergency Imperative make it such that when determining what actions we should take, we need to judge actions according to whether they can scale up and do so fast enough to collectively avert climate catastrophe. For individuals reducing their own personal emissions that means looking at what are some of the more effective actions that can reduce personal emissions, rather than investing significant and proportionate amounts of time and resources for actions which less effectively reduce personal emissions. As quantified by studies such as Wynes and Nichols (2017), actions such as going car free, reducing air travel, switching to an electric car, and eating a plant based diet are some of the most effective actions we can take, whereas actions such as hang drying clothes and recycling are less high impact. The FFCEI would suggest we focus more on high impact actions, particularly if we have limited capacity to undertake personal emissions reductions and/or there are factors such a lack of infrastructure which make doing so difficult. Furthermore, in accordance with the APP, while prioritizing high impact personal emission reductions, we must also pay attention to where pushing for structural change may sometimes be a more important and effective arena to be pushing for change.

When looking at action for broader structural transformation, individuals, organizations and communities should focus on what within their power may be the most effective and equitable levers for change they can shift. Determining just which levers may be the most effective will be a deeply context-dependent exercise and one relative to the sorts of skills or tools that an individual agent can effectively wield. What we need is rapid and transformative short-and-medium term disruption of the fossil fueled status quo, embedded in the context of longer-term deeper reform towards a more just and sustainable future. It is part of our moral

---

Trump Administration (see Jotzo, Depledge, & Winkler, 2018). As such it seems that using up significant amounts of political capital to develop a new constitutional convention might be a less effective use of political capital than pushing for actions within each country and strengthening and deepening ambition under the UNFCCC. While political capital may not quite be zero-sum, it is not an infinite resource, and in the face of a climate emergency rapidly spiralling out of control, we arguably should use that political capital where it has the most chance of success. Additionally, as the previous chapter attempted to highlight, and as Fergus Green convincingly argues, much of the challenge for pushing more ambitious action lies not so much with global governance structures, but with overcoming domestic entrenched interests which are thwarting the ability for communities and countries to take action.

responsibility to work to determine what, based on our own skill sets and talents, and within our own context, we can do to most effectively push for such a transformation. For example, in Washington State where transportation emissions are the largest fossil fuel polluter, advocating for increased public transit or pushing for a law which bans new ICE vehicles may be some of the most effective levers to pull. In relation to such a task, individual agents can determine how they can best contribute to pulling such levers. Writers can help raise awareness, organizers can help build needed coalitions, policy wonks can help figure out the best policy, and new volunteers unsure about how they can best use their skills can do things like speaking to neighbors, petitioning, helping out with administrative and organizing tasks, and/or donating, unless or until they are able to identify ways that they can more effectively contribute.

While it is an empirical question likely beyond the ken of an individual philosopher such as me to precisely determine which actions would be most important, the moral responsibility points to the need to work to identify them.[61] Fortunately, some research already exists as to what some of the more effective ways of pushing for action are. For

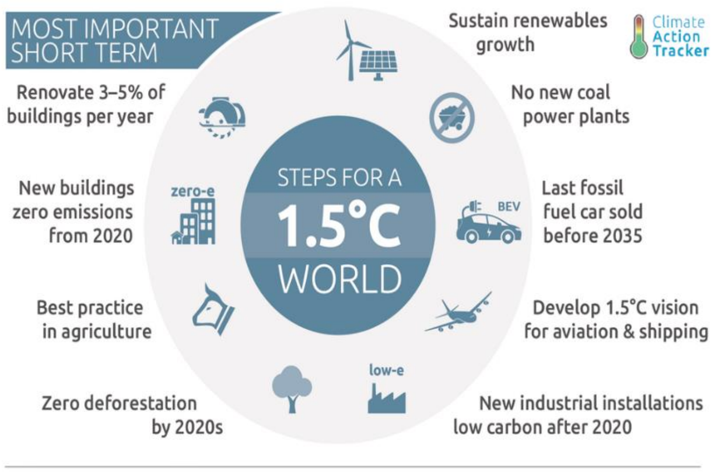


Figure 8 - Most Important Short-Term Actions to Stay within 1.5°C (Kuramuchi et al 2016)

[61] Elizabeth Cripps makes a similar point about the need to work with broader empirical research to determine the most fair and effective actions to tackle climate change in the context of her call for promotional duties (Cripps, 2013, p. 166). As Roser and Heyward highlight, some might argue that such questions of more specific action guidance are outside of the realm of the philosopher's discipline, especially philosophers who are engaged with ideal theory, which focuses on what justice looks like under ideal conditions. Others, such as Amartya Sen argue that philosophers should do better to engage with action guiding philosophy, moving away from the project of ideal theorizing and more into the space of non-ideal theory and provide normative guidance for the world as it is. Within this space, I believe this chapter can best be characterized as a form of non-ideal theory, which attempts to provide what Iris Marion Young refers to as parameters of moral reasoning. It does not provide an exact formula for determining how to act, but provides some moral parameters and principles to help guide our actions.

instance, as represented in the above graph, Climate Action Tracker has identified the 10 most important steps we need to take if we are to keep warming to 1.5°C (Kuramochi et al., 2016, 2018). Similarly, Figueres et al launched the project Mission 2020, "a collaborative campaign to raise ambition and action across key sectors to bend the greenhouse-gas emissions curve downwards by 2020", with an accompanying action plan and report to outline how to do so (Revill & Harris, 2017). Another project which has attempted to identify the most effective actions to address climate change and reduce emissions is Project Drawdown (2017), which brought together researchers from around the world to identify, research, and model the 100 most substantive, existing solutions to address climate change. Jointly the actions could get us to carbon neutrality in thirty years, and would not require anything new to be invented, as the solutions they identified already exist, it is just a question of implementing and scaling them up.

While there may not be a silver bullet to addressing reducing fossil fuel dependence, we need to focus on what are the most effective ways of acting that can jointly rein in the problem at the speed and scale that the FFCEI demands. As Alex Steffen highlights: "The most important criteria for climate strategies now is how fast they can scale… The 2020s may well be the deciding moment for humanity's future, for millennia to come. We are about to enter the Last Decade. That is when we are." (A. Steffen, 2017b). If we are to adequately fulfil the Fossil Free and Climate Emergency Imperative (FFCEI) then we will need to be sure that the sorts of action we are pushing for can shift our societies at the requisite pace. Many of the actions listed above are concrete projects or pathways that we need to undertake, however, given our political context, vested interests have and will continue to slow the needed uptake of these solutions. Thus, much of the work of movements and those seeking solutions to our emergency, is to build the political will to push back against vested interests, so that we can undertake needed action.

While the need to push for such broader structural transformation does not give us free rein to pollute in our personal lives, it does suggest that there may often be times where the need to push for broader structural transformation will outweigh the prima facie moral duty to reduce our personal emissions. Doing so is in line with the Anti-Pollution Principle, which holds that we should not use resources, especially limited resources, whose use contributes to the harms of others, unless there are sufficiently strong moral reasons for doing so. Helping to prevent the catastrophic outcomes that may result if we do not act on the FFCEI will often serve as such a sufficiently strong moral reason to use up resources, however, given the limited carbon budget we have left, and the billions of other people we have to share it with, we must also be judicious as we weigh up when our actions will in fact be worth the resources they use up and the pollution they may create.

As the next chapter explores, the moral questions we need to ask ourselves is not only how much resources we can justifiably use up in doing this work, but also how much can be asked of us to do this work. The sorts of structural transformation we need to undertake will be resisted fiercely by entrenched interests as has been shown time and time again even for some of the most modest reforms. Partly as a result, we do not yet have the popular support needed to pass such policies either. As such, if we are to be successful, many people will likely need to give much of themselves to fighting for climate justice and to advocating and organizing for needed change. Morally speaking, how much is enough for us to give in fulfilling this task, and how much is asking too much of us? What is the extent of and how demanding can our moral responsibilities really be in the face of the climate and fossil free emergency? How do we fairly share that responsibility?

Chapter 7: A Morally Demanding Emergency

As the previous chapter argued, we need to push for rapid and comprehensive action to shift away from fossil fuels if we are to fulfil the Fossil Free and Climate Emergency Imperative. In an ideal world, we would all join together to make that push and jointly meet the FFCEI. In such a world, for the most part, each individual's responsibility would be minimally demanding, or rather less demanding than the status quo, given how, as we highlighted in Part A, a clean energy future is a potentially much more prosperous and equitable future, which would avoid grave, widespread and unnecessary harm associated with maintaining the fossil fueled status quo and provide significant benefits for both the present and future generations.

Of course, we are not in such an ideal world, otherwise we wouldn't be in this mess. Looking forward we can expect that not everyone will do their fair share and entrenched interests will continue to push back against progress. As such, if we are to successfully tackle climate change, the responsibility to push for needed action will not be spread evenly across us but will fall to a smaller number of people, and be more demanding than would be the case in an ideal world. Given this, is it alright for morality to ask more than would be our fair share in an ideal world? Can morality ask us to take up the slack created by the inaction and negative actions of others?

Such questions situate us firmly in the realm of non-ideal theory where we attempt to determine what our responsibilities for justice are, given that people are not fulfilling that would be their responsibilities for justice under an ideal world. As Laura Valentini (2012) highlights, there are 3 different conceptions of ideal versus non-ideal theory. Here I focus on one particular conception concerning how the demands of justice shift when individuals are not fully complying with what their responsibilities would be under ideally just conditions. Assuming one's fair share is defined by what one would be required to do under conditions of full compliance, Valentini argues there are 3 broad answers: 1) Do your exactly your fair share; 2) Do more than your fair share; 3) Do less than your fair share. In the next section, I defend option number 2, arguing that the appropriate response is to do more than your fair share.

As Roser and Heyward (2016, p. 5) argue, when engaging in non-ideal theory not only does the demandingness of our duties shift, so too does the content of our duties. Likewise, in the face of emergency, the content and demandingness of our duties to act on the fossil free moral imperative are very different to what they would be in an ideal world. Not only will we be asked to take on more than would be our fair share under ideal circumstances. More than that, we may be asked to engage in more radical forms of action than would otherwise be required of us under more ideal circumstances. Additionally, while ideally the wealthy, powerful, and capable individuals who significantly benefit from and use fossil fuel would take on the lion share of this responsibility, given that they are not, awesome levels of responsibility may fall to the rest of us.

Balancing Harm Avoidance and Burden Sharing Justice

In his survey of the philosophical literature on individual responsibility for climate action, Augustin Fragnière shows that authors are divided on the question of how demanding our responsibilities to act on climate change can be, with some authors arguing we have little to no moral responsibility to reduce our individual greenhouse gas emissions, some arguing that we have a very stringent duty to do so, and most finding a middle ground, "acknowledging the existence of a duty to reduce one's emissions, but limiting its extent to some conception of 'reasonable sacrifice'" (Fragnière, 2018, p. 3).[62] A number of authors object to a focus on individual emissions, partly because they believe that focusing on individual emissions will impose too demanding a duty on individuals (Cripps, 2013; Tan, 2015). They thus argue that we should shift our moral responsibility to pushing for collective action. However, shifting our action to the collective, institutional or systemic level does not free us from having to engage

[62] As Fragnière's survey also reveals, in the climate ethics literature, the question of demandingness is often focused around determining how demanding our individual responsibilities to reduce our greenhouse gas emissions should be. However, given the objections raised in earlier sections against focusing on individual emissions, here I aim to broaden the question to focus instead on how demanding our moral duties can be to take effective action on climate change, with reducing individual emissions being just one element of the broader action needed. As I will argue, there is a strong demanding responsibility to act more broadly to fulfil the fossil free imperative.

with questions of demandingness, as demanding amounts of responsibility may be required to ensure a transformation at the structural and institutional level.

While it is true, that the sorts of changes that societies can take to become fossil free will bring about immense benefits for both the present and future generations compared to continuing with the fossil-fueled status quo, nonetheless the action needed to ensure that we undertake the necessary actions in the window of time available are significant. Making the necessary institutional and systemic changes will not be easy, due to entrenched and powerful interests holding back the necessary action, corrupting governments, and misinforming citizens. As evidenced by the last few decades of political struggle on climate change, the fossil fuel industry and other interests who benefit from the status quo, will not go quietly into that good night. Instead they will fight tooth and nail, using almost any tactic available to protect their profits, ranging from lobbying, corruption, murder, violence, war, intimidation, vast misinformation and propaganda campaigns, and more (Bond, 2011; Conway & Oreskes, 2010; McKinnon, 2016; Muttitt, 2012).

In the face of this immense power struggle over the future of the planet, it falls to people to build the power and capabilities necessary to take on entrenched interests. And given that the majority of people are not fully aware of the dire straits we are in, are not willing to take requisite action, and/or are misguided as to what is required, then the responsibility for action falls to the small minority who are aware, able and willing to take action.[63] In the words of Chris Cuomo "an unfair and possibly unmanageable degree of practical responsibility therefore falls on citizens and consumers, who *may* turn out to be ineffective as political actors… Nonetheless, if national and corporate policies will not go in a more sustainable direction without a great swell of public support in places like the United States, then it is

[63] The reason why knowledge matters is because those who are unaware of an injustice are unlikely to act on it, so those who have knowledge, who are aware of the crisis we face have a responsibility to act. Part of that action can be to make others aware of the problem and get them to join in acting.

ethically and practically necessary that the significant minority who hopes to effectively address the problem of climate change find ways to build that support." (2011, p. 708)[64]

While some might feel disheartened and even hopeless in the face of the possibility that such a responsibility might fall on a relatively small minority, such hopelessness would not necessarily be supported by the history of social change. To borrow the words of Margaret Mead, we should "never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has". To put some empirical support to that pithy quote, Erica Chenoweth's work draws on historical studies to show that it typically takes about 3.5% of the population engaged in sustained nonviolent civil resistance to topple brutal dictatorships (Chenoweth, 2017; Chenoweth & Stephan, 2012). In the American context, we may also be heartened by this, given that polls reveal that many Americans (24%) would support an organization involved not just in civil resistance, but the even more radical and controversial strategy of non-violent civil disobedience against corporate or government activities that make global warming worse.[65] One in eight people (13%) say they would be willing to personally engage in non-violent civil disobedience against corporate or government activities that make global warming worse (Leiserowitz, Maibach, Roser-Renouf, & Feinberg, 2013).

Engler and Engler's masterful overview of the history of social change shows numerous examples of how using non-violent civil resistance "people with-few material resources and little access to conventional powerbrokers have sometimes been able to bring about

[64] Emphasis my own.

[65] Civil resistance is a broad term that includes many different types of action, and can be distinguished from the more specific acts of civil disobedience which involves refusing to comply with or breaking certain laws as part of a protest against injustice (Brownlee, 2017). According to Adams Roberts (2009), "civil resistance is a type of political action that relies on the use of non-violent methods. It is largely synonymous with certain other terms, including 'non-violent action', 'non-violent resistance' and 'people power'. It involves a range of widespread and sustained activities that challenge a particular power, force, policy or regime – hence the term 'resistance'. The adjective 'civil' in this context denotes that which pertains to a citizen or society, implying that a movement's goals are 'civil' in the sense of being widely shared in a society; and it denotes that the action concerned is non-military or non-violent in character". Civil disobedience can be a subset of civil resistance, but acts of civil resistance are not necessarily acts of civil disobedience. Brownlee provides a good overview of the philosophy of civil disobedience, including questions of under what conditions civil disobedience may be justified.

transformations that mainstream politicians consider to be absurd and impractical—right up until the moment when these changes become common sense" (2016, pp. 87–9). While the struggle for a fossil free future is different to struggles like the civil rights movement, the suffragettes, or anti-fascist movements, nonetheless the history of movements for social change provide hope that a small yet dedicated minority can make change – a hope that is buoyed by the growing climate justice movement and also by the rapidly declining costs and rapid growth of renewable energy alternatives highlighted in chapter 2. However, while it is true that history shows that a small dedicated minority can enact broad sweeping change, it is not without significant sacrifice and dedication on behalf of their members, and so the demandingness question comes back, and we must ask how much morality can ask of individuals to take on to ensure a fossil free future.

Some philosophers have argued against the idea that morality can require us to take on more than what would be our fair share of responsibility under ideal conditions. Liam Murphy (1993), for instance, proposes something referred to as the compliance condition, which holds that that our obligations of beneficence ought not to demand more of agents than would be demanded of them under full compliance. In other words, our duty should not increase just because others are doing less, and we should only do as much as would be asked of us if everybody was doing their fair share. Murphy's compliance condition is grounded in his outlook that beneficence is best understood as a collective and cooperative project rather than an individualistic one. As a collective project, he claims that the burdens of beneficence have to be assumed by all members of the collective. He argues that it undermines the collective character of the moral project if one's share of duty increases just because others fail to do their part.

In response, Elizabeth Cripps has argued that "this appeal to one narrow sense of fairness (fairness between duty-bearers) seems itself to beg the question. If our duties… are originally grounded in the moral badness of the severe suffering of other moral subjects, it is hard to see how that suffering can be altogether irrelevant in determining an appropriate response, even when there is only partial compliance" (Cripps, 2013, p. 159). Here I am in agreement with Cripps and believe that arguments like Murphy's often tend to prioritize fairness among the relatively well-off duty bearers, over moral duties to prevent or even stop contributing to harm. It is true that there is some unfairness to having to take on the slack of others, but that unfairness pales in comparison to the unfairness that would result if we fail to collectively act on the FFCEI. Indeed, the compliance condition's privileging of fairness among duty bearers is particularly problematic in the context of climate change and fossil fuel harms, for if we, and especially the affluent polluting class, do not act and take up the slack of non-actors, then the harms of fossil fuels will fall disproportionately on those least responsible for the problem and most vulnerable to its impacts (cf. Abeysinghe & Huq, 2016; Watson Institute for International Studies, 2012). So, by saying we will only do as much as would be required of us under an ideally fair distribution, we are often putting fairness among the privileged of the current generation, over and above the moral commitments to avoid the potentially deep harms that fossil fuels and climate change will impose on the most vulnerable now and in the future.

Simon Caney (2014) provides an important philosophical distinction which can help show why we should turn away from overly focusing on fairness among duty-bearers. The distinction is between Burden Sharing Justice, which is the focus of authors like Murphy, and Harm Avoidance Justice, which is more concerned with avoiding harm. More specifically, Burden Sharing Justice "starts by focusing on how the burden of combating the problem should be shared fairly among the duty-bearers. An agent's responsibility, then, is to do her fair share" (Caney, 2014, p. 125). Harm Avoidance Justice, on the other hand, "takes as its starting point the imperative to prevent climate change [and I would add the broader harms of fossil fuels], and it works back from this to deduce who should do what. Its focus is primarily on ensuring that the catastrophe is averted (or at least minimized within reason). This perspective is concerned with the potential victims—those whose entitlements are threatened—and it ascribes responsibilities to others to uphold these entitlements" (ibid).[66]

As Caney points out, ideally, both Harm Avoidance and Burden Sharing Justice would coincide, however, when it comes to climate change, they do not neatly overlap, as countries, communities, individuals and companies are not living up to their fair share of the burden, rather for the most part they are falling drastically short of it (cf. Holz et al., 2017). Given this non-ideal situation, Caney points out that we "need an account which includes both kinds of responsibility, and which determines which should take priority when the two conflict" (Caney, 2014, pp. 125–6). In Caney's paper he makes the case for a significant focus on Harm Avoidance Justice under conditions of emergency and argues that the failure of people to comply with their fair share of emissions reductions (what he calls first-order responsibilities) means that those who have the power and ability to push for broader change and compliance have responsibilities to do so (what he calls second-order responsibilities). Caney argues that we should accept second-order responsibilities when four assumptions hold:

1) there is an emergency – which as I argued in the climate case is constituted by the rapidly closing window of time left to avert catastrophic climate change, and the immense harms created by fossil fuels;

2) agents can effectively reduce or limit the chance of those outcomes;

3) "the agents identified in the previous section do not simply have the capacity to effect change. It is also the case that they have a capacity that many others lack";

4) there are no sufficiently weighty countervailing considerations.

[66] Caney developed his account partly by building on Michael Walzer's discussion of how in a 'supreme emergency' we may have to choose between acting in such a way that we secure the specified goal (jus ad bellum) or by acting in ways that distribute the harms equitably (jus in bello). Walzer 1977, ch. 16.

When these four conditions hold, Caney argues that the application of second-order responsibilities should be guided by what he refers to as the Power/Responsibility Principle, based on the idea that "with power comes responsibility" which "asserts that, under certain circumstances, those with the power to ensure that agents comply with their first-order responsibilities have a responsibility to use their power to protect people from the existential threats posed by climate change." As such, for Caney, our responsibility to take on climate change is relative to the power we have to take action. Caney claims that such a Power/Responsibility principle has not received much analysis in the philosophical literature. However, it has also been featured to a certain extent in the work of Iris Marion Young, whose work Caney does not mention, and whose account provides, in my assessment, a more robust although not perfect account of how we should divide responsibility when focusing on Harm Avoidance Justice and second-order responsibility.

Young develops an account of responsibility in the face of structural injustices, which she argues exist "when social processes put large categories of persons under a systematic threat of domination or deprivation of the means to develop and exercise their capacities, at the same time as these processes enable others to dominate or have a wide range of opportunities for developing and exercising their capacities" (Young, 2011, p. 52). In the face of structural injustices, such as that caused by climate change and fossil fuels, Young argues that the extent of one's responsibility is relative to one's power, privilege, interest and collective ability (2011, pp. 144–6). This forms part of Young's social connection model of responsibility, in which she argues that "being responsible in relation to structural injustice means that one has an obligation to join with others who share that responsibility in order to transform the structural process to make their outcomes less unjust" (Young, 2011, p. 96). Young's account is preferable to that of Caney, as each of the additional elements aside from simply power, namely interest, privilege, and collective ability, contribute significantly to better defining who has responsibility and why. As such, I briefly touch on why each is important to add below.

Interest: As Young points out, those who have particular interest in addressing structural injustice, those disproportionately impacted, have a special responsibility to work to address injustice. Doing so can help those working against structural oppression to better understand the nature of injustices visited upon these communities and seek solutions which better addresses them. In the words of Young, "unless the victims themselves are involved in ameliorative efforts, well-meaning outsiders may inadvertently harm them in a different way, or set reforms going in unproductive directions" (Young 2011 p. 146). This coheres with insights put forward Kyle Powys Whyte and Kristie Dotson (2013) about how certain elements of environmental injustice can be unseen, overlooked, or even unknowable by those with privilege – a point explored further in the following chapters.

As Robyn Eckersley highlights in a paper applying Young's parameters of reasoning to climate change, "the primary injustice is that many of the world's poorest and least developed communities will suffer the worst impacts of climate change despite making the least contribution to the problem. At the same time, their marginal social structural position in the economy and the state system not only exposes them to most of the risks, and few of the benefits, generated by these social structures but also places them in a particularly weak position to orchestrate their transformation in ways that will reduce their vulnerability" (2016, p. 347). I would add, furthermore, that the young are also disproportionately marginalized from discussions even though they are the ones who will have to experience more of the impacts of climate change. Importantly, we should also include those most likely to be negatively impacted by the transition, such as working-class fossil fuel industry employees without adequate safety nets to assist them in the transition, but not fossil fuel corporations, apologists, and billionaires given their privileged, non-vulnerable positions and history of corrupting climate policy. Thus, applying Young's parameters of reasoning to the case of climate change, those who are disproportionately impacted by the harms of fossil fuels and the transition away from them, the young, the global south, low-income communities, communities of color, women, indigenous people and fossil fuel workers, have a special responsibility to be involved in efforts to address fossil fuel injustice.

We must, however, be careful about how this special responsibility is fulfilled, for we should be weary of putting the burden of transforming a harmful system on those who are already disenfranchised and harmed by the system. Thus, I would argue that ideally those who are privileged, who have the means, and who benefit from the current system, have a corresponding special responsibility to support, compensate, and uplift the voices of those who are marginalized and disproportionately impacted by these problems. Otherwise we risk compounding injustice by putting both the harms of the current system and the responsibility to address it on the shoulders of the marginalized and disproportionately impacted.

Collective Ability: Caney's conception of power focuses more narrowly on the role of particular agents such as leaders and experts who play a "crucial and privileged causal role" who have capacities "that many others lack" and who unlike others "can make a major difference" (Caney, 2014, p. 143). However, apart from the sort of direct power that an individual might have as a result of their position in life, there are other ways that are important to think about in terms of what it means to have the ability to create change. In the words of Young, "some agents are in positions where they can draw on the resources of already organized entities and use them in new ways for trying to promote change" (Young, 2011, p. 138). Young's appeal to collective ability is an important compliment to Caney's conception of power and the power/responsibility principle, as it helps us to think of power in a broader sense as grounded in our relations to each other, and the collective organizations and institutions we might have, rather than in a more individualistic, agent-centric manner. In the words of Eckersley, "Young would be the first to concede that power… is not only intentional, active, and agential; it can also be diffuse, unintended, structural, and productive (via discourses)" (Eckersley, 2016, p. 353).

Such a shift to the collective and a broader notion of power is incredibly important in the case of climate change, and indeed most social movements, for it is largely through collective organizing and movement building, that movements were able to generate enough momentum to make broad sweeping shifts of the sort that will be needed to ensure a rapid transition away from fossil fuels. An analysis of power which focuses only on individuals in traditional roles of power misses out on the real strength of movements, their ability to tap into collective power. It also perpetuates an ahistorical and distorting image of social change which puts it down to the efforts of a few remarkable individuals, and in doing so marginalizes the incredible contributions of so many others who make a social movement and allow for such broad successes. While there are indeed many remarkable heroines and heroes throughout history, often they were only able to be remarkable against the backdrop of a power social movement. Nelson Mandela would be a lone voice in the wilderness without the incredible anti-Apartheid movement, as would Martin Luther King Jr without the powerful civil rights movement.

Additionally, a final reason to move away from Caney's limited focus on the power of those who play "a crucial and privileged causal role", is that, as the following segment discuses, those with traditional power and privilege are typically invested and benefit from the status quo, such that they may be reluctant to challenge it. As such finding alternative sources of power to challenge more traditional sources of power is vitally important. This is particularly important in contesting the fossil fuel industry, the richest and most powerful industry in the world, which has managed to capture and block many halls of power across the globe and corrupt many in power.

Privilege: Benefitting from a system of oppression or structures that bring about harm, brings with it special moral and political responsibilities to address its injustices. Within moral philosophy, moral responsibility is divided by negative and positive duties. Positive duties are duties to assist those who are in need of assistance, even if you did not cause the harm, whereas negative duties are duties to not cause or contribute to harm and to assist those who you have harmed (Pogge, 2005, p. cf.). In the ethics literature, those who contribute to a harm are more morally responsible than those who are merely bystanders – i.e. negative duties are stronger than positive duties. Given the way that most, particularly the affluent and the global north, benefit from the burning of fossil fuels it seems that for most of us we will have a stricter negative duty.[67] In the words of Young, "as beneficiaries of the process, they have responsibilities. Their being privileged usually means that they are able to change their habits or make extra efforts without suffering serious deprivation" (Young 2011 p.147).

However, as Young, Charles Mills (2017), and Eckersley all highlight, "(building on the heritage of Karl Marx), one of the key challenges is that there is typically an inverse relationship between power and privilege, on the one hand, and the interest to transform social structures, on the other. Those who are the major beneficiaries of such processes have the greatest power to transform them but typically have little interest in doing so, and vice versa" (Eckersley, 2016, p. 352). As such, while we would hope that the privileged and powerful are taking on much more of the responsibility for action, as Young and Caney argue they should, the difficulty within the climate case and a number of others, is that they are not doing so. As such, responsibility may fall more heavily on the shoulders of those who are less privileged, less traditionally powerful, and who can least afford to take on the responsibility of climate action. Due to the nature of the harms of climate change and fossil fuels, generally the more those with privilege and power do not take on responsibility, the more the responsibility for action and/or the harms of inaction fall on those who are least privileged and most vulnerable, and who have typically contributed least to the problem.

While Caney and Young were both meant to provide non-ideal answers to the tension between Harm Avoidance Justice and Burden Sharing Justice, it seems that even their conceptions of how to share the burdens may themselves be more ideal or idealistic than our current

[67] Climate and fossil fuel harms are often although not always a little different from the typical notion of harms underpinning negative duties, insofar as negative duties are more typically about avoiding causing direct harm. As such it may be more appropriate to categorize many of the sorts of harms created by climate change and fossil fuels as akin to what Judith Lichtenberg calls "the New Harms", where "no individual's action is the cause of harm; it would be more accurate to say that an individual's action makes a causal contribution to an overall effect that may be very large and significant" (Lichtenberg, 2010, pp. 561–2). The changing nature of the harms does not mean we have no moral responsibility, but it might mean that the moral obligation not to contribute to new harms, while stronger than a positive moral duty, is less stringent than a typical injunction not to do more direct harm, which underpins negative duties. However, there are some harms associated with fossil fuels which are more like the traditional notion of direct harm associated with negative duties. These are harms such as the oppression, violence, military intervention, and intimidation that are associated with a lot of activities that secure fossil fuel interests.

situation. As such, rather than the burden of action falling primarily to the powerful in Caney's case, or to the powerful and privileged in Young's, it is falling increasingly on the less powerful and privileged who have to draw on their collective ability to take action. As I attempt to demonstrate in the table below, what this points to is that even though Caney argues that his view prioritizes Harm Avoidance Justice, his Power/Responsibility Principle is still a view based on Burden Sharing Justice, it is just a less ideal form of Burden Sharing Justice, let us call it a sub-ideal conception of justice.

Level of Theory	Focus	Proponents	Distribute Responsibility
Ideal Theory	Ideal Burden Sharing Justice	Ecoequity Kartha, UNFCCC	Common but Differentiated Responsibilities and Respective Capabilities.
Sub-Ideal Theory	A Balance of Harm Avoidance and Burden Sharing Justice	Young, Caney	Power/ Responsibility Principle (Caney) Power, privilege, interest, & collective ability (Young)
Non-Ideal Theory	Deep failure of Burden Sharing Justice both at an ideal and sub-ideal level, leading to strong priority of Harm Avoidance Justice.	Lenferna	We should as best as possible follow ideal theory and failing that sub-ideal theory, but to avert catastrophic harms we need to prioritize Harm Avoidance Justice, which may ask demanding responsibilities of those who ideally and even sub-ideally would not be asked to take on such burdens.

I consider Caney's a sub-ideal form of justice, as it still hopes that the powerful will take on responsibility to help push for more equitable action. In comparison, an ideal conception of justice, would be views such as Common But Differentiated Responsibilities and Respective

Capabilities, which are more typically used to define how we would equitably share burdens for climate action (see EcoEquity, 2015; Holz et al., 2017; UNFCCC, 1992). Caney's view can be seen as arguing that the powerful should take responsibility for pushing for a more ideal sharing of the burdens of climate justice. The powerful taking on such responsibilities would indeed be morally preferable given our current failure to act in line with more ideal forms of burden sharing justice. However, it is unlikely that the powerful will take on such responsibilities voluntarily and so this deeply non-ideal reality means that the responsibility falls to those who do not have traditional power within such system, and who need to build their collective power to attempt to shift the power structures. As such, both the Power/Responsibility Principle's version of Burden Sharing Justice and Young's conception, are subject to tension with the aims of Harm Avoidance Justice, especially given that those in positions of power and privilege are least likely to act to upend the structures from which they benefit, as Marx, Mills, Young and Eckersley highlight.

Recognizing the need to move away from even Caney's sub-ideal account and for us to take on responsibility is important, for we can imagine the results if other movements had decided they would only take action if the powerful were bearing responsibility. In social movements throughout history, people did not rely on the powerful to make change for them, but instead it often fell on oppressed and marginalized people and movements to build power and/or to claim the latent power that they had as collectives. Indeed, if the anti-Apartheid movement had waited for those in power to make the needed change, we'd likely still have Apartheid, as those with vested interests in the status quo were typically those in traditional positions of power, particularly given that black South Africans did not have the right to vote. It was only through years of movement and collective power building, involving deep and significant resistance to the Apartheid regime from precisely those who were disempowered under the Apartheid system, that the anti-Apartheid movement was able to challenge the power structures of the Apartheid government, and pressure those in formal positions of power to end Apartheid. Likewise, the U.S. Civil Rights movement involved significant sacrifice and resistance, often from precisely those who were disempowered within the system.

To flesh out this point, we can turn to the distinction between bearing responsibility and taking responsibility introduced by Chris Cuomo. According to Cuomo, “to bear responsibility is to be considered morally responsible by common ethical norms, but to take responsibility is to accept responsibility and act on it. According to ideal concepts, whoever or whatever bears ethical responsibility for serious ongoing harms, intended or not, should accept culpability and in some way take responsibility for stopping the harm and redressing past harms” (2011, p. 699). Cuomo goes on to say that “it is unethical for a bearer of great causal responsibility who is able to repair or alleviate a very harmful situation to which she is actively contributing to ignore her obligations to stop contributing to harm. But when this occurs, sometimes a problem can be addressed or solved by others who are able and willing to take responsibility for addressing the harm. Those others may decide to step up because they contributed to the problem in a lesser way, or because they feel a sense of responsibility or duty for a different reason, or because they are simply moved to do so because they care about whatever is harmed or threatened” (2011, 705). Following Cuomo’s distinction, we are called on to take responsibility even if the rich and powerful will not bear the responsibility they have to act.

To be clear, I am not saying that we must abandon the broader commitments that we have to ideals of Burden Sharing Justice, nor am I providing an argument against taking an intersectional approach to climate justice which recognizes inequalities, the different ways we are impacted, and how the fossil fuel fight connects to other struggles. Taking such an intersectional approach is deeply important and may well improve our chances of winning the fossil fuel struggle (Bratman, Brunette, Shelly, & Nicholson, 2016; Grady-Benson & Sarathy, 2016; Healy & Barry, 2017; Healy & Debski, 2016; Schlosberg & Collins, 2014). Indeed, the sorts of action we push for must address social inequalities and injustice, for otherwise it will face significant resistance, as exemplified by the Yellow Jacket protests in France, where despite a populace very concerned about climate change and wanting to take action, significant resistance was mounted against a carbon tax because it was designed in a regressive way, and layered over a slate of regressive tax cuts for the rich and increased burdens for the working class.

While we need to push for just action on climate change, given the immense impending harms we face if we do not act rapidly to address the FFCEI, when it comes to who should take on the responsibility to push for more just action, we may have to significantly relax the stringency of Burden Sharing Justice to prioritize Harm Avoidance Justice at least temporarily as we push for transformation which can better embody Burden Sharing Justice.[68] We are called on to take on demanding sacrifices in the present in order to avert catastrophe and hopefully push for a more equitable arrangements in the future that better line up with more ideal and even sub-ideal theories of justice. It is as this point that the demandingness question re-enters the fray, for if we admit that we need to take a shift towards Harm Avoidance Justice even in relation to conceptions such as Young and Caney's, the question arises of how much can we be asked to take on in the name of Harm Avoidance Justice?

Young offers us a good initial caution on the question of demandingness. In *Responsibility for Justice*, she responds to the objection that one's moral duties should not be overly demanding, claiming that "it is certainly not sufficient to argue against a claim of moral obligation that it asks more of moral agents than they are inclined to do. Our intuitions and inclinations about our obligations are likely to be self-serving and under-demanding" (Young 2011 p.145). The need to be skeptical of self-serving and under-demanding intuitions is particularly important for the more privileged among us, who are often too quick to argue that they have unfair or too demanding burdens placed on them, when in fact the burdens being placed on them are much less than those being imposed on those on the receiving end of fossil fuel harms, and may be much less than their fair share of needed climate action even under more ideal notions of fairness (cf. EcoEquity, 2015; Holz et al., 2017; Kartha, Baer, Athanasiou, & Kemp-Benedict, 2009). However, for those who are not privileged and are perhaps already taking on a lot to

[68] This argument parallels Caney's Long-Haul Argument, whereby we prioritize Harm Avoidance Justice and getting off fossil fuels now, but with the aim of restoring a more robust sense of Burden Sharing Justice in the long term. The difference is both that I think that we need to move beyond even the Power/Responsibility Principle. I also frame the need to move as about more than just the climate, including the broader harms of the fossil fuel industry as part of the reason for giving priority to moving off fossil fuel now.

fight for ending the fossil fuel era, the question arises, how much can or should Harm Avoidance ask of them?

Here we can return to Caney's account, and in particular to his condition that we should take up Harm Avoidance Justice responsibilities only when "there are no sufficiently weighty countervailing considerations". One of the virtues of this approach, like the Anti-Pollution Principle, is that it remains somewhat agnostic about what constitutes sufficiently weighty countervailing conditions, thus allowing it to appeal to those who hold many different moral outlooks, who can each use their own moral views to flesh out what would be sufficiently weighty. However, that virtue also translates into a vice as it may not be very good at providing definitive guidance given that it does not specify what is a sufficiently weighty countervailing condition. As such, it may be broad enough to allow for some moral outlooks which may problematically count relatively frivolous moral goods as somehow countervailing against the need to take action to avert catastrophic harms to billions of people.

To help counteract such worries about agnosticism leading to vagueness and potentially allowing for problematic and under-demanding moral outlooks, in the section below I want to expand on two lines of reasoning which support the claim that the demands of morality in the face of climate crisis will indeed be highly demanding, and that as such, to act morally there will have to be a pretty strong countervailing moral considerations to avert us from taking on these responsibilities. My first line of reasoning in favor of demanding responsibilities is just to highlight that any reasonable moral outlook which gave a fair amount of weight to the interests of future generations, the poor, nature, and life in general, would likely be quite demanding given the emergency we face and the grave, substantial, widespread, and unnecessary harms we face if we don't act. The second line of reasoning involves turning to a virtue ethics approach to thinking about what constitutes an adequate level of moral demandingness, which involves looking to moral exemplars in society to understand what morally virtuous behavior consists of. I turn to moral exemplars who show that in the face of deep injustices and inequality, acting morally may often involve taking on significant sacrifices for the sake of justice.

Turning to the first line of reasoning, if we seriously consider the potential harms that will likely occur should we not collectively act to rapidly reduce fossil fuel dependence, it is difficult to imagine any other problem that could threaten so much that is of value across any reasonable moral outlook. Something would have to be quite important to countervail against potentially plunging billions into poverty, devastating much of the world's ecosystems and species, causing widespread conflict and division, potentially undermining the very conditions upon which 'civilized' society depends, and dangerously destabilizing the climate for millennia to come. In the face of this reality, I would argue that for many (although not all) it is not the case that their well defended and thought-out moral outlooks typically weigh against taking aggressive action, rather it is more the case that many of us have not adequately thought about, understood, or given weight to the moral magnitude of the crisis we face and what that means for us morally. In the words of Alex Steffen, "if people actually understood the speed with which humanity's windows of opportunity are closing, the young would be rioting in the streets", and indeed increasingly they are, as is exemplified by student strikes in Australia and civil disobedience by the like of the youth-led Sunrise Movement in America (A. Steffen, 2017a). While there are many worthwhile things in the world, and some will indeed countervail against the need to take action, it seems the harms we can potentially avoid would outweigh many matters of moral significance and require many to shift their lives considerably to dedicate much of their energies to tackling this crisis.

To help bring home the magnitude of the challenge we face, Simon Caney introduces the comparison to the case of humanitarian intervention, posing the question: "If we are willing to send some to their death to defend others, then can we reasonably object to imposing non-lethal sacrifices on people to defend similarly important interests (in life, physical integrity, health, and subsistence)?" (Caney, 2014, p. 146). A more appropriate analogy to humanitarian intervention may be that of averting multiple world wars, for the scale of avoided harms is closer to numerous world wars than it is to an individual humanitarian intervention. For instance, it is estimated that there would be 153 million avoided deaths from air pollution alone if we acted in line with the 1.5°C rather than the 2°C target (Shindell et al., 2018). That number is close on triple the estimated 60 million deaths from World War II, the deadliest military conflict in history. And to avert World War II countries and communities across the world took on major responsibilities and sacrifices, dedicating huge amounts of their resources and the lives of their people to mobilize for the efforts. If the scale of the harms and losses from continued fossil fuel dependence are likely to be many times more than that of WWII, then should we not mobilize just as intensely for it, if not much, much more?

Of course, under WWII not all life came to a standstill, and there were still responsibilities to ensure the continued well-being of oneself and one's communities. Similarly, working to put food on one's table, ensuring one's health, and fighting other injustices that currently exist are important, even in the face of the climate emergency. However, we must be wary of how much we dedicate to such activities, as for too long climate change and fossil fuel harms have been given a back seat to other priorities, and it is because of that, that we are in the mess we are in. Of course, where possible, we should combine fights against broader injustices with the fight against the fossil fuel industry and climate change. For instance, we can push for a bold green new deal which invests equitably into communities not only to wean us off fossil fuels, but also to address a range of broader social ills. Likewise, we can support bold progressive politics which calls for radical reform not only to address climate change, but also to address many dimensions of injustice, as exemplified, for instance, by Bernie Sanders and Jeremy Corbyn. However, with limited resources and limited social and political capital, we will not always be able to dovetail climate justice in with other justice fights, and the scale of the emergency we face means we cannot afford to continue giving it the backseat to other injustices. Weaning ourselves off fossil fuels must rise to be a top priority before runaway climate change and fossil fuel harms drastically undermine the possibility of ensuring other forms of justice in the future, which unchecked climate change will likely do. Indeed, precisely because we care about racial, economic, and environmental justice, we cannot ignore the Fossil Free and Climate

Emergency Imperative any longer, for failing to act on it will drastically undermine the possibility of ensuring justice and prosperity more broadly.

In sum, being in an emergency augments the nature of our moral responsibilities. Things we might not otherwise be called on to do become part of the purview of what can be morally asked of us. Our moral responsibilities shift in proportion to the emergencies that we face. Of course, we should be appropriately wary of appeals to emergency, as they have been used to grant certain authorities undue power, and in the climate case they may be abused to justify problematic interventions such as morally questionable climate engineering interventions (cf. Gardiner, 2010). In our case, however, the emergency is real, and while the moral demands in our emergency may indeed be demanding, that is not a problem of morality, rather it is a reflection of the demanding times we are living in. While we can shirk those demanding responsibilities, the burdens do not go away, instead because of the nature of the climate and fossil fuel problem, harms and burdens would fall even harder onto the poor, communities of color, indigenous people, women, future generations and nature, those least responsible for the problem yet most impacted by it. While it might seem unfair to take on added demands that come about as a result of other people's inaction and the action of vested interests, there is a much greater unfairness if we do not do so. As we consider what it means to take on such demands in the face of a problem of the magnitude we face, we can find inspiration and moral guidance from those who have engaged in struggle for justice before us.

Virtuous Martyrs, Moral Exemplars, and Imperfect Aspirations

Virtue ethics refers to a group of moral theories that emphasize the role of character and virtue as central to defining what it means to act morally. In Western Philosophy, virtue ethics developed significantly out of the works of Aristotle. In *Nicomachean Ethics,* Aristotle's account of virtue ethics put significant emphasis on the importance of looking to moral exemplars in order to learn what it means to be virtuous (Aristotle, 1953). In more recent works in virtue ethics this model of moral thinking where we look to moral exemplars for our understanding of virtue has come to be termed an exemplarist account of virtue ethics

(Hursthouse & Pettigrove, 2016; Zagzebski, 2011). Following in the exemplarist tradition, I aim to look at moral exemplars of and from previous social movements to draw guidance as to what sorts of moral virtues may be needed in the face of the climate crisis and what sorts of guidance it might provide us on the nature and demandingness of our moral responsibilities. I do not follow more radical notions of moral exemplarism whereby looking to moral exemplars is the fundamental way in which we determine what is moral (Zagzebski, 2011). Rather, I approach it more pluralistically, taking the example of moral exemplars as helping guide a broad understanding of what it means to act virtuously in the face of grave potential injustice, but not replacing the moral principles and conception of justice outlined in previous chapters. Moral exemplarism is meant to supplement such moral principles with a reflection on how others have acted virtuously in the face of grave potential injustice, and how that can provide lessons for what it means to act consistent with the demands of morality in the face of the Fossil Free and Climate Emergency Imperative.

When we look to the history of social movements and reflect on those who we consider moral heroes, we see a history of major sacrifice taken on by both movements and individuals. For instance, Nelson Mandela spent years living in exile, dedicated his life to the anti-Apartheid movement, took profound risks to his personal well-being, jeopardized his family life, and spent 27 years in jail. Similar stories of people dedicating their lives, facing incredible hardship, state oppression, violence and intimidation can be told of leaders such as Steve Biko, Rosa Parks, Mahatma Gandhi, Wangari Maathai, Martin Luther King Jr, Harriet Tubman, and Ken Sarowiwa. Those we consider moral heroes, we consider moral heroes often to a large extent because of the significant sacrifice that they undertook in order to fight against injustice. It is hard to imagine that the line of reasoning of these moral exemplars was to ask: what is my fair share of responsibility under ideal conditions of fairness? Rather it was to take the world as it is, deeply unjust, and to then dedicate their lives to alleviate the grave injustices. They dedicated their lives to the struggle against injustice, even though often the demands and sacrifices they took on were more than we could fairly ask them to take on, at least under more ideal conditions.

In the face of the climate crisis, a similar moral outlook and resolve to fight injustice and take on personal sacrifice is arguably needed for the inaction of many may call for significant sacrifices on behalf of those willing to take action. Already there are those who are stepping up to the moral demandingness of our time. For instance, on October 11, 2016, a team of 5 activists engaged in civil disobedience, shutting off the 5 pipelines carrying tar sands oil from Alberta, Canada into the United States. The flow of 2.8 million barrels of oil, approximately 15% of US daily consumption, was stopped. Reuters called it, "the biggest coordinated move on US energy infrastructure ever undertaken by environmental protesters," an act that "shook the North American energy industry." All of the Valve Turners face the potential of years in prison and some facing the potential of decades in prison for their actions to take on the climate crisis.

The Valve Turners are an important example of acting on our moral conscience in the time of emergency. Yet, they are a group of 5 middle- and old-aged white, college-educated Americans, none of whom are truly poor (Nijhuis, 2018). That makes them relatively privileged, compared to indigenous activists, people of color, and those in the global south who oppose fossil fuel interests and are often subject to much harsher punishments, including violence, imprisonment and death. Indeed, those in the global north are often much more shielded by their privilege and are able to take on action without fear of the sort of incrimination that such activists face. Although, even within developed countries like America, the risks are very different depending on who you are. While the Valve Turners were peacefully arrested, Native American resistance at Standing Rock was met with police violence and brutality in their efforts to resist some of the same pipelines the Valve Turners shut down. As the Valve Turners themselves argued, echoing Young, it is their relative privilege that gives them particular responsibility to take on significant sacrifices and risks, and undertake bold action like civil disobedience (Nijhuis, 2018).

It is also important to bear in mind that while shutting down pipelines for a brief while is a bold move, such actions are relatively modest compared to other acts of resistance, especially those being led by indigenous people in the global south, where activists organize major, coordinated, and sustained campaigns of civil disobedience and resistance despite the fact that they are less protected by privilege and the law, more vulnerable to state violence, and have less resources available to support their acts of resistance. Consider for instance this extract from Zaitchik (2017) discussing indigenous led resistance to oil companies in Peru:

> "The skiffs landed a few hours after sundown on September 18 [2017], a dark and moonless night in the Peruvian Amazon. They landed at several points along the broad Corrientes River, which flows south over the country's densely forested border with Ecuador. Hundreds of indigenous Achuar men, women, and children, many carrying ceremonial spears, organized into units by clan and village. They then followed their apus, or chiefs, toward seven targets: the area's lone paved road, a power plant, and five facilities for the pumping and processing of petroleum.
>
> The sites were occupied, their night staff escorted peacefully outside. By morning, the Achuar of the Corrientes controlled the local infrastructure of Lot 192, the country's largest and most notorious oil block.
>
> Over the next two days, the occupations spread. On the neighboring Tigre and the Pastaza rivers, Kichwa and Quechua chiefs led takeovers of key roads, the only airstrip, and several oil batteries.
>
> "This is not a symbolic action — we have completely paralyzed the country's most important oil field," declared a spokesperson for several of the indigenous federations backing the protest.
>
> The takeover of Lot 192 lasted for 43 days. It was hardly the first protest to shut down the oil facilities studding the rainforests of Loreto, Peru's biggest region and for decades the hub of its petroleum industry".

If indigenous peoples in Peru can dedicate themselves to 43 days' worth of sustained civil disobedience in the face of repression and violence as one of just many actions that they have undertaken, then this puts into perspective some of the relatively milder sacrifices that many in the developed world might consider too demanding to take on in the face of the climate crisis. Likewise, when we look to the history of social movements, we see that in the face of recalcitrant power structures, many were willing to undertake sustained campaigns of civil disobedience, breaking laws they perceived as unjust, and putting their freedom and lives at risk in order to support a higher moral law or cause.

Here it is important to separate out civil disobedience from civil resistance. As Adams Roberts (2009) defines it, "civil resistance is a type of political action that relies on the use of non-violent methods. It is largely synonymous with certain other terms, including 'non-violent action', 'non-violent resistance' and 'people power'. It involves a range of widespread and sustained activities that challenge a particular power, force, policy or regime – hence the term 'resistance'. The adjective 'civil' in this context denotes that which pertains to a citizen or society, implying that a movement's goals are 'civil' in the sense of being widely shared in a society; and it denotes that the action concerned is non-military or non-violent in character". Thus, civil resistance is a broad term that includes many different types of action and can be distinguished from the more specific acts of civil disobedience which involves refusing to comply with or breaking certain laws as part of a protest against injustice.

Civil disobedience can be seen as a subset of civil resistance, and when engaging in civil resistance it is just one set of tools that can be used to challenge unjust power structures. While I do not have the space to fully defend such a claim within this chapter, I would argue that civil disobedience against governments not acting adequately to address climate change and the broader harms of fossils fuels is justified. However, recognizing that civil disobedience may be justified does not mean it is justified under any circumstances, as is recognized by groups engaged in climate civil disobedience, such as the Frontline Action on Coal in Australia and the Climate Disobedience Centre in America. Following a conception of when civil disobedience is justified put forward by John Rawls, one could argue that in well-ordered relatively democratic, well-ordered societies, civil disobedience is justified when it is undertaken: 1) in response to an instance of substantial and clear injustice, 2) as a last resort and 3) in coordination with other minority groups. Additionally, as Brownlee (2017) highlights, many who advocate for civil disobedience argue that it should only be undertaken under the right circumstances and context, while acting conscientiously, committing the action in public, openly communicating about the nature and reason of such actions, committing preferably to non-violence, being willing to accept the legal consequences of one's actions, and following the leadership or consulting with relevant stakeholder and those most impacted. However, while under ideal conditions one would ideally adhere to all such conditions to justify civil disobedience, given the emergency we are in and that climate inaction often takes place in more oligarchic non-democratic spaces, not all such conditions will necessarily have to hold to justify civil disobedience. [69]

Of course, civil disobedience is not the only form of action that is important, and for many it may not be the most impactful contributions they can make to the cause. After all, acts of civil

---

[69] I defend here just the limited right to non-violent civil disobedience. However, that is not to outright condemn violent civil disobedience, for under certain circumstances it may be justified. Political philosophers such as Rawls defended their particular conceptions of non-violent civil disobedience in relation to the context of nearly just societies. However, under much more oppressive, illiberal and unjust regimes, other forms of resistance may be justified, as Rawls himself recognizes. Here we can turn to the work of Kimberley Brown who discusses this further:
"Non-violence, publicity and a willingness to accept punishment are often regarded as marks of disobedients' fidelity to the legal system in which they carry out their protest. Those who deny that these features are definitive of civil disobedience endorse a more inclusive conception according to which civil disobedience involves a conscientious and communicative breach of law designed to demonstrate condemnation of a law or policy and to contribute to a change in that law or policy. Such a conception allows that civil disobedience can be violent, partially covert, and revolutionary. This conception also accommodates vagaries in the practice and justifiability of civil disobedience for different political contexts: it grants that the appropriate model of how civil disobedience works in a context such as apartheid South Africa may differ from the model that applies to a well-ordered, liberal, just democracy." (Brownlee, 2017)

Similar to how violent disobedience may have been justified in the South African context, it may be the case that under certain circumstances those in non-functioning, non-liberal, non-democratic states may be justified in the use of violent disobedience against the state and fossil fuel companies. The question of if and when violent disobedience might be justified in the climate case is a little outside the scope of this thesis, but I would recommend turning to the work of Kimberley Brownlee (2017) who provides a good overview of the philosophy of civil disobedience. Also, in yet-to-be-published work, Simon Caney explores the right to resistance against global injustice. In it he note that "in extreme circumstances, persons may (subject to certain moral conditions) engage in actions that would otherwise not be permitted in order to protect their most vital interests" (Caney, n.d.).

disobedience are most meaningful when done for the right reasons in relation to much broader movements filled with a range of different tactics and strategies (Brownlee, 2017). Broader acts of civil resistance and mass uprisings are incredibly important compliments to civil disobedience. Furthermore, as I discussed earlier, many (but not all) forms of climate action are important, and moral heroism comes in many shapes and sizes. To borrow the words of Rebecca Solnit perhaps heroism these days might consist of occasional "high-profile heroism in public" but it may mostly be "just painstaking mastery of arcane policy, stubborn perseverance year after year for a cause, empathy with those who remain unseen, and outrage channeled into dedication" (Solnit, 2006, p. 44). Indeed, there are many forms of moral climate heroes who work in different ways, yet similarly dedicate their lives or much of their lives to working on climate justice. The dedicated non-profit worker who works incredibly hard every day trying to organize their community in exchange for little to no compensation; the committed volunteer who dedicates what little spare time they have to climate justice; the politician who actually takes political risks and fights for climate action against vested interests; each of these individuals display elements of the moral heroism we need. For in addition to grand acts of political courage, climate action will also be won through many smaller acts of resistance and courage which jointly can hopefully shift the tides of change.

It is also important to remember that even those who engage in the more high-profile heroism and who often get heralded as the heroes of the movement are embedded within a context of a much broader and deeper movement. As such, we should be cautious of appeals to solitary moral heroes and recognize that a movement is made up of many different roles and activities, and that the impact and legacy of the Mandelas and MLKs of the world are made possible through the vast movements which they were part of. In addition to individual commitment and sacrifice, as Young and Eckersley highlight, making political change requires a particular kind of solidarity that "must be forged between individuals who may have little in common but for a preparedness to engage in a public debate and collective action for the sake of preventing structural injustices" (Eckersley, 2016, p. 350). Likewise, if we are to properly understand history and how social change works, we cannot tell history just through the lens of a few charismatic leaders. We also need to recognize the broad and deep movements which they were part of.

While civil disobedience is just one element of a much broader array of needed climate action, it does provide an important comparative point against which to think about the sort of demanding responsibilities that we have. If many, including some of the world's poorest and most marginalized people, are putting their life, liberty and freedom on the line to stand up to the climate crisis and fossil fuel extraction, then what does that say when the privileged are not willing to even mildly disrupt their relatively privileged lives to combat the climate crisis? The ability to prompt such questions is a big part of the reason why civil disobedience is so important, for it shines a light on the magnitude of the problem, and by seeing others acting in proportion to the moral emergency we face, it can help inspire others to act in ways that are more up to the scale of the challenge we face.

As Hackel and Sparkman outline, "people don't spring into action just because they see smoke; they spring into action because they see others rushing in with water".[70] They make this claim based on a class study by psychologists Bibb Latane and John Darley (1968), in which participants filled out a survey in a quiet room, which suddenly began to fill with smoke (from a vent set up by the experimenters). When alone, participants left the room and reported the apparent fire. But in the presence of others who ignored the smoke, participants carried on as though nothing were wrong. Likewise, at a broader scale, according to Engler & Engler's (2016, p. 148) survey of the evidence of social movements, which drew on the works of Richard Clowen, Erika Chenowerth, Frances Fox Piven and Gene Sharp, when social movement participants demonstrate the seriousness of their cause through personal sacrifice it provides

[70] Hackel and Sparkman use this evidence to make the claim that personal emissions reductions are important because they can help provide social cues that we need to act on climate change. However, while personal emission reductions can play a role in communicating the need to act and demonstrating sacrifice, they are not quite proportionate to the scale of the crisis in the same way that civil disobedience is. They are the metaphorical equivalent of walking towards the water in the case of a fire, rather than rushing to the water and acting like there is a real emergency, as we currently face.

strong kindling for much larger mass uprisings which are key to shifting entrenched power structures.

Of course, by focusing on relatively extraordinary moral exemplars, the bar that I am setting for virtuous behavior and the limits of moral demandingness may seem quite high. That is because I hold morality to not be a comfortable bar we can all meet relatively easily, but rather something we aspire to, knowing that it is likely that we will fall short, especially given our deeply non-ideal context. Indeed, it is a standard that very few will meet, and likely only occasionally, but that is arguably what it means to be human, to be imperfect beings trying our best to live up to the best possible person we can be even though we will often fall short, particularly given the immense challenge we now face when it comes to the climate crisis. As Thompson and Bendik-Keymer highlight, "the English word "virtue" has an origin in the Latin 'virtus' as moral perfection, which was a Roman translation of the Ancient Greek term for excellence, 'arête'" (2012, p. 10). This definition is illuminating for we cannot always expect ourselves to be "excellent" or to meet the bar for "moral perfection", but we can look to moral exemplars as a standard to aspire towards. Does it mean we are bad people if we fall short? No not quite, as not everyone can be a moral saint, and certainly not all the time. Furthermore, even the world's moral exemplars had their shortcomings, and falling short is part of being human with limited capacities and constraints on our abilities. However, rather than watering down the standards of morality to meet our imperfection, let us hold the bar for morality to be consistent with the moral challenge we face, and the demands that it makes of us.

It is difficult to outline what exactly the FFCEI demands of each individual, as how we can best apply our energies, how much we can afford to take on, and the nature of our responsibilities will depend greatly on our individual circumstances and context. As such, I cannot say what each person should do in response to our crisis, but it does call on us to radically reconsider our life plans and determine how much we can give before it is too late. Indeed, many people engaged in the struggle against climate change, myself included, have shifted their entire life plans so as to dedicate themselves to working on this crisis while we still have a window of opportunity left to do so. For instance, Aji Piper, a teenager in Seattle, is a youth plaintiff in the case *Juliana vs the United States,* which is suing the United States government for failing to tackle climate action and thus compromising his generations' right to clean air, water and a stable climate (Terstein, 2018). Aji has dropped out of high school so as to focus his energies on the lawsuit. Many others I know have turned down decent paying jobs to dedicate themselves to working on climate change for little-to-no-pay. Others who cannot afford to drop out, have dedicated their lives outside of work to fighting climate change and have dedicated what wealth they have to support groups addressing climate change in ways that infringe on their ability to enjoy what many would refer to as a "normal life". And, of course, there are the range of activists who have put their life and liberty on the line to fight back against fossil fuels and climate inaction.

Some may object that taking on such demanding moral responsibility would constrain what it means to live a full flourishing life. Of course, it is true that adopting such demanding responsibilities may well infringe upon what is typically seen to be a flourishing life, but as Thompson and Bendikmeyer (2012) argue, perhaps we need to understand flourishing as the ancient Greek virtue ethicists did, where well-being was not simply a subjective matter of individualistic well-being, but rather our own well-being and flourishing was tied to that of our communities. Such a notion not only finds traction in the Ancient Greeks, but also within African philosophy. For instance, in Mandela's native language of isiXhosa the saying 'Umuntu ngumuntu ngabantu' is a maxim which underpins the philosophy of Ubuntu.[71] Roughly translated, it states that a person is a person through others – that a person's identity, their personhood and humanity, is inextricably tied into the personhood of others.[72] What this means is that your well-being, your ability to thrive and live a full human life is only possible

[71] The discussion of Ubuntu and Mandela is borrowed from my own earlier piece (G. A. Lenferna, 2013)

[72] While the "others" we are a person through under modern conceptions of Ubuntu is typically conceived of as being our fellow human beings, historically, particularly before colonialism, Ubuntu used to extend to non-human others and the environment, as argued by Danford Chibvongodze (2016). Chibvongodze convincingly argues that colonial powers stamped out ecocentric moral outlooks and the cultures around which they were formed, in order to further their exploitation of both people and the environment.

through your relationships to and the thriving of your community. To paraphrase Mandela, true enrichment and fulfilment is naturally aligned with the duty to act towards the growth and well-being of one's community. Given that our communities, both social and ecological, are threatened by a severe crisis, then to act consistent with such a broadened notion of responsibility and fulfilment means to act to protect them.

However, while we can accept such a broadened sense of flourishing it is true that we will have to make sacrifices in this time of emergency, and reframing flourishing does not erase the depth of those sacrifices. To think more about this, we can turn to the work of Lisa Tessman, who argues that in the context of liberatory struggles we need to take on what she refers to as "burdened virtues." These are traits that are necessary for a person to cultivate if some liberatory project is to progress, but which do not contribute to the person's flourishing in the way the Aristotelian tradition standardly takes virtues to do. Her examples of such virtues are from the perspective of the oppressed who are trying to cultivate a character that can fight injustice: anger, a hard resolve against the oppressor, indifference to suffering of the oppressors, loyalty and self-criticism, the welcoming of personal loss and sacrifice (Tessman, 2005, Chapter 5). Tessman takes these to be virtues because they are effective in achieving liberatory ends and thus eventually flourishing for all. She holds them as virtues because resisting oppression is praiseworthy, but at the same time, they are "mixed" traits for "apart from the terrible circumstances, [they] would never be endorsed" because they "disable a good life for their bearers" in the traditional sense of a good life (Tessman, 2005, pp. 114–5). Adapting Tessman's line of reasoning for climate justice, under normal circumstances we may not think that the consuming moral commitment that I am suggesting we take on in relation to the FFCEI is typical of a normal flourishing life. However, in the context of a climate crisis which threatens so much, taking on burdened virtues is part of ensuring the flourishing and well-being of billions of people in the next few decades alone, as well as the well-being of future generations and the natural world.

Importantly, we also need to take care of ourselves and each other, for burnt out, exhausted and unhealthy people are likely to be relatively ineffectual anyway. However, while self-care is vital, we should be careful about not allowing self-care to slip into over-indulgence in the face of crisis, particularly for the relatively privileged whose stresses may be relatively minor in comparison to vulnerable communities. As we are called on to take on these burdened virtues, it is also worth considering that dedicating one's life to addressing one of the most significant problems of our time is not simply a burden, but in many ways lends significant meaning to those engaged in such a struggle. Indeed, in a world oft bereft of meaning, where many claim to lack purpose, fighting for the well-being of billions and the future of the planet is a rich source of meaning and purpose in life, and can provide a form of flourishing and meaning that much else may not be able to.

Many of those who I have spoken to, who have dedicated much of their life to tackling climate change and fighting against fossil fuel dependence, find it to be one of the greatest and most important sources of meaning in their lives. In the words of Emily Johnston (2018), a poet, a friend, and one of the Valve Turners, "There are still moments when I feel exhausted and frustrated and alone—not a compass for anything but sorrow. But it's such an astonishing honor to live in this moment, knowing that we probably still have the power to set the world back onto a stable path, and thereby make life better, or at least possible, for countless people and other beings. I cannot imagine anything more meaningful". The alternative, for those who are aware of the problem but not acting, is to live with a sense of moral dissonance, knowing that the greatest potential crisis is going on, but that you are doing little to address it. As Stephen Gardiner puts it:

> "many of us alive now, and especially those in the richer nations, are at risk of being remembered as members of a profligate generation— one that was recklessly wasteful, distracted, and self- absorbed. Moreover, our failures seem likely to be regarded especially harshly by the future, as they threaten to occur on a grand scale. The most serious involve an explosion in environmental

> degradation, with profound implications for all: globally, intergenerationally, and across species. If we do not address this issue, we may end up being remembered not just as a profligate generation, but as "the scum of the Earth," the generation that stood by as the world burned" (Gardiner in Gardiner & Weisbach, 2016, p. 4)

While I think that the title "scum of the Earth" should perhaps be reserved for those who are actively working to prevent progress on climate change and reducing fossil fuel dependence, nonetheless, Gardiner's words do highlight the gravity of the choice we face in this the final few years we have left to really turn the tides on the climate crisis. We have a small window left to avoid becoming known as the generation that "stood by as the world burned". Additionally, in contrast to the idea of our generation being the scum of the earth, it is important to pause and reflect on the beauty of the fact that in the space of just a few short decades, recognizing our role in changing our climate, a vast and growing global climate justice movement has emerged based on respect for and recognition of our shared humanity and mutual home. In the words of Indigenous Environmental Network Organizer, Dallas Goldtooth, "This movement we are a part of is beautiful." The question now is whether this beautiful movement will become powerful and effective enough to act at the scale and speed that it needs to in the short time it has left.

Concluding Thoughts

In conclusion, if we look to moral exemplars, and consider the weightiness of the climate crisis, the level of responsibilities that we should be willing take on to push for action to reduce our dependence on fossil fuels and tackle the climate crisis will be significantly demanding. This is not a problem with moral thinking being too demanding, but rather a reflection of the deeply demanding times we live in where the window of opportunity to avert dangerous climate change is rapidly closing. We live in a time of moral emergency and that demands so much of so many of us to avoid grave, widespread, substantial, enduring and unnecessary harm.

As discussed earlier in the chapter, as we attempt to discharge the demanding duties created by the FFCEI, we do have prima facie responsibilities to reduce our emissions, especially for the rich and affluent high-consuming individuals, as otherwise we problematically contribute to harm and deplete the small remaining carbon budget. These duties, I argued, can be grounded in the Anti-Pollution Principle (APP), which holds that unless there are sufficiently strong moral reasons for doing so, we should not consume resources whose use contributes to harming others, especially not ones who deplete the very limited carbon budget we have left. However, it is not enough for us to simply focus on reducing our own individual greenhouse gas emissions and fossil fuel use. Rather, in line the APP and the FFCEI, it is often more important for us to focus on the ways in which we can effectively push for broader structural change that is up to the scale and the speed of the transformational change we need to enact if we are to avert the worst harms of continued dependence on fossil fuels.

As we take on such demanding responsibilities, we will need to weigh up the difficult question of which actions are most effective, as well as the tensions between Harm Avoidance Justice and Burden Sharing Justice. Given the scale of potential harms that climate change and fossil fuels pose, we would arguably be acting unjustly if we overly prioritized Burden Sharing Justice over Harm Avoidance Justice. The deeply non-ideal situation we are in means that we cannot rely on the powerful to take the requisite action, and as such, even sub-ideal theories like Caney's Power/Responsibility Principle may overly privilege Burden Sharing Justice. Rather, if we are to truly grapple with the deeply non-ideal situation we face, and the demands of Harm Avoidance Justice, then significantly demanding responsibilities may fall on those who are less traditionally powerful, to take on demanding responsibilities, and to attempt to build their collective power to shift the broader structures in line with Harm Avoidance Justice as well as with more ideal conceptions of justice which more fairly share the burdens of needed change. If we do not do so, we will miss the short window of opportunity left to avert grave, substantial, widespread and unnecessary harm and create a much better world while doing so.

Part C: Half a Degree of Climate Justice

"Half a degree Celcius may not sound like much, but it makes a world of difference in climate impacts." - Prof Rob Jackson

"The consensus... was that a 2°C danger level seemed utterly inadequate given the already observed impacts on ecosystems, food, livelihoods, and sustainable development, and the progressively higher risks and lower adaptation potential with rising temperatures, combined with disproportionate vulnerability...   [At 0,8°C above pre-industrial levels] the poor and disadvantaged in particular, and threatened ecosystems, are already in multiple danger zones and any additional temperature increase, coupled with other climatic hazards, would further exacerbate precarious conditions"
- Prof Petra Tschakert – IPCC AR5 Lead Author (2015).

"A global goal of about 2 degrees is to condemn Africa to incineration"
- Archbishop Desmond Tutu (2009).

"Vulnerable countries have insisted on limiting warming to 1.5°C as a matter of survival... If we pass 1.5°C not only will we witness new weather extremes but the world's oceans will also be sure to ultimately submerge countries like Kiribati, the Marshall Islands and the Maldives, as well as large and populated low-lying territories in places as diverse as Bangladesh, Egypt, the United States and Vietnam. Half a degree does matter. As you will see here, going beyond 1.5, even to 2°C of warming, means committing to the virtual disappearance of the world's coral reefs within the lifetime of most people. It would also increase heatwave duration for most regions by an entire month each year & raise risks of crop yield losses for key breadbasket areas by 10-15% in just the coming decades. Acknowledging dangers of this nature, all nations agreed to pursue efforts to limit warming to 1.5°C as the goal of the Paris Agreement"
Shiferaw Teklemariam, Minister of Environment, Forest and Climate Change, Ethiopia
Loren Legarda, Senator & Chair, Permanent Climate Change Committee, Philippine Senate
Edgar Gutierrez, Minister of Environment and Energy, Costa Rica

"According to the latest report *by the Intergovernmental Panel on Climate Change, the world's main scientific authority on global warming, keeping global temperatures from rising more than 1.5°C above pre-industrial levels is a feasible goal. The IPCC's stance represents a move in the direction of the kind of "radical realism" that many civil-society actors have long advocated... Demanding such a transformation is not "naive" or "politically unfeasible." It is radically realistic. In fact, it is the only way we can achieve* social justice *while protecting our environment from devastating climate change."*
- Barbara Unmüßig - President of the Heinrich Böll Foundation

The interests of the poor and developing world have played a central role in discussions about climate justice. Their interests are often invoked both to justify or to object to action on climate change and to reduce fossil fuel dependence. One of the fossil fuel industry's largest public relations campaigns attempted to sell the idea that a primary reason we should not act on climate change and instead promote fossil fuels is to alleviate poverty and drive development. In Part C, I aim to counteract such arguments, and show that if we aimed to elevate the interests of the poor and vulnerable, that we would need to push for an incredibly rapid and ambitious transition away from fossil fuels. More specifically, I argue that we should push for a just transition away from fossil fuels that aligns with the aim of keeping the rise in global average temperatures as close as possible to 1.5°C. I make my argument in favor of 1.5°C by focusing on the arguments of prominent theorists who have argued against the 1.5°C and instead in favor of the 2°C. As Darrel Moellendorf is one of the few philosophers who has argued at length against the 1.5°C target and in favor of 2°C in the name of "the global poor", I focus predominately on his arguments against the 1.5°C put forward in his book *The Moral Challenge of Dangerous Climate Change: Values, Poverty, and Policy*.

I begin in Chapter 8 by providing a critical analysis of Moellendorf's philosophical approach to climate and poverty, showing that his application of his Anti-Poverty Principle may be a self-defeating approach which ironically deepens poverty in the long run. I start by challenging Moellendorf's claim that what constitutes dangerous climate is only relative to what pathways are available to us and will not deepen poverty. I argue that such a conception obscures the dangers of climate change which we may not be able to avoid or have already locked in. I also argue that his view problematically obscures what pathways are available by prematurely declaring that pathways to 1.5°C will deepen poverty. He does so by drawing on scant evidence, and his view is contrary to the views of many experts including the IPCC's latest report. I then challenge his Anti-Poverty approach as focusing too narrowly on energy access and not thinking more broadly about the drivers of poverty and development. I argue, firstly, that even if we accept his narrow focus on energy poverty that renewable energy is better positioned than fossil fuels to deliver on energy poverty. I argue, secondly, that if we broaden our conception of justice to think about the broader factors driving poverty and development that pushing for a just transition in line with the 1.5°C target would be in better alignment with poverty alleviation and development. I thus recommend rejecting Moellendorf's narrow Anti-Poverty Principle in favor of a more comprehensive principled approach which prioritizes poverty alleviation and development more broadly beyond just energy poverty.

In Chapter 9, I then argue that if we accept Moellendorf's arguments against the 1.5°C target we would be committing four different yet interconnected forms of injustice, namely, procedural, recognitional, distributive and epistemic injustice. I show how his arguments serve to marginalize the voice and interests of those most impacted by climate change, particularly voices from the global south who have long called for action in line with the 1.5°C target (thus causing both recognitional and epistemic injustice). I argue contrary to Moellendorf that the 2°C is not supported by "science" as the safe limit for climate change, rather it is a product of politics and power, particularly from actors in the global north who are both more significant polluters than the global south, and who are also less vulnerable to the impacts of climate change (procedural and distributive injustice). I argue that far from 2°C being a safe target, already at 1°C we are seeing dangerous climate change, and the more we allow warming to occur the more dangerous and harmful it will be, particularly for the poor and vulnerable (distributive justice). As such, if we are to elevate the interests of the global poor, we should be aiming not for 2°C, but for more stringent action in line with at least the 1.5°C.

I then go on to explore further how questions of epistemic injustice are central to how the voices of the poor and vulnerable are often marginalized in climate discourses, such that their calls for 1.5°C have often been ignored. I aim to argue that determining what levels of climate change are considered dangerous and what targets we should hit constitutes a hermeneutical hotspot, where "the powerful have no interest in achieving a proper interpretation [of the viewpoints of the marginalized]" (Fricker, 2007, p. 172). I argue that those working on climate ethics, particularly those in relatively privileged positions need to take heed of how this affects climate justice discourses. Attention to privilege, class and gender is particularly important given, as I will show, that the so-called consensus in favor of the 2°C target is a worryingly white, male, and/or wealthy consensus whereas the voices of those calling for 1.5°C are predominately black, brown, female, and/or poor.

In Chapter 10, I then go on to consider some possible objections to my argument in favor of the 1.5°C, starting with the objection that aiming for 1.5°C would detrimentally impact economic development and that as such on a precautionary approach we should aim for 2°C. In line with Laruen Hartzell-Nichols, I argue that a truly precautionary approach would do its utmost to stop climate change as soon as possible within ethical constraints in order to avoid us going further into our already dangerous territory where we risk hitting tipping points on the climate system. I then argue, contrary to commentators like Moellendorf and Lomborg that aiming for 1.5°C would not necessarily lead to an economic recession, which will leave the global poor in the dark, without energy access. I draw on economic models and studies to show that a renewable energy revolution in alignment with the 1.5°C could create more energy access, development, economic growth, and prosperity compared to the 2°C target. However, to ensure this happens equitably, in line with widely accepted principles of common but differentiated responsibility, there is a three-pronged moral responsibility for rich and developed nations to reduce their emissions much more significantly, leave fossil fuels in the ground, and contribute financially and otherwise to support developing and least developed nations both to transition to a renewable energy future and to deal with impacts of the harmful climate change already locked in.

In Chapter 11, I then consider and respond to the objection that keeping warming to 1.5°C is not feasible. I accept that if the climate turns out to be highly sensitive to greenhouse gas emissions, and/or if we delay action significantly, then we may not be able to meet the 1.5°C. However, if we are somewhat lucky with regards to climate sensitivity, and we take rapid comprehensive climate action, especially to reduce fossil fuels, we can still hold temperatures close to 1.5°C. However, most scenarios which get us there rely on temporarily overshooting the 1.5°C target, and then using negative emissions to bring temperatures back down. I argue precautionarily that a safer, more just pathway to get to 1.5°C is not to rely heavily on negative emissions, for while some forms of negative emissions strategies can have beneficial consequences, many are unproven, risky and resource intensive technologies, which may have harmful impacts particularly on the poor and vulnerable. I apply a similar argument to 1.5°C scenarios that rely too heavily on solar geoengineering. I conclude that the pathway that best serves the interests of the poor and vulnerable, and also best ensures a stable climate and prosperous future, is a pathway in line with 1.5°C that involves a rapid transition away from fossil fuels alongside broader climate action, and that relies as little as possible on risky, unproven technologies like carbon capture and storage, negative emissions or solar geoengineering.

Chapter 8: Arguing Against "the Global Poor" on Behalf of "the Global Poor"

Moral philosophers often approach the issue of climate justice by arguing that justice requires that we choose social arrangements that are most beneficial to the poor and vulnerable. Doing so builds on a long moral and religious tradition of giving moral priority to the interests of those least well off. In political philosophy, theories of distributive justice which give priority to the interest of the poor in the distribution of costs and benefits are known as prioritarian theories and their proponents as prioritarians (Holtug, 2017). Applying such a moral outlook to the realm of climate and energy policy, many academics have argued that we urgently need to transition away from fossil fuels (Caney, 2009; Gardiner, 2017b; Shue, 2014b). However, some academics argue that mitigating climate change will be detrimental to the poor, as they will not be able to burn fossil fuels as much as they need to develop, or their energy costs will go up, slowing their ability to develop and alleviate poverty. The central proponent of such a purportedly pro-poor moral argument that I aim to focus on in this chapter is political philosopher Darrel Moellendorf in his latest book *The Moral Challenge of Dangerous Climate Change: Values, Poverty, and Policy*. I focus predominately on Moellendorf, because he is one of the only philosophers I know that has developed an argument against the 1.5°C target, and furthermore he does so specifically claiming to defend the interests of "the global poor".

There are many other non-philosopher authors whose positions are less defensible than Moellendorf's, arguing not just against the 1.5°C but also the 2°C target. By critiquing Moellendorf's view and arguing in favor of the 1.5°C target, I aim to by extension show such other views to be problematic. For instance, Bjorn Lomborg, a Danish political scientist (who Moellendorf draws on significantly and who receives significant funding from the fossil fuel industry) claims that acting on even the weaker 2°C target is a "high-cost, low-effectiveness gesture" and warns that acting on climate will waste billions as the poor starve (Lomborg, 2017, 2018). Lomborg's views are highly controversial, and many more relevantly qualified academics than him reject his views on climate policy as being biased and inaccurate (Karp, 2017). In a similar vein to Lomborg, industry-paid fossil fuel apologist Alex Epstein (2013) who we encountered in Chapter 1, argues that climate action would hinder human development, which is provided in large part by the fossil fuel economy. He concludes, contrary to the supposed "blind, anti-development hostility and hysteria" of environmentalists, that we are morally obligated to use more fossil fuels because of their contribution to prosperity and poverty alleviation. Notably, both Epstein and Lomborg receive significant amounts of funding from the fossil fuel industry, and, as I have detailed elsewhere, their work is often intentionally misleading and cherry-picked, engaging in scholarship that is unintentionally biased and harmful at best, and intentionally dishonest and corrupted at worse (G. A. Lenferna, 2016a, 2018b). Unfortunately, their arguments and arguments like theirs have been taken up by those in power who attempt to defend their promotion of fossil fuels in the name of the poor.

Echoing the views of such problematic scholars, fossil fuel industry lobby groups, and politicians who often have questionable and arguably corrupted ties to the fossil fuel industry, have tried to promote fossil fuel use on such pro-poor moral grounds. The Australian Government attempted to fund a center for Lomborg at the University of West Australia to help justify their expansion of fossil fuels, an effort stopped by a major outcry by the academic community (ABC News, 2015). Nonetheless, Australia's Energy and Environment Minister Josh Frydenberg, continues to echo Lomborg and fossil fuel industry lobby groups, arguing that there is a "strong moral case" for expanding coal and building new coal mines on the basis of how it will help end energy poverty and spur on development (Ayling, 2017; Norman, 2015). Similarly, speaking at a 2018 energy conference in Texas, Trump's appointee to U.S. Energy Secretary Rick Perry took on an Epstein-esque approach, calling international efforts to slash fossil fuel use "immoral," arguing that the shift threatens economic progress in developing nations and keeps people in poverty. Perry, who receives significant campaign contributions from fossil fuel companies, asked attendees to: "Look those people in the eyes that are starving and tell them you can't have electricity. Because as a society we decided fossil fuels were bad. I think that is immoral" (Mufson, 2018; Osborne, 2018).

The moral arguments in favor of fossil fuels by politicians like Perry and Frydenberg parrot messaging from a broad and sustained public relations campaign funded by the fossil fuel industry aimed at convincing the public that fossil fuels are essential to poverty alleviation and development. Coal companies like Peabody Energy, and mining lobby groups like the Minerals Council of Australia, are spending millions on advertising, public relations and lobbyists to spread the message that coal and other fossil fuels are the answer to the issue of energy poverty in developing nations in Africa, Asia and other parts of the world (Ayling, 2017). Notably, Peabody Energy does not actually contribute to any energy poverty alleviation efforts, and the coal companies that do work on energy poverty projects, do not do so through coal (Bradshaw, 2015; Campbell, 2014). This is symbolic of a point that will be more robustly defended throughout this chapter, which is that while fossil fuels have historically played a significant role in past development, fossil fuels are no longer the best answer to ensure energy access, development and poverty alleviation, and the development they did allow was a harmful form of development. I bring up these connections to the fossil fuel industry, not to serve as a mere ad hominem attack, as I will go on to show why they are problematic arguments in their own right. Rather I raise these connections to show how appeals to poverty alleviation are central to the fossil fuel propaganda machine and why debunking them as I aim to do is key to pushing back against problematic fossil fuel industry propaganda.

What the brief survey of pro-fossil fuel purportedly prioritarian views above shows is that poverty has been used by a range of actors and interests to argue that we should continue to promote fossil fuels. Concern trolling about the interests of the poor by rich politicians and fossil fuel execs defending polluting interests is a pervasive feature of climate policy discussions. Given the central role such reasoning has played in blocking climate action, dealing with such arguments is central to ensuring continued action on ending the fossil fuel era. Moellendorf's book draws on many of the ideas and argument mentioned above, although he does so while pushing for more ambitious action on climate change than any of the above do. Thus, by critiquing Moellendorf's argument in favor of 2°C and against the 1.5°C target, I aim to show by extension, and sometimes more directly, that these weaker, less ambitious views are also inaccurate. Contrary to such pro-fossil fuel positions, I will argue that if we really want to prioritize the interests of the poor and vulnerable, we should be doing our best to ensure a rapid and just transition away from fossil fuels in line with the 1.5°C. Additionally, because there are legitimate concerns about how climate policy may affect the poor, I will argue that justice requires that we address how the poor and vulnerable might be impacted by a transition away from fossil fuels, and that rich and developed countries, communities and individuals have strong moral responsibilities to assist the poor and vulnerable to transition away from fossil fuels. Let us turn now to Moellendorf's argument.

Moellendorf's Purportedly Pro Poor Prioritarianism

The "ultimate objective" of the United Nations Framework on Climate Change (UNFCCC) "is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UNFCCC, 1992). As many philosophers have pointed out in relation to this definition, the term 'dangerous' is a normative term, which implies an evaluative judgment as to what constitutes danger (Broome, 2012; Gardiner, 2011a). One of the central aims of Moellendorf's book is to define what he believes we should consider "dangerous" climate change. Moellendorf attempts to define what he takes dangerous climate change to be, not in some absolute sense, but only in a relative sense, where he takes something to be dangerous if it is too risky relative to available alternatives. He then says that when considering what alternative approaches we should consider, there are three evaluative reasons we need to weigh up, namely: "the reasons that people in the future will have that we mitigate [climate change]; the reasons the people presently have to consume energy to fuel poverty eradicating human development; and the reasons that people in the future will also have that we consume energy for human development". Based on this approach, Moellendorf then claims that what is fundamental to identifying whether climate change is dangerous or not is whether poverty eradication is delayed by either climate change or climate change policy. He develops this argument into a principle he calls the Anti-Poverty Principle, which he uses to evaluate whether our approach to climate change is dangerous. I will call it

Moellendorf's Anti-Poverty Principle (MAPP) to avoid confusion with my chapter 5 Anti-Pollution Principle (APP) which to recall allows for resource use and pollution when there are morally significant reasons for doing so, which would include poverty alleviation. Here is Moellendorf's Anti-Poverty Principle by comparison:

> Policies and institutions should not impose any of costs of climate change or climate change policy (such as mitigation and adaptation) on the global poor, of the present or future generations, when those costs make the prospects for poverty eradication worse than they would be absent them, if there are alternative policies that would prevent the poor from assuming those costs." (2014, p. 5).

Moellendorf goes on to state that the MAPP "identifies policies as dangerous if they impose poverty-prolonging costs on the poor", adding "if all available policies prolong or deepen poverty, the [MAPP] identifies the one that does so the least as the one that is not dangerous" (2014, pp. 22–23). Moellendorf then applies the MAPP to make the argument that a focus on poverty should weigh against taking action on climate change in line with the 1.5°C target, and lead us instead to aim for 2°C. He argues that aiming for 1.5°C would prevent poverty alleviation and work against the interests of the poor because it would limit access to energy and progress on development. That is because he believes that hitting 1.5°C will suppress economic growth, potentially leading to a recession, and will also constrain access to cheap energy, which Moellendorf outdatedly believes comes from fossil fuels, which he holds to be central to rapid development given its role in powering the lives of the poor and providing services such as lighting, appliances, internet, refrigeration, transportation etc. (Moellendorf, 2014, p. 132).

Also, seemingly contradicting his stated aim of providing a relative sense of what is considered dangerous, he also claims, in somewhat of an absolute sense, that scientific evidence supports the claim that 2°C is really what constitutes dangerous climate change, whereas 1.5°C does not really. I aim to debunk both of these claims in the following sections, arguing, firstly, that pursuing 1.5°C does not necessarily inhibit development and that it can in fact bolster it. Secondly, I argue that 2°C should be seen as extremely dangerous, and that warming of 1.5°C and even current levels of warming, which are a bit above 1°C, should be seen as dangerous, especially for the poor and vulnerable. However, before making those two arguments, in this section I want to discuss the nature of Moellendorf's approach with his Anti-Poverty Principle and show how it is a rather limited and narrow criterion for judging whether climate change is dangerous.

The first problem to highlight is that Moellendorf's relativist approach to defining what constitutes dangerous climate change seems to merge two different questions which arguably should be defined separately. The first question is: what constitutes dangerous climate change and the second is: what constitutes the least dangerous or risky climate policy pathway available. While each of these questions is important, and they should be balanced when determining how to act on climate, arguably when defining what is considered dangerous, they can and should be treated independently. In our common understanding, a climate impact can be dangerous and harmful independent of whether climate policy to avoid it would have dangerous impacts. By merging the two questions together we lose a sense of the independent risk that each pose. Conflating those two questions serves to obscure them, not make them clearer, particularly when that conflation is combined with Moellendorf's definition of dangerous climate change as relative to available alternative pathways.

Moellendorf's move to a relative sense of danger, which only defines dangerous climate change in terms of available alternative courses of action, obscures the riskiness of climate change. Whether a climate impact is dangerous or harmful does not depend on whether we could have done otherwise, some things are just harmful in and of themselves, and it seems a strange and problematic redefinition of the term dangerous to suggest something is only dangerous if we could have done otherwise. As Stephen Gardiner points out in his critique of Moellendorf, "my grandfather's parachuting out of a burning plane remains dangerous even when the only other option is certain death from the crash" (2017b, p. 444). On Moellendorf's relativist definition Gardiner's grandfather would be in no danger when parachuting out of an airplane because there is no other safer option. But as Gardiner highlights, that simply doesn't fit with the common usage of the term dangerous.

Like Gardiner's parachuting grandfather, when it comes to climate change, we have already locked in a certain amount of dangerous anthropogenic climate change due to our current and past emissions, and as such all pathways ahead involve some harmful climate change. On Moellendorf's definition we would tell those impacted that the impacts are not "dangerous" because they are already locked in, but that is a problematic and counter-intuitive redefinition of the term dangerous. A more accurate description would be to say that those dangerous impacts were unfortunately locked in due to our emissions, not to deny that the impacts are themselves "dangerous".

Moellendorf's definition is an unnecessarily confusing and obfuscating way of trying to deal with the fact that there are always risky elements of our climate conditions even under pre-industrial conditions, and that we already have dangerous climate change impacts. As Gardiner (2017) argues, instead of confusingly redefining the word "dangerous" to some relative notion of available pathways to accommodate that, we can focus on the fact that what we are trying to achieve under the UNFCCC is to prevent humans from perturbing the climate in a way that would induce further unacceptable levels of dangerous impacts where what is considered dangerous and unacceptable is a value laden evaluation. It may be true that for many we have already failed in fully achieving that goal, but I would argue that rather than redefining the word dangerous to some relative notion, a more accurate and intuitive approach would be to acknowledge that we have already failed to a significant extent in achieving the UNFCCC's ultimate objective of preventing "dangerous anthropogenic interference with the climate system" and to recognize that our task now is to as best as possible avoid some of the worst impacts of anthropogenic climate change.

While philosophers often aim to redefine terms to make them clearer or sharper, in Moellendorf's case his redefinition of what constitutes dangerous climate change serves to obscure more than it illuminates. It conflates two questions that arguably deserve to be treated separately, whether climate impacts are dangerous and whether climate policy has dangerous impacts. He then builds a strange counter-intuitive relativistic notion of danger related to alternative available pathways on top of this conflation. To avoid my chapter being infused with Moellendorf's conflated notion of dangerous climate change I will use dangerous* climate change to refer to Moellendorf's notion, and simply use dangerous climate change when referring to our common understanding of dangerous as something that poses significant risks of harm. Such a reframing is not simply an inconsequential semantic or linguistic debate, rather as Gardiner points out, the dispute over the meaning of the term "dangerous" is "to pick out the *central aim* of global climate policy" (2017b, p. 442).

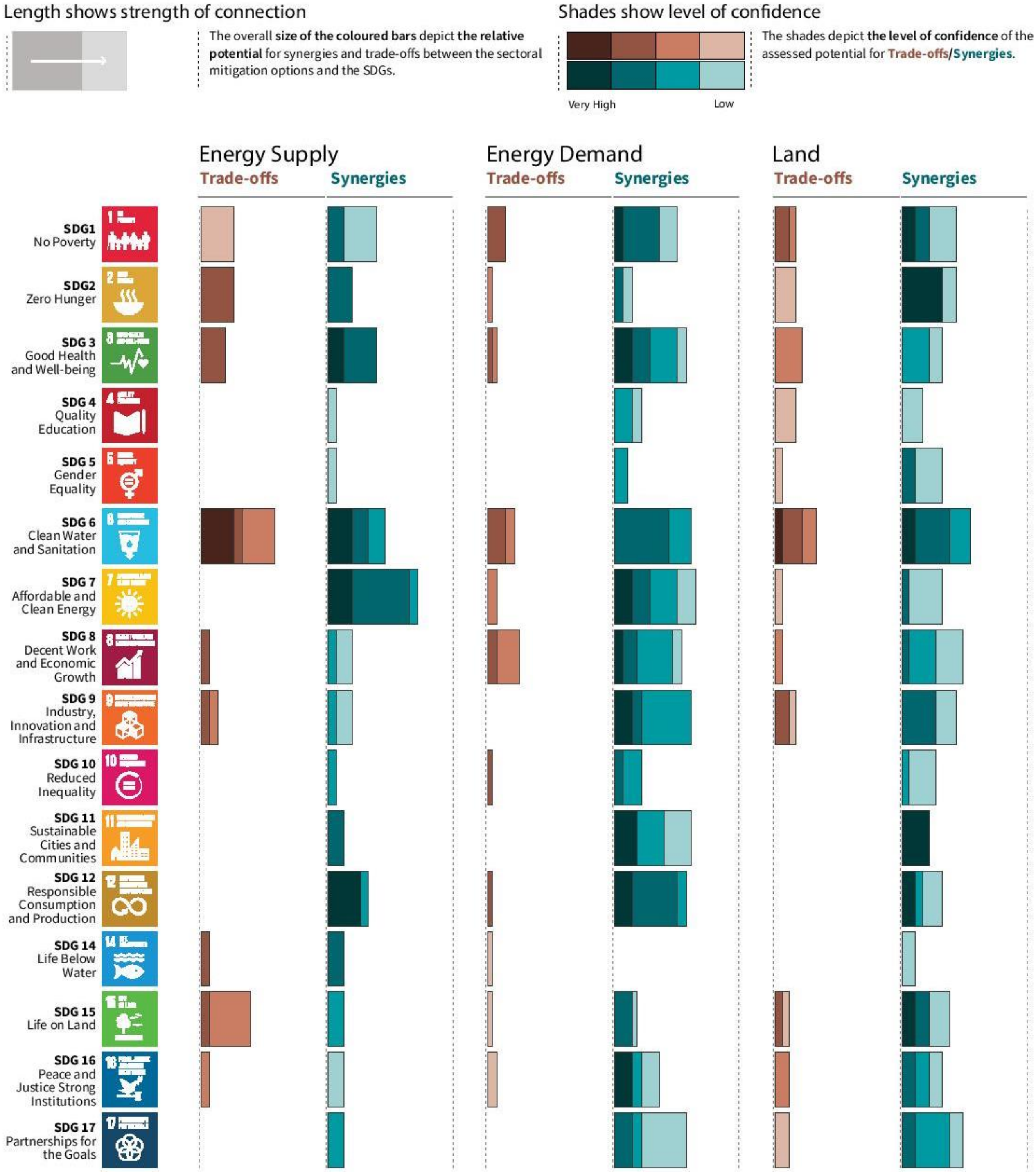
However, for those who are attracted by Moellendorf's relative notion of danger, we can still work with it to show that warming above 1.5°C is prohibitively dangerous, given alternative available routes to avoid 1.5°C. This brings us to another definitional problem with Moellendorf's conception of dangerous* climate change, which is the question of how to conceptualize what counts as "available" alternatively pathways or policies. Recall that Moellendorf states that the MAPP "identifies policies as [dangerous*] if they impose poverty-prolonging costs on the poor", adding "if all available policies prolong or deepen poverty, the [MAPP] identifies the one that does so the least as the one that is not dangerous" (2014, pp. 22–23). Based on this, he makes an even stronger statement arguing that "any energy policy ... that prolongs global poverty [relative to alternative available policies] is unreasonable" (22) even if it does so just for "one day" (26). The problem with this approach to defining what is a reasonable policy, is how we understand what counts as an "available" pathway.

There are arguably policies that are in some theoretical sense "available", but which seem hard to achieve. For instance, the rich deciding to dedicate all their wealth to funding a just transition away from fossil fuels which lifts all out of poverty is theoretically possible. Hearps and Cossar-Gilbert (2015), for instance, argue that 100% renewable electricity for most of the developing world could be achieved with an investment equal to the wealth currently held by the 782 richest people, thus we could theoretically seize their wealth and finance the transition. Perhaps Moellendorf would reply that such seemingly fantastical pathways are not really "available" in a realistic sense, but then he would have to define what is realistic and we end up going down a rabbit hole of definitional questions about what is or is not available. Furthermore, if this pathway or some other pathway is the pathway that most alleviates poverty, then every other policy under the MAPP would be considered dangerous*, as it would prolong poverty relative to such a pathway. Only the best pathway possible to maximally alleviate poverty would be considered not dangerous* under Moellendorf's definition, which seems like a deeply limiting approach.

I would also hesitate to give Moellendorf the mandate for determining what is achievable or not, for his imaginative shortcomings lie not with imagining too grandiose available worlds where poverty is alleviated and climate is addressed, but instead in failing to imagine or countenance evidence on how we can create a better world which alleviates poverty and creates a more prosperous world, while hitting the 1.5°C target. He forecloses this as a realistic available pathway, drawing on scant evidence to claim that achieving 1.5°C would be prohibitively expensive, leading to potential recession which would detrimentally impact the poor (p.24). Yet, as we will explore throughout chapter 10 there are number of scenarios which show we can hit 1.5°C while creating a more prosperous and equitable world. For instance, as the graphic on the following page from the latest IPCC report highlights, we can hit 1.5°C while having many synergies with the world's Sustainable Development Goals (SDGs), and while there are some potential tensions with the SDGs under such a pathway, there are much less than under a pathway to 2°C or more. Furthermore, the IPCC states with high confidence that redistributive policies that shield the poor and vulnerable can resolve trade-offs for a range of SDGs and would only require a small fraction of the overall mitigation investments in 1.5°C pathways (IPCC, 2018, p. 23). As such, we should be skeptical of Moellendorf's claims of what policies or pathways are "available" and how they in turn determine what is considered dangerous* climate change under his definition.

Indicative linkages between mitigation options and sustainable development using SDGs (The linkages do not show costs and benefits)

Mitigation options deployed in each sector can be associated with potential positive effects (synergies) or negative effects (trade-offs) with the Sustainable Development Goals (SDGs). The degree to which this potential is realized will depend on the selected portfolio of mitigation options, mitigation policy design, and local circumstances and context. Particularly in the energy-demand sector, the potential for synergies is larger than for trade-offs. The bars group individually assessed options by level of confidence and take into account the relative strength of the assessed mitigation-SDG connections.



Moellendorf could appeal to the notion of realistic utopia and say that while in a perfect world it is possible to get to 1.5°C, that is not a real possibility given where the world is here and now.[73] However, Moellendorf does not provide enough evidence to support such a claim. Indeed, his evidence against 1.5°C is rather scant and based on limited economic modelling. Of course, it is certainly true that the current state of global politics, with the rise of Trump, Bolsanaro and broader right-wing authoritarianism opposed to environmental regulation, does not inspire confidence that we can achieve 1.5°C. However, as I will discuss further in Chapter 11 and in my conclusion, conceding defeat in the face of such regressive politics would be to prematurely give victory to those opposed to climate action before such a loss is inevitable. There is still a small window left to achieve 1.5°C as many scenarios show, and the history of wide-scale social change and the rapid developments in renewable energy and climate solutions provide reason to believe that we can achieve 1.5°C provided we act aggressively.

Another problem with Moellendorf making maximal poverty alleviation an overriding determinate of acceptable climate action, is that it does not adequately countenance the deeply non-ideal situation we are in when it comes to addressing poverty and inequality, and how much broader factors are holding back poverty alleviation than just climate action. To quote Gardiner:

> "A more general concern about Moellendorf's approach is that the climate issue is framed as "human development versus environment". This is disturbing in several ways. For one thing, in context, it risks setting up a false dichotomy…global poverty, and human underdevelopment more generally, are already with us and have been for many decades. According to many, they are largely the result of conventional human systems that could, and should, be changed. Some even argue that global poverty could be eliminated at low cost, or at least with fairly straightforward institutional reforms. In short, at the

[73] Michael Blake suggested the point that Moellendorf could appeal to the notion of realistic utopia.

> moment, global poverty is a problem with a different source and quite possibly alternative, much better, solutions. Asserting that the key issue is cheap [fossil fuel] energy obscures this."
>
> (Gardiner, 2017b, p. 449)

Gardiner's quote highlights how climate policy is taking place against a backdrop of deep inequality and injustice, and so to put the burden of addressing those injustices in a maximal way at the feet of climate policy seems like setting impossible standards for climate policy to achieve. This is deeply problematic, for not only is climate a grave threat broadly, but it is also one of the gravest threats to poverty alleviation in the long run (United Nations Development Programme, 2013). As such, if we do not act on climate in the name of achieving some maximal idea of poverty alleviation, which we do not seem on track to meet anyway, then we will have engaged in self-defeating exercise, and one which ends up sacrificing not only long-term poverty alleviation but also all the other elements that are at risk from climate impacts. We are in a deeply non-ideal situation, and simply insisting on maximal energy poverty alleviation as the over-riding concern of climate policy, seems like unjustifiably privileging a very narrow conception of justice, and in doing so we may sacrifice much else that is of value and undermine poverty alleviation in the long run.

To be clear, I am not arguing that poverty and development must not be central concerns that are prioritized in how we approach climate change. Indeed, I aim to argue that we should make them central, and that to do so we should push for a rapid and equitable transition to 1.5°C. However, I am arguing that Moellendorf's claim that we cannot delay poverty alleviation by "one day", sets a problematic standard and one that we don't apply to other realms, even ones that aim to alleviate poverty. For instance, in education, we invest in educational programs knowing that it will bring about broader benefits in the long-run, even though there might be other short-term options that would alleviate more poverty right now, but not in as robust and enduring a way. Similarly, this chapter will lay out evidence to show that when it comes to climate and energy, we should invest in renewable energy and other climate solutions knowing that while we may have to invest more to do so, that in the short, medium and long run the social, development, poverty alleviation, climate, economic, and environmental benefits of doing so would greatly outweigh the short-term benefits of sticking with a deeply harmful fossil fueled pathway.

It might seem odd to be dedicating so much time to Moellendorf's poverty maximization view, but such a line of reasoning of setting impossible standards for climate policy on poverty alleviation is common place in the arguments of fossil fuel apologists. For instance, in a recent opinion piece in *The Australian*, Lomborg (2018) calls the Paris Climate Agreement a waste of money, which inhibits poverty alleviation. To make such a claim, he cherry picks the example of biofuels, which has had detrimental impacts on the poor, and claims based on that example that all climate policy is similarly harmful. However, many climate activists and poverty alleviation organizations are already critical of biofuels, something which Lomborg conveniently ignores (cf. R. Kelly, 2012). Lomborg engages in a crude and inaccurate overgeneralization, concluding from that example of one instance of bad climate policy (and some deeply questionable economic modelling) that all climate action, including the Paris Climate Agreement is a harmful waste of money preventing us from actually addressing poverty. Lomborg then goes on to list a range of policies that he claims would be effective at cutting poverty rather than policies like biofuels, thus setting up a false climate vs poverty dichotomy based on cherry-picking bad climate policies as representative of all climate policy. Such a dichotomy fails to recognize both how it is possible to act on climate and poverty at the same time, and also how many climate policies do in fact have significant co-benefits which aid poverty alleviation and the achievement of the SDGs as the above graph from the IPCC showed, and as I will outline more throughout Chapter 10.

The arguments of the likes of Lomborg and Moellendorf are often taken up by corrupted (predominately rich white male) politicians, lobbyists and fossil fuel apologists in places like the United States and Australia, who duplicitously use the poor and vulnerable as an excuse to justify inaction on climate change and the promotion of fossil fuels, while at the same time providing tax breaks to the super wealthy and cutting funding to aid and poverty alleviation programs. Such duplicity shows how in practice maximal poverty alleviation arguments like Moellendorf's are often used as a smokescreen to mask an anti-climate action pro-fossil fuel agenda. What these commentators are often doing is a form of concern trolling where they raise the worry about poverty to block climate action, but, are not really committed advocates for poverty reduction. While this characterization may not be true of Moellendorf himself, his arguments and arguments like them end up providing intellectual support to those who use them in duplicitous ways to resist climate action. They say we shouldn't act on climate because it will impose some costs on the poor relative to some hypothetical better world, but then they go back to living in, benefitting from, and doing little to change a status quo that is much worse for the poor than acting on climate would be.

A final critique of Moellendorf's MAPP has to do with the set of reasons that he uses to inform his conception of what constitutes dangerous* climate change. Recall that Moellendorf says that when considering what is dangerous* climate change, there are three evaluative reasons we need to weigh up, namely: "the reasons that people in the future will have that we mitigate; the reasons the people presently have to consume energy to fuel poverty eradicating human development; and the reasons that people in the future will also have that we consume energy for human development". As we have already seen, the way that Moellendorf applies the MAPP serves to sharply diminish the importance of the first reason while elevating the second (and to a lesser extent the third reason) such that maximizing poverty alleviation in the short term rises to an almost over-riding determination of what constitutes "reasonable" climate policy. Building on that, the criticism I want to draw attention to now, is just how impoverished and incomplete this list is in terms of determining what is important when it comes to climate change, energy, poverty and broader questions of justice.

Firstly, the reasons Moellendorf provides that have to do with poverty alleviation focus rather narrowly on questions of energy, which while an important element in alleviating poverty, is hardly the only factor important in development and poverty alleviation. As Gardiner (2017b) has also highlighted, such a reductive and narrow focus on energy as a driver of poverty, arguably privileges energy over other broader drivers of poverty, which may be equally if not more important. Elevating energy poverty over all else may undermine the broader goal of poverty reduction. After all, access to energy is only of limited usefulness if you can't drink clean water, don't have access to sufficient food due to drought, or in the case of small island states, are losing the place you call home due to rising sea level – all impacts which are set to increase significantly with a 2°C increase in warming, as I will elaborate on later in the paper. As such, Moellendorf's purported prioritarianism seems not to give priority to poverty alleviation but rather to energy poverty only and is thus problematically narrow.

The second point to make about Moellendorf's list of reasons we need to consider when determining what is dangerous* climate change, is that it fails to countenance an important set of reasons, namely reasons present (not future) people might have to mitigate. As Chapter 2 detailed, there are major benefits present people would have by reducing fossil fuel use and mitigating climate change. Some of those benefits are in terms of reduced pollution, increased economic growth and job creation, reduced energy costs, increased energy security and independence, and (contrary to Moellendorf's claims about fossil fuels) increased energy access. As we discussed in Chapter 2, the co-benefits of climate action have been calculated by themselves to outweigh the costs of mitigating climate change, and thus by leaving out such a category of reasons Moellendorf employs a form of greenhouse gas parochialism which skews the calculus in favor of inaction. For instance, a recent study in *Nature Climate Change* found that if we acted in line with 1.5°C, instead of Moellendorf's preferred 2°C, the effects of reduced air pollution alone could avoid 153 ± 43 million fewer premature deaths worldwide, with ~40% occurring during the next 40 years (Shindell et al., 2018). What's more, according to the study, the greatest gain in life would occur in Africa and Asia, in the poorer parts of the world – the people whose interest Moellendorf is supposed to be arguing on behalf of.

While it is true that the impacts of air pollution are technically different and separate to the impacts of climate change, so is the question of energy poverty and so is the question of whether climate policy has risks. So, if Moellendorf aims to include reasons to evaluate what is dangerous* climate change based on energy poverty and climate policy risks, then it is unclear why we should not also include questions of air pollution and other co-benefits of climate action. Moellendorf's omission reveals how his problematic definition of dangerous* climate change can obscure how he only includes certain reasons in his evaluation of what is considered dangerous*, and in doing so he biases the analysis in favor of inaction, allowing him to problematically conclude that "most of the beneficiaries of climate change mitigation will live after we have died" (Moellendorf, 2014, p. 152). However, as Chapter 2 details if we include the broader set of reasons why present people, particularly the poor and vulnerable, would want to mitigate climate change and reduce fossil fuel dependence, then the moral calculus shifts decidedly in favor of action. By leaving this out Moellendorf provides an incomplete and biased analysis employing greenhouse gas parochialism, outdated and conservative analyses of energy, and a deeply narrow conception of what constitutes dangerous* climate change.

One way of trying to make sense of Moellendorf's narrow set of reasons is to appeal to the distinction between minimal and maximal principles of justice (not to be confused with Moellendorf's overriding anti-poverty maximization).[74] When developing theories of justice, philosophers such as Simon Caney and Derek Bell (n.d.) distinguish between maximal and minimal theories of justice, where *minimal* principles of justice are understood as principles which specify the most morally urgent objectives, which take priority over other concerns. M*aximal* principles of justice, on the other hand, are those principles which specify what is fully just. On this distinction, Moellendorf's focus on energy poverty alleviation maximization can be seen as adhering to a very minimal conception of justice, a peculiar type of prioritarianism, which holds that maximizing energy poverty alleviation and not delaying energy poverty alleviation by one day is the most important objective for climate policy. Even if we stick with such a narrow energy poverty alleviation minimal conception of justice, I will

[74] Thanks to Jeremy Moss for this point about seeing Moellendorf's as a minimal conception of justice.

argue that Moellendorf is wrong to prioritize fossil fuels, as renewable energy can increasingly deliver energy access much more effectively and affordably than fossil fuels.

Furthermore, by prioritizing energy poverty alleviation through fossil fuels so much, as I have tried to argue, Moellendorf may end up defeating the long-term goal of poverty alleviation and development. If we want to adhere to a more robust form of prioritarianism which best ensures poverty alleviation and development in the short, medium, and long-term, then there is good evidence to suggest that an equitable transition to a renewable energy low carbon future in line with 1.5°C is the best way to do so. In other words, rejecting Moellendorf's approach is not to reject prioritarianism, but rather to be truer to it in a more robust sense. Furthermore, as I will argue in more detail in Chapter 10, acting in line with the 1.5°C target not only has the benefit of being truer to the prioritarian spirit, but if we do it right, we can also ensure we better fulfil more maximal conceptions of justice too, ensuring a more robust and prosperous future more broadly. Having deconstructed Moellendorf's conception of dangerous* climate change and challenged his Anti-Poverty Principle, in the following chapter, I turn to challenge his argument that there is a consensus that 2°C is the safe level of climate change.

Chapter 9: A Dangerous "Consensus"

Over the last decade, least developed countries, small island states and the majority of developing nations, have been calling for the United Nations Framework Convention on Climate Change to increase its ambition from aiming for 2°C to instead keep warming to below 1.5°C above pre-industrial levels. Despite their calls, which were accompanied with a large and growing body of evidence to show that 2°C is incredibly dangerous, a framing has persisted that there was an international consensus exists that 2°C is an acceptable level to keep warming to in order to avoid dangerous climate change. Echoing such a notion in his book, Moellendorf claims that there is an international consensus in favor of the 2°C. Departing from his relative view of danger*, he holds that in an absolute sense we can say that 2°C is the threshold for dangerous climate change. In this chapter, I aim to challenge the so-called international consensus around 2°C and show how it arose out of a deeply unjust context which marginalized the voices of those most vulnerable to climate change and ignored a large body of scientific evidence.

When critiquing Moellendorf's arguments against the 1.5°C in the following chapters, I aim to appeal to a quadripartite approach to justice which distinguishes four different forms of injustice to help us better understand and make sense of the nature of the injustices which uphold Moellendorf's arguments in favor of 2°C and against the 1.5°C. The four different types of injustice are procedural, recognitional, distributive and epistemic injustice. The first three forms of injustice are often seen to be part of a trivalent understanding of environmental justice, as reflected in the work of David Schlosberg (2004, 2007) who in turn drew on the work of Iris Marion Young (1990), Nancy Fraser (2000), and the diverse conceptions of (in)justice within the environmental justice movement. Schlosberg separated conceptions of environmental injustice into three categories, namely recognitional, procedural and distributive justice.

Recognitional justice stems from the idea that how we characterize people shapes our ability to consider their interests. If we mis-characterize or overlook important features of actors' lives, or the broader systems in which they are embedded, we can end up systematically privileging or devaluing our consideration of them. As Kyle Whyte (2011, p. 200) explains, "Recognition justice requires that policies and programs must meet the standard of fairly considering and representing the cultures, values, and situations of all affected parties." Procedural justice, on the other hand, revolves around the ability for stakeholders to meaningfully participate in decisions that affect them. If we do not allow for meaningful participation, especially from impacted stakeholders, then we engage in procedural injustice. Finally, distributive justice is the more mainstream and prominent notion of justice which refers to questions about the fair allocation of benefits and burdens.

To expand on the trivalent conception of justice, I want to add the category of epistemic injustice, which, following Miranda Fricker (2007), is a form of injustice where a person or community is wronged particularly in their capacity as a knower. As I aim to argue, the knowledge and arguments of vulnerable and developing communities has not been given proper weight in Moellendorf's arguments against the 1.5°C target, and thus his argument exemplifies epistemic injustice. What I aim to show is that this epistemic justice underpins and contributes to the other forms of injustice identified in Schlosberg's trivalent analysis. More specially, I show how Moellendorf's arguments serve to marginalize the voices and interests of those most impacted by climate change, particularly voices from the global south, thus engendering a form of recognitional and epistemic injustice.

I argue contrary to Moellendorf that the 2°C is not supported by "science" as the safe limit for climate change, rather it is a product of politics and power, particularly from actors in the global north who are both more significant polluters than the global south, and who are also less vulnerable to the impacts of climate change (thus perpetuating both procedural and distributive injustice). I argue that that far from 2°C being a safe target, already at 1°C we are seeing dangerous climate change, and the more we allow warming to occur the more dangerous and harmful it will be, particularly for the poor and vulnerable (thus letting warming go beyond 1.5°C would entail a form of distributive justice). As such, if we are to elevate the interests of the global poor and push back against the recognitional, procedural, distributive and epistemic injustice that has propped up arguments in favor of the 2°C target, we should be aiming for an equitable transition in line with 1.5°C.

To see how these forms of injustice come into Moellendorf's arguments, we can turn to how he attempts to characterize the supposed consensus in favor of the 2°C target. His view is most succinctly unpacked in the passage below from his book:

> Internationally, there is a consensus that 2°C is the threshold for dangerous climate change. This has been advocated by internationally respected non-governmental organizations' (NGOs), and it was formally accepted at the Conference of the Parties (COP) 16 in Cancun in 2010. The risks of water and food insecurity, flooding, and intense tropical storms beyond 2°C are alarming. But the Alliance of Small Island States and some least-developed states have argued that the more appropriate threshold is below 1.5°C. To some island states, sea-level rise presents an existential threat. Given the warming we are committed to because of the thermal inertia of the oceans, the costs of limiting warming to 1.5°C might be very high, possibly resulting in a protracted global recession that would be very damaging to the global poor. That also should be avoided. The 2°C temperature limit has been accepted largely because of important scientific forecasts about the risk of serious costs and abrupt changes to the climate system if warming should go higher (Moellendorf, 2014, p. 24)

To see where epistemic injustice begins to emerge in Moellendorf's argument, we can start with the first sentence's claim that that there is an international consensus that 2°C is the threshold for dangerous climate change. Of importance, is Moellendorf's use of the word "consensus". As the term is typically defined, consensus is taken to be a "group solidarity in sentiment and belief" or to indicate a "general agreement", connoting something close to unanimity. As such, unless Moellendorf is straying away from the conventional use of the term, then his claim is that there is a general agreement internationally when it comes the belief that 2°C is the threshold for dangerous climate change. But there is no such consensus and there never was, for as Moellendorf himself later goes on to recognize, small island developing states (SIDS) and least developed countries (LDCs) disagree with the 2°C target, arguing instead that

1.5°C should be the safe limit. Furthermore, scientists have long disagreed with the notion that 2°C is safe as I will show below.

Given that Moellendorf recognizes the dissent of SIDS and LDCs, how then can he make the claim that there is consensus? Such a framing seems to suggest that the voices of the LDCs and small island states are somehow to be discounted and not taken to disrupt the consensus. Is there good reason to think that their voices should be discounted as such? Moellendorf seems to think there is, and he appeals to "science" to dismiss the concerns of the LDCs and SIDS. After briefly summarizing the concerns of those who favor the 1.5°C target in one short sentence, "to some island states, sea-level rise presents an existential threat", Moellendorf then moves on directly to argue that "the 2°C temperature limit has been accepted largely because of important scientific forecasts about the risk of serious costs and abrupt changes to the climate system if warming should go higher" (Moellendorf, 2014, p. 24). The problem with Moellendorf's dismissal by way of appeal to science, is that it is decidedly not the case that there is a scientific consensus that 2°C is an acceptable limit, rather there is a vast body of scientific evidence demonstrating the immense danger of going beyond 1.5°C as I aim to highlight throughout this chapter. Additionally, whether something is dangerous as Moellendorf himself

The arguments in favor of the 1.5°C target, are supported by much more scientific evidence than Moellendorf suggests. In the words of Petra Tschakert, one of the world's foremost experts on climate change and poverty, the 2°C target is "utterly inadequate" (B. Palmer, 2015).[75] In a research paper, Tschakert (2015) shows how at COP 16, where Moellendorf claims the scientific consensus around the 2°C threshold was "formally accepted", parties actually recognized the need to review the target because of the harms 2°C would cause and improved scientific forecasts detailing how 2°C would threaten ecosystems, food security and

[75] Tschakert is Coordinating Lead Author (CLA) of Chapter 5 "Sustainable Development, Poverty Eradication and Reducing Inequalities" of the Special Report on 1.5C Global Warming of the Intergovernmental Panel on Climate Change (IPCC). Previously she was CLA on the IPCC's Fifth Assessment Report (AR5), on Chapter 13 ("Livelihoods and Poverty") of the Working Group II Report on Impacts, Adaptation, and Vulnerability, and was part of the Core Writing Team of the AR5 Synthesis Report. http://www.web.uwa.edu.au/person/petra.tschakert

sustainable development. As Tschakert highlights, critique of the 2°C target came from LDCs, SIDs, and scientists, ranging from climate scientists to economists, political scientists, human geographers, and other social scientists. To revisit a quote from Tschakert, "the consensus… was that a 2°C danger level seemed utterly inadequate given the already observed impacts on ecosystems, food, livelihoods, and sustainable development, and the progressively higher risks and lower adaptation potential with rising temperatures, combined with disproportionate vulnerability" (2015, p. 8). Similarly, as Achala Abeysinghe and Saleemul Huq highlight, for the past decade the LDCs have clarified their views and submitted a wealth of material to the United Nations Framework on Climate Change in support of holding the increase in global average temperature below 1.5°C relative to pre-industrial levels (Abeysinghe & Huq, 2016, p. 199). Notably, much of the evidence showing the dangers of 2°C cited in the above papers was available well before and when Moellendorf was writing his book. Since the publication of his book the scientific evidence showing the dangers of exceeding the 1.5°C target has only gotten stronger.

To give an overview of just some of the recent scientific literature demonstrating the risk of hitting 2°C, we can point to a host of studies which estimate the additional impacts that would be had if the world achieved 2°C instead of 1.5°C. A special issue on the 1.5°C target in the British Royal Society's Philosophical Transactions shows that "2°C could see mass displacement due to rising seas, a drop in per capita income, regional shortages of food and fresh water, and the loss of animal and plant species at an accelerated speed, with the poor and emerging countries of Asia, Africa and Latin America getting hit hardest" (Hood, 2018). Byers et al (2018) project that for populations vulnerable to poverty global exposure to multi-sector risks approximately doubles between 1.5 °C and 2 °C, with exposure even higher (8–32x) under scenarios with high poverty and inequality scenarios, thus illustrating the importance of tackling climate change, poverty, and inequality simultaneously.

At the level of overview, the IPCC Fifth Assessment Report (AR5) Working Group 2 (WG2) in 2014, agreed that even an increase in global temperatures of 2°C constitutes a serious threat to human wellbeing. More recently and in more detail, the draft IPCC Special Report on 1.5°C showed that the difference between warming of 1.5C and 2C would be "substantial" and damaging to communities, economies and ecosystems across the world (Mathiesen, Darby, & Apparicio, 2018). It showed, that while 1.5°C already holds many risks, and 2°C poses significantly increased "risks to human societies through impacts on health, livelihood, food and water security, human security and infrastructure", as well as lower economic growth for many developed and developing countries. Those risks are greatest for "people facing multiple forms of poverty, inequality and marginalization; people in coastal communities and those dependent on agriculture; poor urban residents; and communities displaced from their homes" (Cushman Jr., 2018). The latest IPCC report shows that the impacts of a 1.5°C are severe and dangerous, and 2°C much more so. Some of the major impacts that the IPCC showed could be avoided if we hit 1.5°C rather than 2°C are the following:

- A reduction of 0.1 m in global sea level rise implies that up to 10 million fewer people would be exposed to related risks, based on population in the year 2010 and assuming no adaptation.
- Of 105,000 species studied, 9,6% of insects, 8% of plants and 4% of vertebrates are projected to lose over half of their climatically determined geographic range for global warming of 1.5°C, compared with 18% of insects, 16% of plants and 8% of vertebrates for global warming of 2°C.
- Extreme heatwaves (like one that blanketed southeastern Europe in 2007) would occur at least once every five years, affecting 37% of the world population under 2°C versus 14% under 1.5°C.
- An additional 111 million people will be exposed to urban drought under 2°C.
- Ice free summers in the Arctic are ten times more likely under 2°C than under 1.5°C.
- Coral reefs are projected to decline by a further 70–90% at 1.5°C (high confidence) with larger losses (>99%) at 2°C (very high confidence), essentially meaning that 2°C

spells the death of coral reefs, and negatively impacting all the communities that rely on coral reliefs for coastal protection, fisheries and tourism.

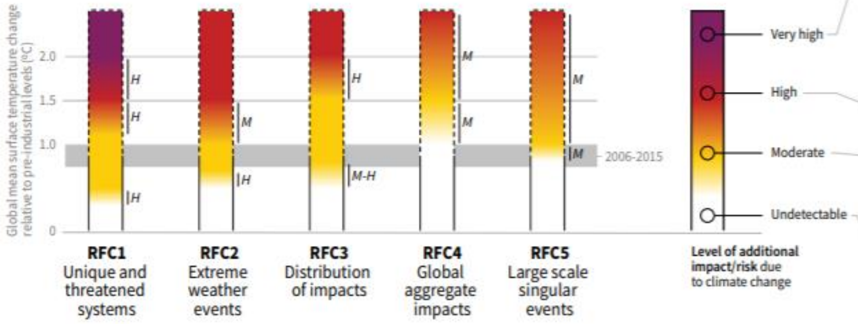
- Limiting global warming to 1.5°C, compared with 2°C, could reduce the number of people both exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050
- Limiting global warming to 1.5°C compared to 2°C may reduce the proportion of the world population exposed to a climate change-induced increase in water stress by up to 50%.

To get a broader visual sense of the risks that we face if we hit 1.5°C versus 2°C we can turn to the burning embers diagram from the latest IPCC report below, which gives us a sense of the risk we face as we get warmer.

How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

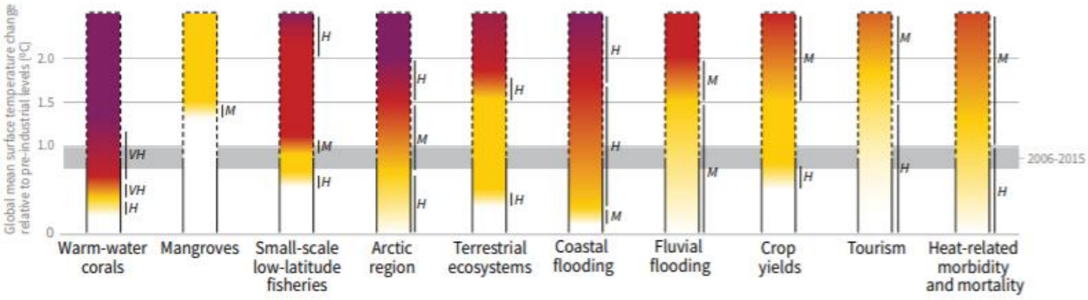
Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.
Red indicates severe and widespread impacts/risks.
Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.
White indicates that no impacts are detectable and attributable to climate change.

Impacts and risks for selected natural, managed and human systems



Confidence level for transition: *L*=Low, *M*=Medium, *H*=High and *VH*=Very high

Figure SPM.2 | Five integrative reasons for concern (RFCs) provide a framework for summarizing key impacts and risks across sectors and regions, and were introduced in the IPCC Third Assessment Report. RFCs illustrate the implications of global warming for people, economies and ecosystems. Impacts and/or risks for each RFC are based on assessment of the new literature that has appeared. As in AR5, this literature was used to make expert judgments to assess the levels of global warming at which levels of impact and/or risk are undetectable, moderate, high or very high. The selection of impacts and risks to natural, managed and human systems in the lower panel is illustrative and is not intended to be fully comprehensive. {3.4, 3.5, 3.5.2.1, 3.5.2.2, 3.5.2.3, 3.5.2.4, 3.5.2.5, 5.4.1, 5.5.3, 5.6.1, Box 3.4}

RFC1 Unique and threatened systems: ecological and human systems that have restricted geographic ranges constrained by climate-related conditions and have high endemism or other distinctive properties. Examples include coral reefs, the Arctic and its indigenous people, mountain glaciers and biodiversity hotspots.
RFC2 Extreme weather events: risks/impacts to human health, livelihoods, assets and ecosystems from extreme weather events such as heat waves, heavy rain, drought and associated wildfires, and coastal flooding.
RFC3 Distribution of impacts: risks/impacts that disproportionately affect particular groups due to uneven distribution of physical climate change hazards, exposure or vulnerability.
RFC4 Global aggregate impacts: global monetary damage, global-scale degradation and loss of ecosystems and biodiversity.
RFC5 Large-scale singular events: are relatively large, abrupt and sometimes irreversible changes in systems that are caused by global warming. Examples include disintegration of the Greenland and Antarctic ice sheets.

Another useful source to demonstrate the risks 2°C poses compared to 1.5°C is the helpful diagram below from Schleussner et al (2016) which provides a summary of key differences in climate impacts between a warming of 1.5°C and 2°C over the 21st century – square brackets give the likely (66 %) range.

		1.5°C	2°C	
Heat wave (warm spell) duration [month]				
	Global	**1.1** [1;1.3]	**1.6** [1.4;1.8]	Tropical regions up to 2 months at 1.5°C or up to 3 months at 2°C
Reduction in annual water availability [%]				
	Mediterranean	**9** [5;16]	**17** [8;28]	Other dry subtropical regions like Central America and South Africa also at risk
Increase in heavy precipitation intensity [%]				
	Global	**5** [4;6]	**7** [5;7]	Global increase in intensity due to warming; high latitudes (>45°N) and monsoon regions affected most.
	South Asia	**7** [4;8]	**10** [7;14]	
Global sea-level rise				
	in 2100 [cm]	**40** [30;55]	**50** [35;65]	1.5°C end-of-century rate about 30% lower than for 2°C reducing long-term SLR commitment.
	2081-2100 rate [mm/yr]	**4** [3;5.5]	**5.5** [4;8]	
Fraction of coral reef cells at risk of long-term degradation [Constant case, %]				
	2050	**90** [50;99]	**98** [86;100]	Only limiting warming to 1.5°C may leave window open for some ecosystem adaptation.
	2100	**70** [14;98]	**99** [85;100]	
Changes in local crop yields over global and tropical present day agricultural areas including the effects of CO_2-fertilization [%]				
Wheat	Global	**2** [-6;17]	**0** [-8;21]	Projected yield reductions are largest for tropical regions, while high-latitude regions may see an increase. Projections not including highly uncertain positive effects of CO_2-fertilization project reductions for all crop types of about 10% globally already at 1.5°C and further reductions at 2°C.
	Tropics	**-9** [-25;12]	**-16** [-42;14]	
Maize	Global	**-1** [-26;8]	**-6** [-38;2]	
	Tropics	**-3** [-16;2]	**-6** [-19;2]	
Soy	Global	**7** [-3;28]	**1** [-12;34]	
	Tropics	**6** [-3;23]	**7** [-5;27]	
Rice	Global	**7** [-17;24]	**7** [-14;27]	
	Tropics	**6** [0;20]	**6** [0;24]	

Adding some of the more recent literature to the summary provided by Schleussner et al (2016) the list below provides an overview of some of the other impacts of hitting 2°C instead of 1.5°C:

- Warm extremes that occur every 20 years in today's climate are expected to increase by 130% with 1.5C and by 340% at 2C (Kharin et al., 2018). Across Africa, limiting end-of-century warming to 1.5 °C would "robustly reduce the frequency of heat extremes compared to 2 °C… and offer considerable benefits in terms of minimizing heat extremes and their associated socio-economic impacts" (Nangombe et al., 2018).
- The projected impacts on economic growth for 1.5°C are close to indistinguishable from current climate conditions, while 2°C suggests statistically lower economic growth for a large set of countries, with negative impacts expected to fall disproportionately on the world's poorest countries (Pretis, Schwarz, Tang, Haustein, & Allen, 2018, p. 2)
- Areas with either significantly wetter or drier conditions are smaller in the 1.5 °C world. Among country groups, low income countries and lower middle income countries are most affected by decreased low flows and increased high flows, respectively, while high income countries are least affected (Doell et al., 2018, p. 1)
- Keeping warming to 1.5C rather than 2°C halves the number of vertebrate and plant species facing severe range loss by the end of the century (Warren, Price, Graham, Forstenhaeusler, & Van Der Wal, 2018)
- Asia's Glacier Ice, which provide water to 800 million people, would be half gone under 2°C, whereas just 1/3 would melt under 1.5°C. Thus helping reduce water scarcity in an already water stressed region home to many of the world's most vulnerable and poor communities (Kraaijenbrink, Bierkens, Lutz, & Immerzeel, 2017).
- ~20-30% of the world's land surface could face aridification under 2°C. Two-thirds of affected regions could avoid significant aridification under 1.5°C (Park et al., 2018)
- 2°C scenarios cause virtually all tropical coral reefs to be at risk of severe degradation due to temperature-induced bleaching from 2050 onwards, detrimentally impacting

subsistence fishing, tourism, and coastal flood protection. This is reduced to about 90 % in 2050 and declining to 70 % by 2100 for a 1.5 °C scenario (Schleussner et al., 2016)

- Increases in either heavy rainfall or drought events imply increased vulnerability to food insecurity, hitting 1.5°C reduces vulnerability in approximately 76% of developing countries. At 2°C, four countries are projected to reach unprecedented levels of vulnerability to food insecurity" (Betts et al., 2018, p. 2)
- a 10-15% increased risks of crop yield losses for key breadbasket areas in the coming decades and a 10% reduction of the global economy by 2050 if we hit 2°C instead of 1.5°C (Low Carbon Monitor, 2016)
- Based on paleoclimate records 2°C may result in "disastrous consequences" ranging from (1) cooling of the Southern Ocean, especially in the Western Hemisphere; (2) slowing of the Southern Ocean overturning circulation, warming of the ice shelves, and growing ice sheet mass loss; (3) slowdown and eventual shutdown of the Atlantic overturning circulation with cooling of the North Atlantic region; (4) increasingly powerful storms; and (5) nonlinearly growing sea level rise, reaching several meters over a timescale of 50–150 years" (Hansen et al., 2013) (Hansen et al., 2016).
- In an essay for the *Bulletin of the Atomic Scientists*, Molina et al (2018) warn that the IPCC has underestimated the risk of tipping points, as climate change is not worsening in a simple, linear fashion, but rather by compounding and accelerating: "Adding 50 percent more warming to reach 1.5 degrees won't simply increase impacts by the same percentage—bad as that would be. Instead, it risks setting up feedbacks that could fall like dangerous dominos, fundamentally destabilizing the planet." The IPCC "fails to adequately warn leaders" about six climate tipping points that work in this way. Making it clear that even the 1.5°C should be considered incredibly dangerous and warming beyond it much more so.

What the wide range studies listed above hopefully makes amply clear is that with warming of 2°C we see a major increase of dangerous and harmful impacts that fall disproportionately on poor and vulnerable communities, and a significant risk of pushing passed dangerous tipping points, all of which are significantly reduced but not eliminated by limiting warming to 1.5°C. Avoiding those impacts should be important to a prioritarian concerned about distributive justice who does not want to foist harms disproportionately on the poor and vulnerable. Recognizing such impacts, also means that one cannot simply appeal to scientific consensus or forecasts to justify why the 2°C target has been adopted, as Moellendorf does.

If we look to the history of how the 2°C target was developed we also see that contrary to Moellendorf's claims, it was not based on a scientific consensus, but rather had its origins in economic modelling, and was then subsequently pushed forward predominately by rich and developed nations. As Joni Seager (2009) highlights, the earliest identified reference to a 2°C target came not from climate scientists but instead from a Yale University economist, William Nordhaus, who was ironically given the Nobel Prize in Economics the same year that the IPCC released its special report on the importance of the 1.5°C target. Seager's exploration of the history of the target shows that "from Nordhaus forward, the 2° target has been contrived and deployed primarily as a policy and economic trade-off point" not a scientific one. What's more the economics was not particularly compelling either. Prominent climate economist Richard Tol reviewed the 2°C target, as proposed by Nordhaus and the European Commission, and he found that scientific studies that they drew on did not actually recommend the 2°C target, or if they did, they did not provide arguments for why. Overall Tol found that the 2°C target was "supported by rather thin arguments, based on inadequate methods, sloppy reasoning, and selective citation from a very narrow set of studies" and that the 2°C was "overall unfounded" (Tol, 2007).[76]

[76] I'd like to highlight one major error in Nordhaus' reasoning which demonstrates the arguably global north centric bias even at the heart of the economic models he used to justify the 2°C. In one of his book-length treatments of the topic of climate change, Nordhaus argued that there are major benefits to a warming world because it allows for more outdoor activities and thus increased revenue from

Despite, and long since such critical reviews of the evidence underpinning the 2°C target, it continued to gain prominence in certain political arenas, particularly in political forums hosted by the wealthy and developed nations. As Seager highlights, it was within the 2008 G8 summit that the 2°C target really came to the fore politically, where it was championed by "mostly first-world politicians and economists cocooned in a masculinized rationality and a certainty that in the climate 'winners and losers' paradigm they conjure, they will be on the winning side – and that holding global warming below 2°C will somehow ensure this" (Seager, 2009, p. 15). Seager details that countries such as those in the G8 are some of the largest polluters, and as such have significant vested interests in not putting in place significant restrictions on pollution, as it would constrain them, or at least it would constrain those who profit from pollution. Furthermore, the rich and powerful countries who gave prominence to the 2°C target were less vulnerable to the impacts of climate change than poorer countries and the global south, such that the impacts before 2°C would not be as much of a challenge for them, and particularly not for the better off within the developed nations (see also Oxfam, 2015; Tschakert, 2015).

The 2°C target then gained prominence internationally during the 2009 UN Climate negations in Copenhagen. There the United States under Obama worked together with a handful of the world's biggest greenhouse-gas-emitting nations to develop a side-deal outside of the proper

recreation (Nordhaus & Boyer, 2000). Warmer weather would provide people with more opportunities to get outdoors, he and his research assistant posited, perhaps from their office, set in the rather temperate surroundings of Yale University. Based on very little by way of evidence, Nordhaus claimed that the benefits of this increased recreation were so large, they almost outweighed the negative impacts of extreme weather events in his cost-benefit calculus. In doing so, Nordhaus generalized his temperate climate to the entire globe, not adequately recognizing that in fact warmer temperatures in much of the world, would reduce the ability to work, lead to less recreation, and cause significantly negative impacts on health, agriculture and ecosystems. Nordhaus' rather incredible generalization may be reflective of a problematic bias of those who are relatively privileged to extend their experience of the world into broad generalizations about how the world as a whole functions. To borrow the words of Gaile Polhaus, ""those dominantly situated may be encouraged to develop a kind of epistemic arrogance in order to maintain that their experience of the world is generalizable to the entirety of reality, a close-mindedness to the possibility that others may experience the world in ways they cannot, and an epistemic laziness with regard to knowing the world well in light of those oppressed" in this case by climate injustice. It seems then, that at the heart of economic models, which are used to determine the fate of the planet, lies the relative privilege of a white male economics professor from Yale who thought a little bit more warmth wouldn't be such a bad thing, as we could go for a hike.

consensus procedures of the UNFCCC. As Mark Hertsgaard (2009) details, the “side deal was then very grudgingly endorsed… by the European Union and other rich industrial nations”. Given the lack of other viable options on the table, the deal was then accepted even more reluctantly “by many, but by no means all, developing nations”, and likely only because it included a clause which called for the long-term review of the adequacy of the 2°C target. As Hertsgaard highlights, “international opinion was so divided, and the side deal so unpopular, that the full summit explicitly declined to approve it… Rather, it voted merely to “take note” of it”. Under UN legal language “taking note” is defined as a perambulatory clause rather than an operative clause, with only the latter meaning that the parties are making a commitment to action on something. As such, the manner in which the 2°C target came to prominence hardly reflects Moellendorf’s supposed scientific and international consensus and may more accurately be described as something that came about as a result of procedural injustice, whereby the rich and polluting nations pushed it forward outside of the proper UNFCCC consensus procedures despite the strong evidence against it and widespread advocacy against it particularly from low and middle income countries, those most vulnerable to climate change, yet least responsible for it - those who Moellendorf claims to be arguing on behalf of, and whose voices deserved to be elevated in the climate justice negotiations.

It seems that Moellendorf was perhaps unaware both of the science debunking the notion that 2°C is a safe target and of the economic modelling showing that 1.5°C is a feasible target. However, even if we excuse his oversight on that front, his claim that there is an international consensus around 2°C would still serve to marginalize the voices of those who have long advocated against the 2°C target, as his arguments suggests that somehow their voices are not valuable enough to warrant disrupting the supposed consensus. Their voices seem to be positioned as somehow outside of the rational consensus when it comes to defining what constitutes dangerous climate change. Such a positioning serves to other their voices, and to deems them somehow lesser than those voices that make up the supposed consensus. The marginalization entailed in claiming there is an international consensus would be bad enough if it were the case, as Moellendorf claims, that just the “Alliance of Small Island States and some least-developed states have argued that the more appropriate threshold is below 1.5°C" (2014, p. 24). However, Moellendorf's claim significantly downplays the extent of support for the 1.5°C target and resistance to the 2°C target.

1.5 to Stay Alive

The 1.5°C is supported not just by "some least-developed countries", it is supported by the full LDC Group, made up of 48 least developed nations that are especially vulnerable to climate change but have done the least to cause the problem (Abeysinghe & Huq, 2016). Furthermore, as Tschakert (2015, p. 2) details, as early as 2009 at COP 15, "the large majority of countries (over two-thirds) that signed and ratified the UNFCCC "strongly objected" to the 2°C target. "This majority (>70%) among the parties comprises, besides the low-lying small island states, essentially all low- and middle-income countries, with the exception of two lower middle-income countries (India, Indonesia) and a few upper-middle income countries such as China, Brazil, Argentina, and Mexico". The parties that support the 2°C target on the other hand, "are all high-income countries and nine upper middle-income countries, the above four included" (Tschakert, 2015, p. 2). Thus far from there being an international consensus that 2°C is the right target, we might instead hold that the global majority favors 1.5°C. [77] In particular, the fact that almost all low- and middle-income countries support the 1.5°C target seems like a pretty significant constituency, given that Moellendorf argues against 1.5°C purportedly on behalf of "the global poor".

The recognition that 2°C is a dangerous target has long been the focus of a significant advocacy push by civil society and state actors especially from Africa, Small Island States and LDCs. Since before 2009, they have been pushing for the global community and the United Nations Framework Convention on Climate Change to adopt 1.5°C as the target instead of 2°C (Cilento,

[77] There is a double meaning of the word global majority here which could be highlighted. One meaning is that the majority of nations support the 1.5°C target. We can also use the term global majority the way it has increasingly come to be used in the United States to represent the fact that people of color are actually the global majority, whereas white people are the global minority. This second meaning is also appropriate, given that, as I will show, it is predominately people of color that support the 1.5°C target, whereas it is predominately white people or nations that support the 2°C target.

2015; Seager, 2009; Solomon, 2015). In reference to the fact that for many the difference of half a degree would literally be a matter of life and death, the push was often organized under the rallying cry of "1.5 to Stay Alive". At the Copenhagen Climate talks, Archbishop Desmond Tutu sent a letter to all heads of state arguing that: "A global goal of about 2 degrees is to condemn Africa to incineration" (Graves, 2010). Similarly, Bruno Sekoli of Lesotho, then chair of the LDC group, argued that 2°C would mean "unmanageable consequences - it will leave millions of people suffering from hunger, diseases, floods and water shortages" (Solomon, 2015).

Eventually, after years of pushing forward the 2°C target, global north world powers conceded somewhat to the advocacy for 1.5°C, such that the final text of the Paris Climate Agreement enshrined the goal to keep warming to well below 2°C and "to pursue efforts to keep warming below 1.5°C". The inclusion of 1.5°C in the Paris Climate Agreement was an historic achievement that came after significant efforts on behalf of many civil society and government actors in the Africa, Small Island States and LDC groups. However, it is important to not overly celebrate it, for many of the more powerful and polluting actors within the UN space still treat 1.5°C as not a strict target, but rather as somewhat of a symbolic aspiration which can be largely ignored. For instance, hardly being a champion of the 1.5°C target, Obama's then Secretary of State John Kerry said, "I'm for embracing — conceptually, aspirationally — anything that gets us below two degrees," however "the formal goal of the agreement is 2 degrees, but yes, we all need to take note that it would be better if we can move in the direction of some further reduction". It is ironic to hear Kerry merely "taking note" of the 1.5°C target, given that it was the U.S. that initially pushed forward the 2°C target as part of the Copenhagen Accord – a target that was so heavily resisted, that parties refused to adopt it, and instead merely took "note of" it.

Unfortunately, Kerry's non-committal approach to 1.5°C is not an isolated one, and many developed and heavy polluting nations within the UN space still do not treat 1.5°C as a commitment they have to fulfil, especially if we are judging by their policy or their diplomacy actions. In the words of Christina Cilento (2015), the 1.5°C is not being treated as a strong limit, "rather as a suggestion or a vague concept". Fortunately, there are some notable exceptions to this, such as France, Germany, the Netherlands, Sweden, Finland, Portugal and Luxembourg calling on the European Union and other countries to enhance their climate ambition to keep warming below 1.5°C and ensure net zero emissions before 2050 (Climate Action Network, 2018). With countries due to update their ambition on the Paris Agreements by 2020, it is overdue for other nations to follow suit and align their emissions targets with an equitable share of what is required to meet the 1.5°C target – a topic I return to in the following chapter.

The history and continued struggle of developing nations to push the global community to act in line with and recognize the importance of the 1.5°C target is very much made invisible or at least severely diminished by Moellendorf's account. Such an account commits a form of epistemic injustice which fails to give adequate weight to the voices of the very people Moellendorf claims to be speaking on behalf. As the world's poorest communities, those most vulnerable to climate change continue to advocate to ensure that action to fulfil the Paris Climate Agreement does not treat the 1.5°C as something merely to "take note of", it is important to make more visible such resistance so that global north politicians and pro-fossil fuel advocates do not simply hide behind a consensus that never existed to justify weaker climate action. While I have so far focused significantly on Moellendorf in my critique, he is certainly not alone in advocating for the 2°C target. Rather, the reasons why 2°C became so prominent have much to do with how the voices of the poor and vulnerable are systemically epistemically marginalized. In the next section I try and consider the more structural and systemic factors which lead to a form of epistemic injustice which privileges views which do not challenge vested interests and serves to marginalize the voices of the poor and vulnerable who challenge them and advocate for more ambitious climate action.

Degrees of Epistemic Injustice

Having shown the supposed international "consensus" around 2°C to be far from a consensus, it is worth examining how such claims of consensus might be reflective of a form of epistemic injustice, which has served to marginalize the voices of those calling for 1.5°C, particularly the voices of people of color, the global south and the global poor. As Tschakert and Seager highlight, the supposed 2°C consensus is made up predominately of the global north and affluent, whiter, wealthier, colonizing and/or settler colonial nations, whereas the voices somehow outside "the consensus", those advocating for the 1.5°C target, are predominately African nations, LDCs, and Caribbean and Pacific Island nations who are majority people of color and former colonized countries (Tschakert, 2015).

It appears to me that at the heart of claims about the 2°C consensus and the broader marginalization of calls for 1.5°C is testimonial injustice – where a testimonial injustice is a form of epistemic injustice wherein a speaker receives an unfair deficit of credibility from a hearer owing to prejudice on the hearer's part. As Miranda Fricker highlights, "broadly speaking, prejudicial dysfunction in testimonial practice can be of two kinds. Either the prejudice results in the speaker's receiving more credibility than she otherwise would have—a credibility excess—or it results in her receiving less credibility than she otherwise would have—a credibility deficit" (Fricker, 2007, p. 17). In our case, the voices of the global south seem to face a severe, and prejudicial, credibility deficit, whereby their voices are not even deemed credible enough to upset the supposed consensus on Moellendorf's account. The flip side of this, is that the voices of the global north were given such strong credibility excess that their support of the 2°C target was able to be referred as a consensus for Moellendorf and many other commentators, despite such significant resistance.

The nature of the testimonial injustice at play in the climate case arguably forms what Fricker refers to as a structural identity prejudice. To understand what a structural identity prejudice is, we first need to define what a hermeneutical resource is, as that is central to her definition and to discussion of hermeneutical justice. A hermeneutical resource is simply a society or group's collective conceptual, intellectual and communicative resources for social interpretation and understanding. Fricker argues that "when there is unequal hermeneutical participation with respect to some significant area(s) of social experience, members of the disadvantaged group are *hermeneutically marginalized"* – *i.e.* the marginalized group's collective conceptual, intellectual and communicative resources for social interpretation and understanding of the world is marginalized or not treated equally. Building on this notion of hermeneutical marginalization she then outlines what she refers to as structural identity prejudice in the following passage:

> "it is generally socially powerless groups that suffer hermeneutical marginalization, and so we can say that, from the moral point of view, what is bad about this sort of hermeneutical marginalization is that the structural prejudice it causes in the collective hermeneutical resource is essentially discriminatory: the prejudice affects people in virtue of their membership of a socially powerless group', and thus in virtue of an aspect of their social identity" (Fricker, 2007, p. 155)

Structural identity prejudice thus arises from a socially powerless group not having significant uptake of their understanding of the world due in large part to features of their identity marginalizing them as a knower. Fricker provides examples such as when sexual harassment is treated as flirting because women's understandings of the situation are not given sufficient uptake by men, the more socially powerful group, whose interpretation of such interactions as harmless flirting gains more uptake in the dominant hermeneutical resources.

In the case of Moellendorf's supposed consensus, given that predominately brown, black and global south nature of the voices that receive credibility deficit, and the predominately white, global north nature of the voices that appear to be receiving credibility deficit, it does not seem unfair to suggest, that the nature of this epistemic injustice is a structural identity prejudice. That the voices of the people that Moellendorf claims to be arguing for, namely "the global poor", including the poorest nations on earth, have their voices so thoroughly discounted, arguably compounds the injustice occurring. Not only are their voices being marginalized, but Moellendorf is claiming to act in their interests to justify the very trajectory against which they have raised their voices in protest against.

We can further refine the categorization of the nature of the epistemic injustice occurring by appealing to Miranda Fricker's category of hermeneutical injustice, which she defines as "the injustice of having some significant area of one's social experience obscured from *collective* understanding owing to a structural identity prejudice in the collective hermeneutical resource" (Fricker, 2007, p. 155).[78] Central to hermeneutical injustice for Fricker, is a form of hermeneutical marginalization which renders the collective hermeneutical resources structurally prejudiced, for it will tend to issue interpretations of the marginalized "group's social experiences that are biased because insufficiently influenced by [them], and therefore unduly influenced by more hermeneutically powerful groups" (Fricker, 2007, p. 155). This, as we've seen, is pretty central to Moellendorf's supposed consensus around the 2°C target, for the experiences and knowledge of the global poor insufficiently influence the understanding and actions of the global north in their determinations of what constitutes dangerous climate change.

However, while it is certainly true that the global south's voice is marginalized in Moellendorf's categorization, there are two inter-related limitations to Fricker's account. One problematic element, as highlighted by Kristie Dotson, is its reliance on the idea of "collective understanding" presumes that there is just "one set of collective hermeneutical resources that we are all equally dependent upon" (Dotson, 2012, p. 31). However, as Dotson contends, "we do not all depend on the same hermeneutical resources", and Fricker's account fails to take into account how the marginalized groups may have hermeneutical resources which the

[78] Some might posit, a little more radically, that Moellendorf's arguing on behalf of the interests of the poor, while marginalizing their voice and protestations, represents a form of what Gaile Polhaus Jr. (2017), following Gayatri Chakravorty Spivak (1988), refers to as 'epistemic violence' where "claims to know the interests of subaltern persons preclude the subaltern from formulating knowledge claims concerning their interests and speaking for themselves" (Pohlhaus, 2017, p. 13). I would perhaps suggest a revised version of epistemic violence, and hold not that it precludes them altogether, but rather that it serves to inhibit and obscure their knowledge claims, and their ability to speak to themselves.

dominant groups fails to adequately countenance or address (Dotson, 2012, p. 31). Where a marginalized group has hermeneutical resources that the dominant group refuses to take up, Dotson argues that the epistemic injustice at hand is not simply an act of hermeneutical injustice, as defined by the likes of Fricker, rather it is an example of contributory injustice or what Gaile Pohlhaus (2017) refers to refers to as willful hermeneutical ignorance. As Dotson highlights, contributory injustice occurs because there are different hermeneutical resources that the perceiver could utilize besides structurally prejudiced hermeneutical resources, and the perceiver willfully refuses 'to acknowledge and acquire the necessary tools for knowing whole parts of the world'" (Dotson, 2012, p. 31).

Similarly, when it comes to climate justice, there is not one set of collective hermeneutical resources that we are all equally dependent on, rather the rich and developed nations relied overly on economic models of the likes put forward by Nordhaus to justify the 2°C target. The global south, on other hand, already had a significant understanding of how the 2°C target might put them at risk, as evidenced by the wealth of resources that they have submitted to the United Nations Framework Convention on Climate Change (Abeysinghe & Huq, 2016; Tschakert, 2015). The understanding held by the global south of the importance of the 1.5°C target, however, was not gaining proper uptake in places of power, and even among climate ethicists that deem to be arguing for the interest of the global poor. Thus, it seems to be a case of contributory injustice where there are different hermeneutical resources that the perceiver could utilize besides structurally prejudiced hermeneutical resources, yet the perceiver refuses "to acknowledge and acquire the necessary tools for knowing whole parts of the world' put forward by the marginalized (Dotson, 2012, p. 31).

Related to Dotson's worries about their not actually being shared hermeneutical resources is a worry raised by Charles W. Mills (2017). Mills worries that claims of shared hermeneutical resources serve to obscure the conflicting interests of different social groups. He argues that Fricker's idea of shared collective hermeneutical resources relies too heavily on a Rawlsian view of society as "a cooperative venture for mutual advantage", which fails to account for conflictual and adversarial relations in a society (Mills, 2017, p. 102). As such, Fricker's account of hermeneutical injustice fails to take into account how due to different and conflicting interest groups in society, those dominantly situated prefer to draw on hermeneutical resources which serve their own interest and obscure the interests of marginalized groups. By doing so, they are able to justify a status quo which benefits themselves, by drawing on hermeneutical resources that serves to benefit them, rather than on the hermeneutical resources of the marginalized which may challenge the status quo.

Similarly to how Mills raises worries about Fricker's idea of shared hermeneutical resources, we might say that Moellendorf himself fails to properly account for the competing adversarial dynamics around what constituted safe levels of climate change, as his claims about a so-called consensus around the 2°C target, gives a problematic sense of shared hermeneutical resources, that masks the conflicting interests at play in determining what constitutes dangerous climate change. The nature of the climate problem is such that the rich and developed countries, particularly those whose governments are dominated by fossil fuel industry influences, have vested interests in polluting, whereas the poor and vulnerable have much more to lose by the world continuing to destabilize the climate, and much less to gain from continued pollution. This creates a site of contestation around what constitutes a dangerous level of climate change, and arguably forms what Miranda Fricker terms a hermeneutical hotspot, where "the powerful have no interest in achieving a proper interpretation [of the viewpoints of the marginalized], perhaps indeed where they have a positive interest in sustaining the extant misinterpretation" (Fricker, 2007, p. 172).

It seems then that the best way to categorize the form of epistemic injustice that is occurring around what constitutes safe climate change would not to be call it a simple form of hermeneutical injustice, as that relies on a problematic idea of shared collective hermeneutical resources. Rather it seems that Dotson's idea of contributory injustice may be a better categorization of how the voices in favor of 1.5°C were marginalized, as it takes into account that the voices of the global south have long understood that 2°C poses a harm to them, it is just that the dominant powers have failed to give their voices proper uptake and have marginalized their concerns. Such an account does not rely on the problematic notion of shared hermeneutical resources, which is central to Fricker's initial notion of hermeneutical justice. Rather it shows that the hermeneutical resources of the global south have been marginalized and undermined, such that we have climate ethicists arguing for a target they have explicitly argued against and claiming to do so in their own name.

Taking Responsibility for Epistemic Injustice

The existence of people advocating for 2°C supposedly in the name of the interests of the global south, shows the importance of a point discussed in Chapter 7, that we have a special responsibility to ensure we elevate the voice and role of those who are disproportionately impacted by injustices and thus have special interest in addressing structural injustices. Doing so can help those working against structural oppression to better understand the nature of injustices visited upon these communities and seek solutions which better addresses them. In the words of Iris Marion Young, "unless the victims themselves are involved in ameliorative efforts, well-meaning outsiders may inadvertently harm them in a different way, or set reforms going in unproductive directions" (Young 2011 p. 146). Likewise Kyle Whyte and Kristie Dotson (2013) detail how certain elements of environmental injustice can be unseen, overlooked, or even unknowable by those with privilege.

Some advocating for 2°C may intend to benefit the global south, let us call them Good Willed 2°C Advocates (GW2DCers). However, by not adequately listening to and centering the voices of those most affected by climate change and related harms of the fossil fuel industry, GW2DCers have unintentionally pushed for a climate target which goes against the interest of those they intend to benefit. In doing so, GW2DCers may inadvertently enact a form of epistemic and recognitional injustice which fails to properly recognize and appreciate the voices and interests of those marginalized. To properly respond to the insights that the relatively privileged might lack full awareness of the nature of structural injustices, it is important that those who are relatively privileged take action to combat the possible influences of such biases and oversights. Important elements of Moellendorf's social identity, as a white male professor from the global north, seems to suggest that he, and other similarly situated people, have a particularly strong responsibility to work to actively address how epistemic injustices might be shaping their perspective on these issues.

As Washington and Kelly (2016) argue, albeit in relation to implicit biases, whether a person is responsible for how biases and prejudices might shape their hermeneutical resources, is partly a function of their social role and position, as well as the epistemic environment they inhabit. A person can be held more responsible when they occupy an epistemic environment where knowledge of those biases is relatively well-established and/or when they occupy a social role where knowledge about such biases are particularly relevant and important. Following Washington and Kelly's argument, as a climate ethicist, or someone at least engaged in the sphere of climate ethics, someone like Moellendorf operates in a social and professional role, in which there should be a responsibility to develop an understanding of the structural, hermeneutical, and testimonial biases that shape major questions like what target we should hold climate change to, especially if one aims to write a book regarding those targets. By failing to adequately discharge that responsibility, not only does Moellendorf potentially perpetuate epistemic injustices, furthermore, those epistemic injustices, then contribute to much broader distributive, recognitional and procedural harms and injustices associated with failing to hold climate change to 1.5°C.

Research has shown that white males (particularly, though not only conservative white males) have biases which make them generally see climate change as less of a risk or lead them to deny it altogether (Grasswick, 2014). One of the dominant posited explanatory factors behind such biases is that the general relative privilege of white men in society tends to shield them from the impacts of climate change, while the fact that they disproportionately benefit from society provides a form of motivated reasoning, which may lead to self-interested resistance towards thinking we need to change that society.[79] In light of the evidence that white males may have biases which lead them to see climate change as less of a risk, it seems there is a special responsibility for white male climate ethicists, like Moellendorf and myself, to think critically about how our own privilege and related biases might shape the way we understand climate change, and what is, or is not, considered dangerous climate change. Following a more intersectional line of analysis, this would probably hold especially true for white men who are in the global north, wealthy, not disabled, heteronormative, and/or in positions of power etc. (the list could and probably should go on). This is not to take the crude position that all who are dominantly situated will be wrong, but it is to caution us to consider how bias and privilege may shape our understandings of certain issues, especially given the considerable evidence which shows how it statistically speaking often does.

Importantly, when investigating biases and how they may affect perspectives on climate change, it is not simply a question of how each of us as individuals might have biased perceptions, and how our relevant identities may contribute to our own biases, although that is an important element. Rather, moving beyond an individualistic analysis, we also need to engage in a broader structural investigation of how collectively power structures, uneven vulnerabilities, biases, prejudices, testimonial injustices, and hermeneutical injustices, may have shaped the different (not always shared) understandings of complex, contested questions such as what constitutes dangerous climate change. Doing so helps us understand the context within which knowledge is created and disseminated, and how bias might play a role in shaping that context and the epistemic structures which uphold it. Paying attention to such questions is a particularly important task in debates which are situated within hermeneutical hotspots. Differentials in power and vulnerability encourage hermeneutical blind spots and

[79] That the privilege and biases of white men often lead them underestimate the broader risks of climate change globally, may be an example of how those who are privileged tend to turn their individual experience into broad generalizations about how the world as a whole functions. To borrow the words of Gaile Pohlhaus (2017, p. 17), "those dominantly situated may be encouraged to develop a kind of epistemic arrogance in order to maintain that their experience of the world is generalizable to the entirety of reality, a close-mindedness to the possibility that others may experience the world in ways they cannot, and an epistemic laziness with regard to knowing the world well in light of those oppressed" – in this case by climate injustice.

marginalization, both intentional and non-intentional, within the dominant classes. Doing so is a structural epistemic mechanism which serves to protect their privileged positions. Furthermore, as the next section details, we need to be careful about how such epistemic injustices may both result from and deepen historical injustices such as racism and colonialism.

A Worryingly White & Wealthy 'Consensus'

As the 1.5 to Stay Alive section outlined, drawing on Tschakert (2015) and Seager's (2009) research, when examining who is for the 1.5°C and who is for 2°C, we see a significant geographic bias, where 2°C is supported predominately by whiter, wealthier, colonizing and/or settler colonial nations in temperate latitudes, whereas the 1.5°C target is preferred by African nations, LDCs, and Caribbean and Pacific Island nations who are majority people of color and former colonized countries. Examining the nature of the geographic bias raises worries that Moellendorf's consensus makers in favor of 2°C map onto a potential colonial, racist, global north bias. Moellendorf's consensus claim seems to suggest that the ideal knowers who make up the consensus are the rich global north nations, whereas the voice of the global south are somehow lesser than, positioned outside of the consensus. Such a grouping of ideal knowers has parallels to colonial and racist epistemic structures. To see this better, we can turn to how Gail Pohlhaus extends Charles Mills (1997) concept of the racial contract to the realm of epistemic injustice in the extract below:

> One lens with which to think about varieties of epistemic injustice is to consider how persons may be systematically subject to injustice generally speaking and to understand epistemic injustices as intertwined with (and reinforcing) relations of dominance and oppression. Charles Mills' analysis of the nonideal conditions that maintain white supremacy in the United States as a racial contract provides such a lens. In the Racial Contract, Mills notes that typically philosophers recognize the moral and political dimensions of social contract theory, but neglect its epistemic dimensions: that signatories and beneficiaries of (real or hypothetical) social

contracts not only submit to political institutions and oblige themselves to standards of behavior for mutual benefit, but also bind themselves to epistemic institutions and habituate themselves to standards of epistemic behavior, so as to mutually recognize and maintain the terms of the social contract (Mills 1997: 17-18). With this lens, epistemic injustices take the form of epistemic institutions and cognitive practices that maintain and enforce unjust power relations.

First, just as the racial contract creates two classes, one of persons and the other of sub-persons (Mills 1997: 16-17), so too does it create two epistemic classes, one of (purportedly ideal) knowers, the other of sub-knowers. In other words, the racial contract establishes terms under which white European men are regarded as "generic" prototypical knowers collectively on a progressive path toward knowing the world and deems those it categorizes as non-white as incapable of intellectual achievement and progress (Pohlhaus, 2017, p. 17).

Just as under the racial contract there appears to be a sub-class of knowers, so in the consensus cited by Moellendorf, the wealthy, predominately white and male global north politicians who crafted the 2°C target are taken to define the consensus when it comes to what constitutes dangerous climate change, whereas the predominately brown and black LDCs, African nations, Pacific and Caribbean Nations, are taken to be outside of the consensus, dissenters whose voice somehow does not count enough to suggest that there is in fact no consensus.[80] Indeed, when it comes to understanding the interests of the poor surrounding climate change and energy, Moellendorf's book gives more weight to the work of Bjorn Lomborg, a white male

[80] A route for extending this analysis is to argue that Moellendorf and 2DCers, may be living within what Mills (1997) refers to as "an inverted world" where those who create and benefit from injustice remain largely ignorant of the unjust arrangements through which they benefit. As Pohlhaus (2017, p. 17) highlights, the creation of a sub-class of knowers goes a long way toward creating such an inverted world, for one way to remain ignorant of injustice is to disqualify those in a position to call attention to it from doing so. One example which supports such a claim is how indigenous knowledge and voices have been marginalized from the UNFCCC (cf. Comberti, Thornton, & Korodimou, 2016; J. Watts, 2017)

political scientist with a long history of climate obfuscation, than he does the entire LDC group.[81]

Beyond simply richer and poorer nations, rough estimations from global data show that 70% of the global poor – those living under $1.25 a day - are likely people of color, and as Meena Krishnamurthy highlights (in Cherry, 2016), the intertwined histories of racism and colonialism plays a significant role in helping explain that fact. Krishnamurthy highlights the long history of (predominately white) colonial powers claiming to act in the interests of the (predominately black and brown) colonized countries and the global poor. Krishnamurthy warns that in questions of poverty alleviation, aid and global justice, there is a significant worry that the global north may similarly claim to do things in the name of the global poor in ways which echoes a form of harmful colonial paternalistic intervention purportedly on behalf of the poor.[82]

Looking at the nature of the resistance to the 2°C target, raises significant worries that Moellendorf's claim to speak on behalf of the interests of the global poor, enacts a similar form of colonial paternalism, drawing on the political agreements, economic models and scientific forecasts of the global north to justify going against the explicitly stated interests of the global south, while claiming that doing so is actually in their own interest, despite them having put forward a wealth of evidence demonstrating otherwise. One worries that similarly to how philosophers like John Stuart Mill helped provide the intellectual underpinnings of

[81] Moellendorf, a political philosopher, appealing to very limited evidence from a controversial fossil fuel industry funded political scientist to outweigh the wealth of evidence provided by such nations arguably represents what Allen Buchanan calls *expertise imperialism*. Buchanan (2002, p. 133) describes expertise imperialism as "the tendency of experts to appeal to their genuine expertise in one area to justify their exercise of control in areas to which their expertise is in fact irrelevant." Lomborg and Moellendorf might contend that the same applies to me, as a philosopher by training (albeit with a decade of research and advocacy focus on environmental ethics, climate justice and poverty along with graduate certificates in climate science and environmental studies). However, the difference is that in my work I have actually paid attention to the relevant experts in this field, such as the IPCC. I have also paid attention to the voices of the global south and the large amounts of evidence they have put forward in defense of their position, rather than claiming to be speaking on their behalf without giving their voices much or any weight in my work.

[82] Sjöstrand et al. (2013, p. 713) characterize paternalism as "courses of action (including decisions) that are done in the assumed interest of a person, but without or against that person's informed consent"

colonialism (Jahn, 2005), so arguments from Moellendorf, Lomborg and others provide global powers and fossil fuel interests with the intellectual justification to push forward towards a 2°C target (or worse) as they are currently doing, while claiming that doing so is in the interests of the poor. Doing so threatens to re-enact a long colonial history of harming the global south while claiming to act in their interests, thus compounding the harms that colonialism has already placed on such communities (see K. P. Whyte, 2016a).

In sum, in this chapter we have shown how claims of so-called consensus around 2°C enact a form of recognitional justice, which fails to recognize and give weight to the voices of the majority of the global south who have advocated for 1.5°C in recognition of the fact that 2°C would harm them greatly. The 2°C target rose to prominence through a process that elevated the voices of the global north and marginalized the global south, thus enacting a form of procedural injustice that originated outside of the formal procedures of the UN and was pushed upon other nations by more powerful nations despite their contestations against it. The fact that many continue to push 2°C despite this history speaks to a systemic form of epistemic injustice where the voices of the global south continue to receive a significant credibility deficit even though they marshal significant amounts of science and other evidence to support their claims. Hopefully with the release of the latest IPCC Special Report on 1.5°C reaffirming the importance of keeping to 1.5°C, that target will gain more prominence and support. The result if we allow global warming to exceed 1.5°C and instead push on to 2°C or beyond, would be to visit grave harms particularly on the world's poorest and most vulnerable communities, representing a deep distributive injustice, given that those who have most contributed to the problem are the world's wealthiest and most power nations.

Chapter 10: Inaccurately Sacrificing 'the Poor' on the Altar of GDP

Those who accept that the science shows that 1.5°C is an important threshold that we should not cross, may still worry that to avoid crossing that threshold we will have to significantly slow economic growth in ways that may be harmful to the poor. Indeed, the idea that climate action would slow growth and endanger advances to human prosperity is often central to resistance to efforts to act on climate change and has also featured prominently in fossil fuel industry propaganda. Likewise, in addition to his claim that 2°C is supported by a scientific consensus, Moellendorf attempts to justify his defense of the 2°C target by way of appealing to a purportedly precautionary argument which says we should not act in line with 1.5°C lest we risk economic recession whose harms would fall on the poor. In this chapter, I show that his precautionary approach is problematic as it relies on a weak and selective evidence base. Contrary to Moellendorf's claims, there is a significant amount of evidence which shows that we can achieve 1.5°C in ways that do not jeopardize but rather enhance the ability of poorer communities to develop. Additionally, his approach also problematically elevates considerations of GDP as being definitive in whether we should act. By doing so, he fails to see the broader values that are at stake in climate change and which are central to why those who care about poverty alleviation, well-being, and the interests of the least well-off support 1.5°C. In this chapter while I aim to focus on Moellendorf's arguments predominately, in doing so I aim by extension to provide a broader critique of those who appeal to economic growth to justify pushing passed 1.5°C.

As Hartzell-Nichols (2017) highlights, there is no unified agreement about what a precautionary approach entails but rather many broad precautionary approaches which attempt in some way to answer the question of how to act in the face uncertainty and risk. Moellendorf appeals to a specific precautionary approach, using a rule of thumb he calls minimax, which "holds that between courses of action - all with uncertain negative outcomes - the agent should compare only the highest loss scenarios of the courses and choose the course of action that causes the lowest of the highest loss scenarios to come to pass" (Moellendorf, 2014, p. 81). Applying his purportedly precautionary approach Moellendorf defends a rather weak version of the 2°C target, asking us to accept a mid-range value for climate sensitivity, as he believes that acting on a higher climate sensitivity, and thus smaller carbon budget, will raise the cost of action too much.[83] Similarly, he argues that the "the costs of limiting warming to 1.5°C might be very high, possibly resulting in a protracted global recession that would be very damaging to the global poor" (Moellendorf, 2014, p. 24). As a result, he says that to avoid the potential highest loss scenario, we should aim for a mid-range value of climate sensitivity for 2°C as the losses for acting on either a higher climate sensitivity for 2°C or in line with the 1.5°C target would be too high given their purported impacts on economic growth, supposedly entailing the highest loss scenario, particularly for the global poor, according to Moellendorf.

There are a number of problems with Moellendorf's purportedly precautionary argument, but I aim to focus on three. The first is that relying on a mid-range value of climate sensitivity is hardly precautionary. Given the potential harms that we face from climate change, a precautionary approach which aimed to avoid the potential highest loss scenario would aim for 1.5°C if not less warming. Secondly, and relatedly, Moellendorf's claim that acting in line with 1.5°C would lead to global recession is not supported by economic modelling, as economic models show that acting in line with 1.5°C would ensure continued economic growth more than 2°C would. And thirdly, even if claims about reduced economic growth from 1.5°C were supported by economic modelling, economic models prioritize efficiency and growth not development and poverty alleviation, so we cannot determine from GDP alone what the best path of action is to protect the poor. Economic models tend to: a) overestimate the costs of acting on climate change; b) underestimate both the harms of not acting and the benefits of acting; and c) do not prioritize the interest of the poor. Thus, Moellendorf's purportedly precautionary argument is not particularly precautionary, relies on somewhat unrealistic

[83] Moellendorf defends a mid-range value of climate sensitivity which predicts that for a doubling of CO_2 emissions we would see an increase of warming of about 3°C. A higher range value of climate sensitivity holds that per doubling of CO_2 we would see a 4.5°C increase. Delving into the various different values of climate sensitivity is beyond the purview of this paper but for further discussion on this front see Gardiner (2017b).

worst-case scenarios based on limited evidence, and problematically prioritizes very limited economic modelling over more refined ways of ensuring poverty alleviation and development.

Turning to the first reason, as Gardiner (2017b) argues, Moellendorf's precautionary approach is hardly a precautionary approach, as there is good reason to think the climate may be more sensitive than mid-range values, and a precautionary approach should arguably plan for such a likelihood.[84] Indeed, recent evidence illustrates that climate sensitivity is proving to be in line with higher climate sensitivity, thus showing the inadequacy of Moellendorf's purportedly precautionary approach. For instance, according to a recent analysis by Brown & Caldeira (2017), climate models that simulate the recent past the best, tend to simulate above average warming in the future. Their key takeaway is that the climate is much more sensitive than mid-range values would suggest. Likewise, the Royal Society (2017) published a compendium which gave an overview of updated climate science. In it they warned that it seems likelier that we've been underestimating the risks of warming than overestimating them. Reviewing such evidence, Penn State climate scientist Michael Mann argued that: "Uncertainty is not our friend here".

Uncertainty is indeed "not our friend" and, as discussed in Chapter 2, even with current levels of warming we risk potential tipping points in the climate which could lead to runaway catastrophic climate change, leading to a "hothouse earth" whose impacts could be far more disastrous than any global recession. For apart from causing widespread devastation, runaway climate change could also lead to global economic collapse and threaten the habitability of large swathes of the planet for humanity (cf. W. Steffen et al., 2018). Building on such a recognition, Lauren Hartzell-Nichols (2017) has developed a much more robust precautionary approach than Moellendorf's, which she terms the Catastrophic Precautionary Principle and Catastrophic Precautionary Decision-Making Framework. According to Hartzell-Nichols,

[84] The mid-range value of climate sensitivity is that per doubling of CO_2 levels we would see an increase of 3°C. A high range value holds that per doubling of CO_2 we would see a 4.5°C increase. Exploring the different values of climate sensitivity is beyond my purview. For more on this see Gardiner (2017b).

"given that we already face the threat of climate catastrophe at current atmospheric GHG concentrations, we have very strong pro tanto moral reasons to take significant precautionary measures to mitigate further climate change to the greatest extent possible [within moral constraints] and to develop and put in place strategies for adapting to those potentially harmful climate change impacts that cannot be avoided." (Hartzell-Nichols, 2017, p. 145). Hartzell-Nichols recognizes that actions to avert catastrophe should not themselves bring about catastrophe, but fortunately, contrary to Moellendorf's claims, economic models show that action in line with 1.5°C rather than creating catastrophic impacts or global recession, could lead to more significant economic growth and prosperity than aiming for 2°C.

A recent study in *Nature* attempted to model the economic benefits of acting on the 1.5°C target (M. Burke, Davis, & Diffenbaugh, 2018). They combined historical evidence with national-level climate and socioeconomic projections to quantify the economic damages associated with the 1.5 °C and 2 °C targets. Burke et al conclude that their results "suggest that achieving the 1.5 °C target is likely to reduce aggregate damages and lessen global inequality, and that failing to meet the 2 °C target is likely to increase economic damages substantially" (M. Burke et al., 2018, p. 549). They estimated that 71% of countries—representing 90% of the global population—have a more than 75% chance of experiencing reduced economic damages at 1.5 °C, with poorer countries benefiting most. By the end of this century, their models showed that there is a more than 60% chance that the accumulated global benefits of acting in line with 1.5°C rather than 2°C will exceed US20 trillion, under a 3% discount rate (2010 US dollars). On the other hand, their study showed that limiting global temperature rise to 1.5° rather than 2° costs just an additional ~$500 billion over the next 30 years. As such, acting in line with the 1.5°C rather than 2°C has a 40-to-1 benefit ratio, even with a 3% discount rate, which values future benefits much less than present benefits.[85]

[85] If we remove the discount rate and weigh future benefits equally to present benefits, then my back of the envelope calculation shows that the benefits of acting in line with the 1.5°C would actually be $80 trillion dollars by 2100. Removing or significantly reducing the discount rate is arguably justified on moral and empirical grounds (Gardiner, 2011a; Parfit, 1983; Stern, 2016).

Furthermore, Burke et al recognized that their results may understate the benefits of limiting warming to 1.5 °C, as they did not adequately take into account unprecedented extreme outcomes and tipping points, such as large-scale sea level rise, which is more likely to occur for warming of 2 °C than warming of 1.5 °C. They also did not include the impacts of climate change on areas that are harder to quantify, such as the natural ecosystems that are vital for clean air and water and fertile soils. Additionally, as they admit, their economic analysis did not include co-benefits of actions, like the health benefits of burning fewer fossil fuels. Including these would make the benefits of action even greater for as we have shown in Chapter 1, the co-benefits of action could pay for themselves, and avoid millions of premature deaths particularly for the poor and vulnerable. Clearly, when adding up the benefits of acting in line with the 1.5°C target, Burke et al's study shows that the benefits of acting on climate change significantly outweigh the costs, and the costs are rather small with just an additional $500 billion required. While $500 billion may sounds like a lot, it is considerably smaller than the US$2.9 trillion in government revenue annually that eliminating fossil fuel subsidies could free up according to International Monetary Fund estimates (Clements et al., 2013).

Another recent study shows that meeting the 1.5°C target would only result in a reduction of a few tenths of a percentage point in global GDP growth per year, globally, even when excluding consideration of the economic benefits from avoided climate damages, reduced air pollution and possibly improved energy security (Rogelj et al., 2015, p. 525). And those excluded benefits would be substantial, as I have detailed in Chapter 1 and is highlighted by the 2016 Low Carbon Monitor report, released by the United Nations Development Program and the Vulnerable Countries Forum. Their report highlighted major gains and avoided harms that would be had by achieving the 1.5°C target rather than the 2°C goal. Their estimates show that "a difference of 0.5°C in global temperature has enormous repercussions", such as the avoidance of a 10-15% increased risks of crop yield losses for key breadbasket areas in just the coming decades; and a 10% reduction of the global economy by 2050 (Low Carbon Monitor, 2016, p. viii). Their report also demonstrates that a transition in line with the 1.5°C target could potentially create many more jobs, improved global health, and improved access to energy when compared to both business as usual or the 2°C target.

What's more even though economic models support the 1.5°C target, we should view such economic models with a healthy level of skepticism as they may actually skew the calculus somewhat in favor of inaction due to underestimating the impacts of climate change and overestimating the costs of climate action. As renowned climate economist Lord Nicholas Stern, argues, "current economic models tend to underestimate seriously both the potential impacts of dangerous climate change and the wider benefits of a transition to low-carbon growth (Stern, 2016, pp. 407–408). Similarly, Stoerk, Wagner and Ward (2018) draw attention to "mounting evidence that current economic models of the aggregate global impacts of climate change are inadequate in their treatment of uncertainty and grossly underestimate potential future risks." They warn that the "integrated assessment models" used by economists "largely ignore the potential for 'tipping points' beyond which impacts accelerate, become unstoppable, or become irreversible." The authors also draw attention to "a major discrepancy between scientific and economic estimates of the impacts of unmanaged future climate change." They state: "These discrepancies between the physical and the economic impact estimates are large, and they matter… physical impacts are often not translated into monetary terms and they have largely been ignored by climate economists."

Stoerk et al's critiques point to another broader problem with economic models of climate change, insofar as economic models are unable to take into account what are referred to as non-economic loss and damage (NELD). As Winkler and Klinsky define it, NELD "refers to all losses that are not commonly traded in markets and include everything from biodiversity loss to psychological harm from relocation". Klinsky and Winkler argue that NELD is difficult to represent in economic models and so is often excluded, but excluding NELD from analysis is often a form of recognition inequity with distributive implications as "choosing not to recognize profound losses to some communities artificially reduces the perceived desirability of limiting temperature increases… systematically discounts consideration of subsistence communities or those whose cultural identities are tied to vulnerable biophysical processes and places" (2018, pp. 3–4). Least Developed Countries and indigenous communities have long been arguing that economic models do not adequately represent their vulnerability to climate change or the value of their communities, cultures and ecosystems. Thus, Moellendorf's appeal to GDP growth and economic models to justify acting against their stated interests of a 1.5°C target represents a form of recognition inequity, as the economic models he appeals to fail to adequately countenance and recognize their vulnerability.

Another problem with using GDP as the measure to justify acting on the interest of the "global poor", is that GDP problematically ranks as "poor" those who may have an immense wealth when it comes to cultural and ecological knowledge and practices. Such an immense wealth is being eroded by the intertwined forces of climate change and (neo)colonization and fails to be value and recognized by economic models. To adapt a point from Chris Cuomo (2011), emphasizing vulnerability and poverty through the lens of GDP tends to obfuscate the agency, knowledge, and resilience of members of disempowered or marginalized groups. Cuomo highlights that indigenous, anti-globalization, feminist, and youth movements for climate justice are developing alternatives to discourses of vulnerability. To quote Cuomo, "these movements point out that many communities are in vulnerable positions precisely because they uphold ecological values that have not been engulfed by global capitalism and technological modernization, recognizing marginal status in fossil-fuel cultures to be a sign of wisdom and resilience rather than weakness" (2011, p. 695). Using GDP to justify acting on behalf of these groups threatens to further erode the values which are not recognized or valued by such a limited measure of value.

Beyond not recognizing the values and value of many communities and ecosystems, GDP as a measure of value has deep shortcomings. In the words of John F Kennedy (in Rogers, 2012):

> "Gross National Product counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for the people who break them. It counts the destruction of

the redwood and the loss of our natural wonder in chaotic sprawl. It counts napalm and counts nuclear warheads and armored cars for the police to fight the riots in our cities. It counts Whitman's rifle and Speck's knife, and the television programs which glorify violence in order to sell toys to our children. Yet the gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything in short, except that which makes life worthwhile. "

Those who make economic growth and GDP the predominate and/or defining factor in their assessment of whether we should take climate action, also enshrine a particular consequentialist moral outlook, which assumes that risks and benefits can be traded off against one another. As Hourdequin argues, "although this frame is widely deployed throughout the world, it is arguably a culturally parochial one that encodes certain dominant Western presuppositions about the nature and fungibility of value" (Hourdequin, 2018, p. 21).[86] According to Hourdequin, assuming such an approach is definitive of how we act on climate change, particularly when claiming to argue on behalf of "the global poor", reflects a form of recognitional injustice which fails to countenance what, outside of such a limited frame, may be important for impacted communities:

""[T]aking recognition seriously would encourage deeper dialogue about the principles of distributive justice and about what climate policy aims to distribute. It might prompt more careful thought about how climate change

[86] Hourdequin levels this critique at Horton and Keith who claim that mitigation is not in the interests of the poor, as part of their problematic argument to advocate for solar radiation management research.

> interacts with diverse cultures and ways of life, such that climate losses and vulnerabilities would not be reduced to economic losses and vulnerabilities… Additionally, it would require greater engagement with the perspectives and needs of those who lack significant political, economic, and cultural power." (Hourdequin, 2016, p. 37)"

In another paper, Hourdequin argues that rather than simply assuming that a consequentialist cost-benefit framework is the proper way to approach how to define what is in the interest of the so-called "global poor" a more just and empirically complete approach would involve engaging in a robust, inclusive participatory process, which actually engaged with the communities one aimed to be arguing on behalf of. As Hourdequin highlights, such a process would not only lead to a more just approach to determining how to act, it may also provoke important questions such as:

- What is being distributed?... Have all the relevant distributive dimensions been taken into account?
- Is a particular approach to remedying distributive injustice the only or best one? What alternatives exist?
- What principles of distribution are being presupposed?
- How are historical injustices taken into account? For example, do proposed distributive schemes or policies take history into account, and if so, how?
- How are future generations being considered?
- How will distributive decisions and frameworks be assessed and revisited over time?
- Are the values at stake fungible, as distributive approaches often presuppose?
- At what scale(s) are distributive frameworks being developed? What scale(s) are being overlooked?" (Hourdequin, 2018, pp. 9–10)

Another good reason to push back against GDP and economic growth as the measure of progress particularly on poverty alleviation, is because of the simple fact that increased global or domestic GDP does not necessarily translate into increased well-being for vulnerable or low-income communities. As Chukwumerije Okereke (2011) highlights, the argument that increased economic growth lifts all boats is often appealed to as a reason to support economic growth at the cost of ecological stability. Such trickle-down arguments are made by economists such Bhagwati, Anderson and Leal. However, as Okereke argues, the evidence does not favor such a line of thinking and rather than the benefits trickling down to the poor, it is often the case that the harms of ecological exploitation land heavily on the world's poorest and most vulnerable while economic growth funnels upwards in a deeply unequal fashion to the global north and the global rich. This holds particularly true for the world's least developed countries, for as Abeysinghe and Huq argue, even though globally GDP has been growing, "since the 1980s, most of the LDCs have made little progress so far and are a considerable distance from meeting the criteria for graduation [from the status of being a least developed country, which is a country characterized by low income, weak human assets index, and high economic vulnerability]. In fact, the number of countries that fall into the LDC category has nearly doubled since the 1970s. Economic growth has made little progress on eradicating poverty and social disparities in LDCs. Hunger and malnutrition are widespread, with dire consequences for the large vulnerable populations" (Abeysinghe & Huq, 2016, p. 191). And while the benefits of economic growth have not really trickled down to the LDCs, the impacts of climate change have fallen heavily on them, as Abeysinghe and Huq (2016, p.192-3) detail in this powerful passage:

> The evidence proves that the LDCs are experiencing 'dangerous' climate impacts. For example, the growing climate change impacts bring frequent and extreme climate- and weather-related disasters such as floods, cyclones, tornadoes, landslides, droughts, heatwaves, and malaria outbreaks in the LDCs (IPCC 2007). This has been exacerbated by loss of life, displacement, increased urbanization, migration, accelerated land degradation, reduced water availability and deteriorating sanitation, and increased conflicts over scarce resources (Beddington 2011). From 1980 to 2013, the forty-eight LDC countries have

collectively endured 1,291 climate-related disasters (International Disaster Database 2009). The data also suggest that in the first ten years of the twenty-first century, the LDCs experienced a 44 per cent increase in the number of droughts over the previous decade, and a 40 per cent increase in the number of severe storms (International Disaster Database 2009). The number of floods more than doubled—from 170 to 369—killing over 200,000 citizens, disrupting the lives of 200 million, and causing billions of dollars in damages (International Disaster Database 2009). In the first half of 2010 alone, LDCs endured seventy-one major flood events, causing a further 1,285 premature deaths (International Disaster Database 2009). Roughly 120,000 deaths occurred in LDCs in 2010 alone because of rising rates of climate-related malnutrition, diarrhoeal infections, malaria, and other illness related to climate change (International Disaster Database 2009). Evidence suggests that, over the last four years alone, LDCs have experienced 67 per cent of all deaths from climate-related disasters, nearly six times the global average (Ciplet et al. 2013). Economic growth in the LDCs has been weaker by a full two percentage points in the past five years (2009-13) than during the previous five-year period (UNCTAD/LDC/2013). They have not reached the target rate of 7 per cent annual growth established in the Istanbul Programme of Action for the Least Developed Countries for the Decade 2011-2020. With further impacts of climate change, poverty in LDCs will further exacerbate and push countries well beyond their limits. More lives will be lost, people will be displaced, livelihoods will be further disrupted, disease will become more prevalent and severe, economic development will suffer further, and their social and political systems will struggle further to cope.

If history is to be our guide, then it seems then that sacrificing the 1.5°C goal on the altar of global economic growth that does not necessarily benefit the most vulnerable and poor is not the best way to address poverty, far from it. Rather, if our number one priority is to protect the poor, then we should focus on restructuring the systems that harm them and putting in place policies that would more directly protect the interests of the poor and vulnerable.[87] Likewise, to revisit a point from Gardiner, views like Moellendorf's set up a false dichotomy between poverty and the environment. "Global poverty, and human underdevelopment more generally, are already with us and have been for many decades. According to many, they are largely the result of conventional human systems that could, and should, be changed" (Gardiner, 2017b, p. 449). Simply stoking the fires of economic growth will not address the root cause of global poverty which persists despite economic growth. Likewise, pitting 1.5°C against poverty creates a false dichotomy. Of course, there are ways that we can approach 1.5°C which would deepen poverty, but similarly there are ways that we can hit 2°C or go above it which also deepen poverty and inequality. Fortunately, there are numerous paths to 1.5°C that enhance sustainable development. Indeed, as the IPCC SR1.5 highlights, most pathways to 1.5°C have more synergies with the world's sustainable development goals than they do trade-offs.

The IPCC shows with high confidence that 1.5°C pathways that include low energy demand, low material consumption, and low GHG-intensive food consumption have the most pronounced synergies and the lowest number of trade-offs with respect to sustainable development and the SDGs. That is in large part because such pathways would reduce dependence on resource intensive carbon dioxide removal (CDR) interventions, a topic I return to in Chapter 11. The IPCC concludes with high confidence that "in modelled pathways, sustainable development, eradicating poverty and reducing inequality can support limiting warming to 1.5°C" (IPCC, 2018, p. 21). Furthermore, the IPCC also concludes with high confidence that "redistributive policies across sectors and populations that shield the poor and vulnerable can resolve trade-offs for a range of SDGs, particularly hunger, poverty and energy access. Investment needs for such complementary policies are only a small fraction of the overall mitigation investments in 1.5°C pathways" (Ibid, p.23). They add that "social justice and equity are core aspects of climate-resilient development pathways that aim to limit global

[87] This point was made in a comment on this paper by Carina Fourie.

warming to 1.5°C as they address challenges and inevitable trade-offs, widen opportunities, and ensure that options, visions, and values are deliberated, between and within countries and communities, without making the poor and disadvantaged worse off" (ibid p.24). Far from Moellendorf's claim that pursuing 1.5°C will undermine development, the IPCC says with high confidence that "sustainable development supports, and often enables, the fundamental societal and systems transitions and transformations that help limit global warming to 1.5°C. Such changes facilitate the pursuit of climate-resilient development pathways that achieve ambitious mitigation and adaptation in conjunction with poverty eradication and efforts to reduce inequalities" (ibid p.24).

To conclude this section, as a result of a recognitional inequity which fails to see the challenges facing the most vulnerable, as well as a vast over-estimation of the costs of climate action, Moellendorf pushes for a climate target that would hamper economic growth, prosperity, and well-being, creating significant climate risks and pollution whose impacts would fall disproportionately on low-income and vulnerable communities. What these studies demonstrate is that Moellendorf's claim that acting in line with the 1.5°C target would create a global recession that is worse than the impacts of climate change simply is not supported by the evidence. There may be pathways to 1.5°C that cause harmful economic impacts that result in recession, but we do not have to choose such pathways as other pathways exist, at least they exist currently provided we do not delay action much further. As such, if we want to follow Moellendorf's minimax rule and avoid the worst outcomes, we should be acting in line with the 1.5°C target, or as Hartzell-Nichols Catastrophic Precautionary Principle suggests, mitigating further climate change "to the greatest extent possible" while considering other important moral concerns.

Energy Poverty and the 1.5°C Target

It is important to consider a central objection that Moellendorf raises, which is that if we act on climate in line with the 1.5°C target, it could constrain the ability to use fossil fuel energy in ways that lift people out of poverty. I would like to cede this point, in a qualified way to

Moellendorf, for depending on how we act on climate change, this may well be true. If wealthy nations continue to emit such high levels of greenhouse gases, while simultaneously failing to adequately assist developing nations to transition away from fossil fuels, then keeping near or in line with the 1.5°C target could indeed impede energy poverty alleviation (Holz et al., 2017). However, even if we grant this point to Moellendorf, that does not justify his argument that therefore 2°C is the level at which climate change should be considered dangerous. Indeed, a similar worry could be raised about the 2°C target, that achieving it could impede poverty alleviation if we act in line with it inequitably. However, just as there are more equitable pathways open to reaching the 2°C target, so there are more equitable pathways still open to meeting the 1.5°C which also lead to the eradication of poverty.

Moellendorf's argument that achieving the 1.5°C would stall poverty and development is based on his claims that: a) "achieving a high level of human development requires... a lot of energy"; and b) "in order to develop rapidly [and power their economies], countries need access to cheap forms of energy [and fossil fuels] are much cheaper than renewable energy" (Moellendorf, 2014, p. 132). The view that cheap fossil fuel energy is needed to power developing economies is often echoed by Bjorn Lomborg, Bill Gates and the fossil fuel lobby (Ayling, 2017; G. A. Lenferna, 2016a). However, increasingly both of these claims are proving to be inaccurate. At the country and region-specific level there is significant evidence to show that one can achieve high human development without high amounts of energy use and/or without heavy reliance on fossil fuels.

Costa Rica, for instance, is a shining example of how pursuing renewable energy can help facilitate more equitable, inclusive and democratic development, and contrasts with how fossil fuel centric development has often led to more unequal forms of development in many developing countries (N. Johnson, 2016b, 2016a; Stiglitz, 2018). Costa Rica uses about 7 times less energy per person than the United States and has just 1.6 metric tons of CO_2 per person, ten times less than the United States' 16.5 metric tons per capita (World Bank, 2018a, 2018b). Nonetheless, Costa Rica is not only in the high human development category, it is also one of the happiest countries on earth, according to the World Happiness ranking which measures subjective well-being on the basis of six key variables: income, healthy life expectancy, social support, freedom, trust and generosity. Costa Rica ranks well above the United States on the happiness ranking, providing a similar health-life expectancy, a higher freedom to make choices, and less corruption (Helliwell, Layard, & Sachs, 2018).

Likewise, Denmark (0.06 tons of CO_2 per capita), Finland (0.09), and Netherlands (0.21), have very low per capita emissions and are all high human development countries, and among the top six happiest countries on earth according to the World Happiness Rankings, with Finland being the happiest on earth (Helliwell et al., 2018; O. Smith, 2017; United Nations Development Programme, 2016). What these countries experience demonstrates is: a) you can decouple energy use from fossil fuels use; b) decouple fossil fuel use from human development and well-being; c) high development does not necessary equal high energy usage; and d) high levels of carbon emissions and fossil fuels do not necessarily buy you development, well-being or happiness, as there are other routes available to achieve that. What's more these countries were able to achieve this before the current inflection point we face, where solar and wind are becoming increasingly cheaper than even the existing fossil fuel base as detailed in Chapter 2.

Some might object that while these countries were able to achieve low emissions and high development, developing countries need to go through a phase of high emissions before they can achieve low-carbon development. However, while this may have held true historically for some countries, looking forward such a view is becoming increasingly untenable as advancements in renewable energy technologies increasingly unlock the potential for prosperous low carbon development. Let us consider the African continent, which currently accounts for two-thirds of people in extreme poverty (Kharas, Hamel, & Hofer, 2018). Far from needing to rely on fossil fuels to rapidly develop, a recent study used state-of-the-art Integrated Assessment Models to show that "an almost complete shift towards renewable energy by 2050, sourced largely from solar, wind and hydro power is feasible and affordable across the entire African continent. (Schwerhoff & Sy, 2018). It shows that contrary to

Moellendorf and the fossil fuel industry lobby's claims that rapid development requires fossil fuels, "Africa could rely almost completely on renewable energy in electricity production and still develop its economy rapidly" (Schwerhoff & Sy, 2018). This is just one example of a growing body of evidence which shows that renewable energy is increasingly more affordable than fossil fuels, and is often much better suited to providing energy access and development, such that relying on fossil fuels may actually slow energy access (Calitz et al., 2015; CTI, 2014a; G. A. Lenferna, 2016b; Mahapatra, 2017; McCrone et al., 2017; Ram et al., 2017; Wright et al., 2016).

At the global level, studies show that we can meet the 1.5°C target while still ensuring robust development and poverty alleviation. Consider for instance, a recent study by Grubler et al (2018) in *Nature Energy* which models a future – called the Low Energy Demand (LED) scenario – where warming is limited to 1.5C while many of the world's sustainable development goals are fulfilled, including the goals of zero hunger, good health and wellbeing and affordable and renewable energy for all. Their model does not entail constraining poverty alleviation, rather they show how through improving energy efficiency, agricultural practices, switching to healthier diets, and reducing deforestation we could limit warming to 1.5C. Likewise, Ecofsys modelled a rapid energy system transformation coupled with afforestation and improvements to agricultural practices can cost-effectively meet the 1.5°C target and spur on development and growth (Blok, Exter, & Terlouw, 2018). The Low Carbon Monitor Report, commissioned by the Climate Vulnerable Forum, also modelled a 1.5°C scenario and showed that in addition to significant climate benefits a transition in line with the 1.5°C target could potentially create many more jobs, improve global health, and improved access to energy when compared to both business as usual or the 2°C target (Low Carbon Monitor, 2016, p. viii).

However, while in the medium-to-long term achieving the 1.5°C could lead to such beneficial results, in the short-term achieving such a low-carbon transition will require higher upfront investments than sticking with the fossil fueled status quo. As such, this is where I can partly concede to Moellendorf that it is true that if developed nations do not act fast enough to reduce their emissions, and adequate support is not provided to developing countries to transition, that achieving the 1.5°C could place unfair burdens on developing countries. In addition, if we do not design domestic policies equitably, we may place the burden for action on the poor and vulnerable. However, recognizing such a possibility and the need to address it, is very different to arguing as Moellendorf does, that achieving 1.5°C necessarily involves inhibiting poverty alleviation or to arguing that if climate action inhibits poverty alleviation by one day then it should be rejected. Rather it points to the importance of ensuring that rich global north nations and historical polluters are doing their fair share both of reducing their own emissions and supporting developing countries, as well as ensuring that all nations and communities work to implement just climate policies which do not put the burden on the poor.

Sharing 1.5C Fairly

As Gardiner (2004a) highlights there are two widely espoused approaches to climate justice. The first one invokes historical principles which require one to clean up one's mess. On this approach industrialized countries should pay for the costs imposed by their past emissions. The second approach characterizes the capacity of the Earth to absorb man-made emissions of carbon dioxide as a common resource, and claims that since this capacity is limited, a question of justice arises about how the remainder of its use should be fairly allocated (cf. Singer, 2002). On the second approach, developed countries have largely exhausted the atmospheric sink in the process of industrializing and have thus, in effect, denied other countries the opportunity to use their share. On this view too, it is held that justice requires that developed countries compensate less developed countries for this overuse. As both Gardiner (2011b) and Singer (2010) point out, these two approaches form part of a broader consensus within the climate ethics literature, around what Gardiner refers to as the Burden Claim. The Burden Claim holds that industrialized countries should take the lead in addressing climate change, both in terms of reducing their emissions and dealing with the negative impacts created by a problem which they have been the predominant cause. 192 nations of the world have agreed to this approach under the United Nations Framework Convention on Climate Change, where it was agreed that "developed countries should take the lead in combating climate change, and the adverse effects thereof'" (Kartha et al., 2009, p. 215). There are divergent interpretations of how to apply the Burden Claim, and how to weigh different considerations, such as historical emissions, wealth, and state responsibility. However, there is broad agreement that the Burden Claim, in some form, is central to an adequate account of climate ethics.

As Holz et al (2017) demonstrate, a broad range of ways of defining equity all show that if we are to meet the Paris Agreement targets equitably, then developed nations have dual obligations to reduce their emissions, and to fund emissions reductions in other parts of the world through mechanisms such as the Green Climate Fund (GCF). A large swathe of global civil society agree, having argued in the civil society equity review that we can only meet the 1.5°C target equitably if developed countries embrace their dual obligations of reducing domestic emissions, and supporting emissions reductions in the developing world (CSO Review, 2016). Their report found that on average poorer countries were already pledging more than their fair share, while wealthier countries were falling far short of theirs. To meet 1.5°C, all countries will have to increase their ambition – even poorer countries that had already pledged more than their fair share. However, since this additional mitigation would far exceed their fair share, these countries could not fairly be expected to undertake these efforts on their own, instead wealthier countries would have to provide support in the form of finance, capacity building or technology transfer to allow poorer countries to achieve this additional mitigation. As Holz et al point out, if developed countries do not adequately fulfil both domestic emissions reductions and international climate finance, we risk either not meeting the 1.5°C and/or imposing an inequitable burden on those who can least afford it, and who are least responsible for causing the climate problem.

International cooperation is thus key to meeting 1.5°C as was also recognized in the IPCC SR1.5. The Summary for Policy Makers highlighted with high confidence that "international cooperation is a critical enabler for developing countries and vulnerable regions to strengthen their action for the implementation of 1.5°C-consistent climate responses, including through enhancing access to finance and technology and enhancing domestic capacities, taking into account national and local circumstances and needs" (IPCC, 2018, p. 25). Such a point is demonstrated even in the economic models used to arrive at 1.5°C, insofar as "the large majority of modelling studies could not construct pathways characterized by lack of international cooperation, inequality and poverty that were able to limit global warming to 1.5°C" (ibid, p.24). Such a reality, where international cooperation is central to meeting 1.5°C also points to why fossil fuel industry magnates have increasingly funded the rise of authoritarian fascists who embody crude nationalist policies that stoke international division and inequality, such as Trump's America First policy and echoes of it in Brazil, Australia and Europe. It also speaks to the centrality of the climate justice movement needing to fight against the rise of fascist authoritarianism and work towards international cooperation.

Additionally, apart from developed countries increasing their ambition on domestic emissions reductions and providing financial and other support for developing countries, a third more overlooked responsibility also exists for them, which is to lead in leaving fossil fuels in the ground. Given that we already have more fossil fuels than we can afford to burn, we will need to pursue a managed decline of fossil fuel production, and if we are to do so in ways that are equitable it is important, as Simon Caney (2016a) argues, that wealthy developed countries, especially those who have most benefited from fossil fuel extraction, and who can best afford to transition, take the lead in leaving fossil fuels in the ground. If we are to combine questions of equity with economic efficiency, then such countries should prioritize leaving in the ground fossil fuels that are economically inefficient, greenhouse gas and resource intensive, and/or that are opposed by local communities, as I have argued elsewhere (G. A. Lenferna, 2018a). While I do not here have the space to go into the complex details entailed in how to equitably manage a decline in fossil fuel production, I bring it up to emphasize that developed countries have a three-fold responsibility to reduce domestic emissions, leave fossil fuels in the ground, and support developing countries as they adapt to and mitigate climate change, as well as take on the loss and damage that at this point cannot be adequately adapted to.

Recognizing this three-fold responsibility, it is true that rich and polluting countries and communities failing to act appropriately is unfair and a moral ground for why developing countries and communities could reject mitigation responsibilities on a fair burden sharing justice framework. However, building on chapter seven’s point about the tension between burden sharing justice and harm avoidance justice, many developing nations are realizing that the gravity of the climate situation and the harms of fossil fuels are so large that harm avoidance justice may at times outweigh burden sharing justice. For instance, if we look to the actions of the Least Developed Countries we see that they are all committing to 100% renewable energy between 2030-2050 despite the fact that they are not receiving adequate climate finance from the developed countries, and despite the fact that such an investment will involve shouldering some costs in the present (Hrala, 2016). They are doing so though, based on the realization that we need to act aggressively on climate change, and also because they recognize such a transition will increasingly create significant benefits for them in the long run. As such, while it is unfair that developing countries take on additional responsibilities, the unfairness and harms of not acting on climate and moving away from fossil fuels will be much graver.

The actions of LDCs to push for 100% renewable energy despite the inactions of richer polluting nations, shows that there is much more to climate justice than simply concerns for short-term poverty alleviation. Indeed, poorer nations and communities have proven willing to shoulder some costs now to ensure long-term flourishing, the continued survival of their culture, and climate stability, among other things. It also shows that for many developing nations, renewable energy is increasingly positioned as the best pathway to ensure a robust form of development, despite the fact that it does have more significant upfront costs than following the more harmful, and in the long run more expensive fossil fueled model of development. This is not to argue that we are justified placing such burdens on them, far from it, the global north has a deep obligation to assist them, which it is failing terribly on. I am not arguing that we should expect developing countries to simply take up the slack of developed countries. Rather, as I have advocated elsewhere, we need to recognize how the inactions of developed nations are putting increased burdens on the developing world and work both to compensate them for those efforts and to ensure that developed and polluting nations and sub-national actors take on their fair share of action on reducing emissions, leaving fossil fuel in the ground, and providing support to developing nations (G. A. Lenferna, 2018d).

However, given the magnitude of the harms that come with pushing passed the 1.5°C target, and how they will fall disproportionately on the poor and vulnerable, we should indeed be wary of those that argue that we should weaken climate action to help the poor. While some countries and communities may be justified under certain circumstances in making such a claim, we are seeing that even Least Developed Countries are not accepting such an argument and are instead moving ahead with robust action and climate and renewable energy. Thus, using the poor as an excuse not to act seems like it would ring a little hollow coming out of the mouths of countries, communities and individuals that have many more resources than the LDCs and who are much less vulnerable to the climate problem than them. We need to ensure as best as possible that our action on climate and renewable energy does not burden the poor and vulnerable, but it seems problematic to weaken action on behalf of the world's most vulnerable, when they themselves are increasing ambition and have long been demanding more ambitious action from the rest of the global community (Hrala, 2016).

As Simon Caney (2016b) argues in his paper on climate change and non-ideal theory, there are a number of ways that we can respond to the fact that agents are not complying with their fair share of climate responsibilities, including ramping up action to ensure compliance. However, Caney argues and I agree, that the harms of climate change (and I would add of fossil fuels more broadly) are so severe that weakening our climate targets should be one of the last options that we take:

> "Given the magnitude of the harmful impacts of climate change; its impact on the lives of so many people now and in the future; the irreversible nature of its effects on many; the fact that its dire impacts fall in particular on the least advantaged; and, finally, given the availability both of ways of promoting compliance and coping with non-compliance I believe that it is the worst of all the options and we should minimize the extent to which we water down the climatic target" (Caney, 2016b, pp. 39–40)

To conclude, in the last few chapters, I have attempted to provide a range of evidence to show just how grave letting climate change push passed the 1.5°C target would be. Achieving 2°C instead could lead to hundreds of millions more deaths from air pollution alone, in addition to more water pollution, a doubling in warm extremes, increases in both flooding and droughts, increased water scarcity, aridification, increased risks of crop yield losses for key breadbasket areas increased sea level rise and increased risks of nonlinear runaway sea level rise, the virtual disappearance of reefs, lower economic growth, among other impacts. All of these are harms which fall disproportionately on the world's most vulnerable communities who are least responsible for causing climate change. To reemphasize the importance of meeting the 1.5°C target, I end this chapter with the words of Gebru Jember Endalew, the Chair of the Least Developed Countries Group, who in a press release in response to the release of the IPCC Special Report on 1.5°C had the following to say:

> "The report provides concrete scientific evidence that confirms the importance of limiting global warming to 1.5°C as opposed to 2°C. Communities across the world are already experiencing the devastating impacts of 1°C global warming. Each fraction of a degree that global temperatures rise is extremely dangerous… Limiting global temperature increases to 1.5°C means significantly decreased levels of food insecurity, water shortages, destruction of infrastructure, and displacement from sea level rise and other impacts. To the lives and livelihoods of billions, that half a degree is everything…

The science makes clear that there is an urgent need to accelerate the global response to climate change to avoid exceeding the 1.5°C limit. Governments must increase climate action now and submit more ambitious plans for the future. This includes increasing the level of support to developing countries to enable them to develop and lift their people out of poverty without going down a traditional, unsustainable development pathway…

The most important message of this IPCC report is that achieving the 1.5°C is necessary, achievable, and urgent. A safer more prosperous future is possible with immediate action to implement transformative change across societies. There is a need to take advantage of the increasing availability of affordable, renewable and efficient energy solutions, rapidly reduce the use of fossil fuels, with coal phased out by mid-century, preserve and restore forests and soils, promote sustainable agriculture and implement other real climate solutions that together can bring about a zero-carbon economy." (Endalew, 2018)

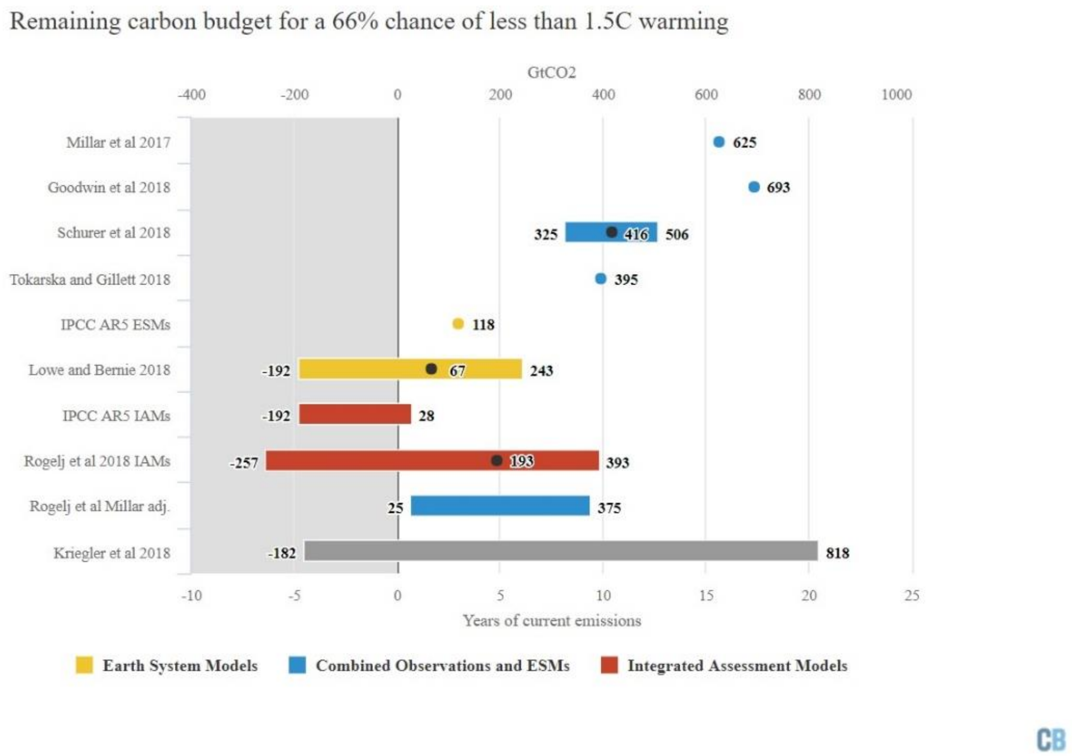
Chapter 11: Radical Realism, Negative Emissions, and Geoengineering

In the previous chapters, I have argued that meeting the 1.5°C is very much in the interests of the global south and those communities marginalized and vulnerable to climate change. Some might object that despite the models showing that we can meet the 1.5°C target, that doing so in practice is not politically feasible. Alternatively, they may argue that it is only feasible by first significantly overshooting the 1.5°C target, then relying on problematic levels of negative emissions/carbon dioxide removal (CDR) technologies which draw greenhouse gases out of the atmosphere in order to bring us back down to somewhere close to 1.5°C. Some might object further that relying heavily on negative emissions may be a cure worse than the disease. In response, I aim to critically examine the notion of what is feasible and argue that whether the 1.5°C target is in fact feasible depends on a combination of factors, some of which are out of our control, such as how sensitive the climate is, and others which are still in our control, such as building political will for change and policy innovation.

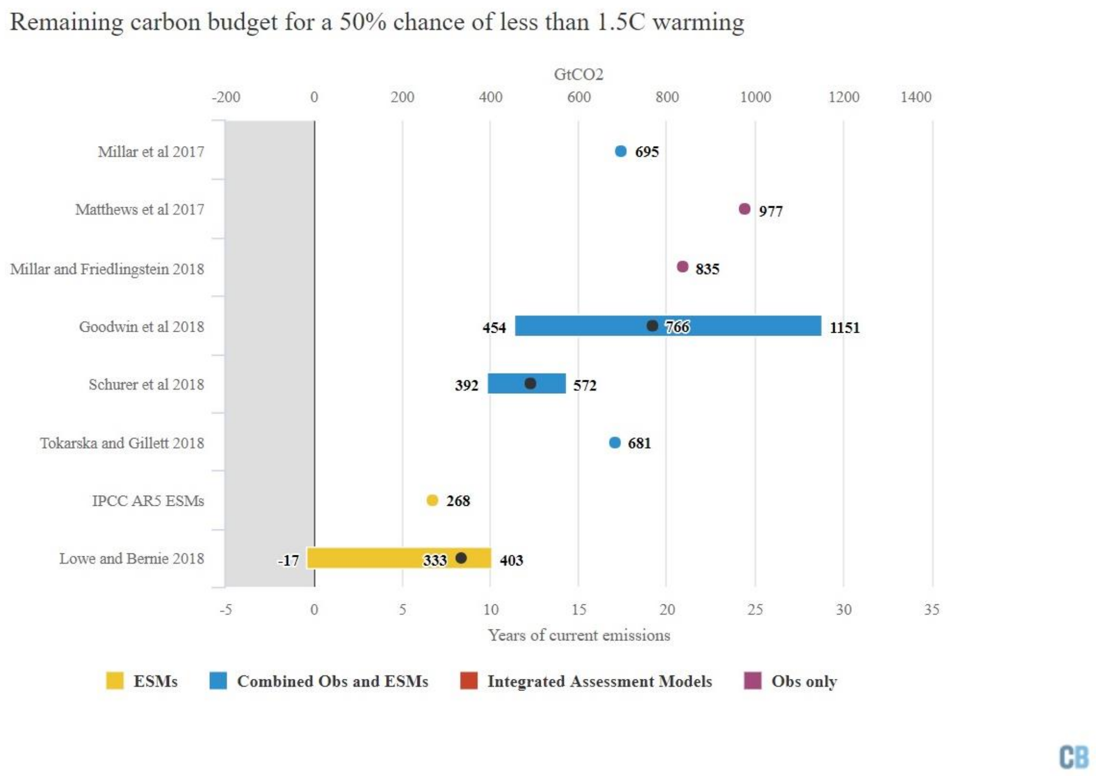
I argue that provided the climate is not highly sensitive to greenhouse gas emissions, it is still feasible to keep warming to 1.5°C with little to relatively small levels of overshoot, such that the negative emissions we will need to rely on can be mostly beneficial negative emissions technologies. However, the slower we are to rapidly reduce our emissions the less chance we have of hitting 1.5°C and/or the more we will have to rely on negative emissions or solar radiation management technologies which are risky, unproven, potentially deeply expensive, and may have harmful effects on the poor. As such, to best ensure we can meet 1.5°C without relying on risky and unproven technologies, our primary objective should be to ramp up ambitious climate action in the short-to-medium term, which provide the stepping stones to ambitious and deep long term decarbonization plans. Of utmost importance is rapidly reducing our dependence on burning fossil fuels as the faster we reduce fossil fuel dependence the less we will have to rely on problematic technologies and interventions to meet 1.5°C.

Getting Lucky or Betting the Farm

Determining whether hitting 1.5°C is feasible is a question sharply delimited by geophysical constraints which determine whether we will be able to act in time. There is one large factor that is out of our control, which may make it such that 1.5°C is already out of reach. That factor is the question of climate sensitivity – which in basic terms is a measure of how much the global average surface temperature warms in response to a given amount of greenhouse gasses in the atmosphere. To see this more clearly we can turn to the work of Hausfather (2018a), who has collated the various different estimates of climate sensitivity and what they mean for our 1.5°C carbon budget in the diagrams below – Hausfather also provides a very useful explanation of why there are such differences between the carbon budget estimates, which I do not have the space to delve into here, but I recommend as further reading for those interested in understanding the difference between the budgets.



Remaining carbon budgets in gigatonnes CO2 (GtCO2) from various studies that limit warming to a 66% chance of staying below 1.5C (see links at end of article), as well as equivalent years of current emissions using data from the Global Carbon Project. Ranges reflect reported budget uncertainties, while points show best-estimates. All studies have been normalised based on observed emissions to show the remaining budget as of January 2018. Integrated assessment models limit warming to well below 1.5C warming in the year 2100, while other approaches avoid any exceedance within the next century. Chart by Carbon Brief using Highcharts.



Remaining carbon budgets in gigatonnes CO2 (GtCO2) from various studies that limit warming to a 50% chance of staying below 1.5C (see links at end of article), as well as equivalent years of current emissions using data from the Global Carbon Project. Ranges reflect reported budget uncertainties, while points show best-estimates. All studies have been normalised based on observed emissions to show the remaining budget as of January 2018. Chart by Carbon Brief using Highcharts.

As the graphs above demonstrate, how much of a carbon budget remains, if any, depends significantly on how high of a chance we want to have of keeping warming to 1.5°C and how sensitive the climate is.[88] If the climate turns out to be highly sensitive, then we may have already blown passed our carbon budget. However, rather than weakening our moral imperative to reduce fossil fuel usage and act on climate, such a reality would arguably increase the urgency of moving away from fossil fuels, for that

[88] The IPCC SR1.5 gives a range of estimates for the carbon budget. "The choice of the measure of global temperature affects the estimated remaining carbon budget. Using global mean surface air temperature, as in AR5, gives an estimate of the remaining carbon budget of 580 GtCO2 for a 50% probability of limiting warming to 1.5°C, and 420 GtCO2 for a 66% probability (medium confidence).14 Alternatively, using GMST gives estimates of 770 and 570 GtCO2, for 50% and 66% probabilities,15 respectively (medium confidence). Uncertainties in the size of these estimated remaining carbon budgets are substantial and depend on several factors. Uncertainties in the climate response to CO2 and non-CO2 emissions contribute ±400 GtCO2 and the level of historic warming contributes ±250 GtCO2 (medium confidence). Potential additional carbon release from future permafrost thawing and methane release from wetlands would reduce budgets by up to 100 GtCO2 over the course of this century and more thereafter (medium confidence). In addition, the level of non-CO2 mitigation in the future could alter the remaining carbon budget by 250 GtCO2 in either direction (medium confidence)" (IPCC, 2018, p. 14).

means that inaction will have even more severe negative impacts than a low climate sensitivity reality. As such, higher climate sensitivity heightens our responsibility to act more rapidly and increases the moral urgency to end the fossil fuel era and act on climate change. However, provided we get somewhat lucky on the climate, we may still have a window of opportunity to keep warming to 1.5°C. Although, even with a low climate sensitivity that window is rapidly closing. Betting on low climate sensitivity though does not seem like an adequately precautionary approach, and as such, arguably if we aim to act with precaution, we should act with more heightened urgency to hedge against the possibility of a high sensitivity future.

Whether we can achieve the 1.5°C target without significantly overshooting the 1.5°C and relying heavily on negative emissions to bring us back down, depends heavily on climate sensitivity as this quote from Kriegler et al (2018, p. 14) highlights:

> "The answer to the question whether it is still possible to limit warming to 1.5°C without overshoot and CDR depends strongly on the remaining 1.5°C budget from 2016 onwards. For a [high sensitivity] 1.5°C CO2 budget up to 550 GtCO2, overshoot will be inevitable; CDR will be required to return to the 1.5°C limit if the limiting cases formulated in our analysis hold. For [medium sensitivity] budgets between 550 and 650 GtCO2, we find CDR trajectories that allow to stay below 1.5°C without overshoot in the steepest FFI CO2 emissions reduction cases. For [low sensitivity] budgets of 650 GtCO2 and higher, the steepest emissions reduction cases are sufficient to limit warming to 1.5°C without CDR deployment....
>
> Limiting warming to 1.5°C is an enormous challenge. To tackle this challenge, every tonne of CO2 that is not emitted into the atmosphere counts. In the scenarios analysed here 200 GtCO2, a third of the CO2 budget in the limiting case, are already used up until 2020. This calls for a parallel approach to strengthen action as quickly as possible and at the same time invest in the development of critical

mitigation options like carbon-neutral liquids and radical energy efficiency measures that will be needed to reach carbon neutrality."

Kriegler et al make it clear that whether we can reach 1.5°C without CDR depends strongly on the size of the remaining carbon budget, and our ability to rapidly reduce emissions. Reinforcing their point, recent studies provide pathways which do allow us to hit 1.5°C without a significant overshoot and drawdown. For instance, Van Vuuren et al (2018) develop a pathway which compared to conventional models includes lifestyle change, additional reduction of non-CO_2 greenhouse gases and more rapid electrification of energy demand based on renewable energy. By including such elements, the pathway significantly reduces the need for CDR, although it does not fully eliminate it. Likewise, a study by Ecofsys modelled a rapid energy system transformation to meet the 1.5°C target which relied on minimal and mostly beneficial negative emissions solutions through afforestation and improvements to agricultural practices (Blok et al., 2018). The study by Grubler et al (2018) also models a future – called the Low Energy Demand (LED) scenario – where warming is limited to 1.5C while many of the world's sustainable development goals are fulfilled, including the goals of zero hunger, good health and wellbeing and affordable and renewable energy for all. Their model entails meeting these goals through interventions that are beneficial not only for the climate but also for overall wellbeing, such as improving energy efficiency, agricultural practices, switching to healthier diets, and reducing deforestation.

The IPCC report shows that in model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO_2 emissions decline by about 45% from 2010 levels by 2030, reaching net zero around 2050. Non-CO_2 emissions in pathways that limit global warming to 1.5°C show deep reductions that are similar to those in pathways limiting warming to 2°C. CO^2 emissions reductions that limit global warming to 1.5°C with no or limited overshoot can involve different portfolios of mitigation measures, striking different balances between lowering energy and resource intensity, rate of decarbonization, and the reliance on carbon dioxide removal. Different portfolios face different implementation challenges and potential synergies and trade-offs with sustainable development (high confidence)… Modelled pathways that limit global warming to 1.5°C with no or limited overshoot involve deep reductions in emissions of methane and black carbon (35% or more of both by 2050 relative to 2010)… Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (high confidence). These systems transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options (medium confidence)" (IPCC, 2018, pp. 15–17)

While such a task may seem daunting, the changes that the IPCC and the reports highlighted here recommend are largely important steps forward in creating a more efficient, socially and ecologically beneficial society and economy. As Nafeez Ahmed (2018) summarizes, "the radical transformation set out by the UN report is not a backward step, but a new pathway to a different kind of prosperity involving fundamental changes in core industries. Construction needs to shift to greater resource efficiency, more use of insulation and the use of low carbon materials; transport should include more electric vehicles, a preference for walking or cycling for short distances, and government investment in sustainable mass transit options; energy requires more energy-efficient appliances, as well as widespread rooftop solar, solar water heaters, and more business and government support for renewables; food should involve reducing dairy and meat consumption, buying local and seasonal products as much as possible, and putting an end to food waste".

Importantly, we have many of the tools needed to get us to 1.5°C with no to little overshoot. The IPCC holds that in 1.5°C pathways with no or limited overshoot, renewables are projected to supply 70–85% of electricity in 2050. Yet as we have explored at several points throughout this dissertation, numerous studies have shown that by 2050 "a global transition to 100% renewable electricity is feasible… and more cost effective than the existing system, which is largely based on fossil fuels and nuclear energy" (Ram et al., 2017). This reality holds even for the poorer regions of the world, including the African continent (Schwerhoff & Sy, 2018). Pursuing a rapid move to a 100% renewable energy system can reduce the need to rely on problematic CDR technologies and help relieve pressure on other harder to decarbonize sectors. However, even in sectors that have been traditionally harder to decarbonize such as heavy industry and transport, industry leaders are charting pathways which can achieve the necessary reductions.

In a recent report aptly titled *Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-Century*, the Energy Transitions Commission (ETC) (2018), outlines pathways to fully decarbonize cement, steel, plastics, trucking, shipping and aviation. The ETC is made of an array of leaders and experts from diverse sectors across society, and they developed the report with contributions from over 200 industry experts over a 6-month consultation process. Together they showed pathways to achieving zero emissions in heavy industry and transport by 2060 – a target consistent with the IPCC's findings that CO^2 emissions from industry need to be 65–90% lower in 2050 relative to 2010 to limit global warming to 1.5°C with no or limited overshoot. What's more the ETC study shows that this goal can be achieved using technologies that already exist or are in development, and which have only a minor impact on the cost of end consumer products. The impacts on economic growth are minimal with the global economy at most 0.5 per cent smaller than it would otherwise have been, a figure which could be reduced to less than 0.3 per cent if we increased the recycling and reuse of industrial materials. And while such cost impacts are relatively minimal, they exclude the immense climate and co-benefits of action. Additionally, with future innovation over the next few decades they could well turn into positive impacts on prices and economic growth. In the words of Adair Turner, chair of the ETC, the findings of their study show that: "The issue is not feasibility, but whether governments, industry and consumers are willing to take the actions required to get there… there are no unmanageable technological, resource or even cost barriers to impede our path to a zero-carbon economy. Still, without strong government intervention and policies we will fail to achieve it… Reaching agreement on many of these policies will of course be difficult. But it should at least be easier if we start with certainty that a zero-carbon economy is both technically feasible and affordable" (Turner, 2018)

Meeting 1.5°C will be challenging, requiring radical changes, but it is feasible, and rather than such changes being a burden, they represent an incredible opportunity, as hitting 1.5°C can be part of embracing a new vision for inclusive and sustainable growth. For example, the New Climate Economy is a project of the Global Commission and the Economy and the Climate. In their latest report, *Unlocking the Inclusive Growth Story of the 21st Century,* they argue that, "We are on the cusp of a new economic era: one where growth is driven by the interaction between rapid technological innovation, sustainable infrastructure investment, and increased resource productivity. This is the only growth story of the 21st century. It will result in efficient, livable cities; low-carbon, smart and resilient infrastructure; and the restoration of degraded lands while protecting valuable forests. We can have growth that is strong, sustainable, balanced, and inclusive" (The New Climate Economy, 2018, p. 8).

If pursued equitably, this vision can benefit those most overlooked and harmed by the current inequitable fossil fuel and resource intensive paradigm. As the previous chapter explored, meeting 1.5°C has many synergies with meeting the Sustainable Development Goals, and trade-offs that do exist can be addressed through redistributive policies. Meeting 1.5°C equitably thus represents one of the greatest opportunities we have to bolster development, ensure long-lasting gains in poverty alleviation, and pursue a more inclusive and sustainable growth model. But the time frame we have to embrace it is short, with the next 10-15 years being a pivotal time where the world is expected to invest about US$90 trillion in infrastructure to 2030, more than the total current stock (The New Climate Economy, 2018). Ensuring that this infrastructure is sustainable will be a critical determinant of future growth and prosperity, and of whether we can meet the 1.5°C target. In the words of the Global Commission on the Economy and Climate: "The growth story of the 21st century will unlock unprecedented opportunities and deliver a strong, sustainable, inclusive global economy. The benefits of climate action are greater than ever before, while the costs of inaction continue to mount. It is time for a decisive shift to a new climate economy."

A Precautionary Approach to Geoengineering

Many of the pathways highlighted above are part of a new generation of models and studies which show that (with some good luck on climate sensitivity) we can meet the 1.5°C target without having to rely on a significant overshoot of 1.5°C and large negative emissions thereafter. However, they are somewhat atypical, for the modelling community have predominately been modelling pathways which entail us significantly overshooting the 1.5°C target and then using rather large amounts of CDR in the second half of the century to bring us back down to 1.5°C (Blok et al., 2018; D. Roberts, 2018a; Shue, 2017). As Dooley and Kartha (2017) detail, while assuming an overshoot and drawdown in emissions is quite widespread even for scenarios of 2°C, it is particularly widespread in scenarios aiming for 1.5°C. Worryingly, as Anderson and Peters (2016) highlight, in many scenarios, the level of negative emissions is comparable in size with the remaining carbon budget, such that if we followed them, we may have to drawdown as much emissions out of the atmosphere as we will emit in the future, a rather Herculean and potentially unfeasible task as we will explore.

As David Roberts (2018a) highlights, the justifications for such widespread modelling of pathways that involve major overshoots and drawdowns are often based on either economic efficiency or the idea that such a pathway is more realistic or politically feasible than expecting us to achieve rapid emissions reductions in the near future. In response, it is worth briefly questioning both such assumptions within the modelling community and showing why it is important that some of the modelling community are breaking from such assumptions and modelling pathways that do not rely on such a significant overshoot. By doing so, we can show why pathways which do their best to reduce emissions in the present and rely less heavily on negative emissions are both ethically preferable and more feasible pathways. Let's begin with the question of whether such pathways are in fact more economically efficient, least cost pathways to meet our targets.

A number of authors have critiqued the assumption within many integrated assessment models (IAM), which claim that least-cost pathways to reach 1.5°C would first exceed the carbon budget significantly and subsequently deploy negative emissions on a large scale in the second half of this century. As Blok et al (2018) highlight, one major reason is that renewable energy has come down much further in price than previously assumed, making it more cost effective to reduce emissions. On the other hand, carbon capture technologies, which are widely applied in overshoot IAMs, have stalled in development and have proved prohibitively expensive. As such, it would arguably be more efficient to deploy low cost renewable energy technologies than to rely on expensive and unproved CCS solutions. There are several studies which add to the case against assuming negative emissions technologies in the second half of the century are the most economically efficient. As Hansen et el (2017) highlight, while some negative emissions measures, such as reforestation and improving soils, have a relatively low cost and produce co-benefits, if we significantly overshoot emissions targets by failing to reduce greenhouse gas emissions enough, we would have to rely on expensive and unproven CCS technologies, and the costs of negative emissions technologies could then equal between $89 and $535 trillion this century, costs that would have to be borne on top of all the other costs of maintaining a fossil fueled pathway.[89] This hardly seems like the most efficient pathway. Rather as Hansen et al highlight, it is a pathway, which "sentences young people to either a massive, implausible clean-up or growing deleterious climate impacts or both" (2017, p. 578). Furthermore, as John Shepherd (2015) highlights, apart from most negative emissions technologies being potentially very expensive and resource intensive, they are also highly speculative, and it is unclear that we have the technical capacity to do them at the scales required if we significantly overshoot our emission trajectories. As such, Henry Shue (2017)

[89] A recent study highlighted how natural climate solutions can also do a lot to make up for the needed emissions reductions/negative emissions: "We examine how much climate mitigation nature can contribute to this goal with a comprehensive analysis of "natural climate solutions" (NCS)... We show that NCS can provide over one-third of the cost-effective climate mitigation needed between now and 2030 to stabilize warming to below 2 °C. Alongside aggressive fossil fuel emissions reductions, NCS offer a powerful set of options for nations to deliver on the Paris Climate Agreement while improving soil productivity, cleaning our air and water, and maintaining biodiversity" (Griscom et al., 2017).

has deemed heavy reliance on negative emissions technologies an unjustified form of wishful "climate dreaming", concluding that "the substitution of the dream of later negative emissions for immediate mitigation is therefore completely unjustified".[90]

Lawrence et al (2018) published a comprehensive study evaluating a range of negative emissions technologies. While acknowledging that "several techniques may eventually have the physical potential to contribute to limiting climate change," the study concludes that "all are in early stages of development, involve substantial uncertainties and risks, and raise ethical and governance dilemmas." The study finds that there is no certainty that any of them could ever scale and concludes that "based on present knowledge, climate geoengineering techniques cannot be relied on to significantly contribute to meeting the Paris Agreement temperature goals." Rather they hold that the "only reliable way to attain a high probability of achieving the Paris Agreement goals requires considerably increasing mitigation efforts" (Lawrence et al., 2018, p. 14). While there is some evidence that come CDR techniques are beginning to become more affordable, we are still very far them being affordable or scalable at a rate that can meaningfully help us meet the Paris Climate Agreements (Ballard, 2018).

The evidence from carbon capture and storage for fossil fuel power plants (CCS-FF) does not provide much hope either. As discussed in Chapter 2, CCS-FF allows fossil fuel power plants to capture their carbon and store it in the ground. Given that this would lower the fossil fuel industry's carbon footprint, there are major incentives for the fossil fuel industry to develop CCS-FF as it would allow for the extension of fossil fuel usage in a low carbon future. However, despite that and despite large investments into research CCS-FF, it has stalled year after year, developing at a rate 100 times slower than what would be needed for it to play a meaningful role in mitigation efforts, according to a study by Haszeldine et al (2018). CCS-FF provides an important precautionary tale against relying heavily on negative emissions to meet our climate targets, as for many years fossil fuel apologists were arguing that CCS-FF would allow us to

[90] A recent expert analysis concluded that many integrated assessment models aimed at limited climate change to below 2°C contained unrealistically optimistic assumptions of the levels of potential biomass energy with carbon capture and storage (N. E. Vaughan et al., 2016).

continue to use fossil fuels into the future, yet the potential for CCS-FF never materialized. A similar logic seems to be occurring more broadly with negative emissions, where we are gambling on negative emissions in the future to allow us to continue to pollute in the present.

Given the risks and uncertainties surrounding negative emissions, scholars have suggested to follow a precautionary approach to relying on negative emissions, where, we rely as little as possible on negative emissions technologies in our planning for the future, apart from where there are social and ecologically beneficial negative emissions solutions currently available such as reforestation, biochar, and better soil management (cf. Anderson & Peters, 2016; Cusack et al., 2014; Holz, 2018). While there might be advances which allow other negative emissions technologies to scale up and become more cost-effective, to gamble on them doing so is to gamble the future of our planet, when we already have the tools needed not to have to make such gamble and to avoid all the other grave harms that come with being locked into a fossil fueled futured (cf. Anderson & Peters, 2016; Holz, 2018).

In addition, if our concern is about addressing the impacts on the poor and vulnerable, then a heavy reliance on negative emissions technologies may be problematic as it may have heavy impacts on just those populations. As Anderson and Peters highlight, negative emissions scenarios often rely quite heavily on Biomass Energy Carbon Capture and Storage (BECCS), which is a future greenhouse gas mitigation technology which produces negative carbon dioxide emissions by combining bioenergy (energy from biomass) use with geologic carbon capture and storage. Henry Shue (2017) provides an overview of the evidence, demonstrating how BECCS is a very water and land-intensive process, which at high levels of use could compete with agricultural needs thus raising the price of food. In the quote below, Holz (2018, p. 11) succinctly summarizes the immense land-use requirements of BECCS in mainstream IAMS that significantly overshoot 1.5°C and then rely primarily on BECCs to bring us back down:

> BECCS' large demand for land has been pegged at about 30–160 million hectares (Mha) per $GtCO_2$, depending on the type of bioenergy feedstock used. This means that land in the order of 600–3,200Mha would be required to achieve the 20 $GtCO_2$ magnitude at the upper end of the range of annual sequestration found in the models. In contrast, current global cropland is approximately 1,500Mha, suggesting that massive-scale BECCS deployment would be in strong land-use competition with land currently used for food production, thus undermining efforts to increase food security and end hunger, or with land that is currently forest or other natural land, thus undermining protection of biodiversity and efforts to stop deforestation, itself a major contributor to climate change

Tied into BECCS' heavy land-use requirements, a recent study warns that heavy reliance on BECCS may threaten our planetary boundaries for freshwater use and lead to further transgression of the planetary boundaries for land-system change, biosphere integrity and biogeochemical flows (Heck, Gerten, Lucht, & Popp, 2018). As such, BECCS may have significantly detrimental impacts on the poor and vulnerable who are typically most impacted by rising food prices, as well as by shortages in water and arable land. Furthermore, as Henry Shue warns, if we are aiming to significantly overshoot 1.5°C and then use BECCS for drawdown, then BECCS will have impacts on agriculture, land and water use at the same time that we will have overshot the 1.5°C target and be facing significant climate impacts. Thus, BECCS would compound some of the harmful impacts on land, water and food that such a rise in temperature would bring.

Given the potential negative impacts of BECCS, Shue warns that "adopting BECCS is gambling on being able to walk a thin tight-rope: take over enough land and water to stabilize climate but not so much land and water as to cause malnutrition. Gambling on 'surgical precision' in public policy is foolhardy", especially if we have to do so in the midst of unprecedented climate impacts. What's more, as Shue warns, by overshooting we push ourselves increasingly into the territory of tipping points in the earth system, which may lead to irreversible changes in the climate, such that we may not be able to bring the climate back from a point of overshoot. Even if we luck out enough that our dangerous gamble of an overshoot does not lead to us pushing past any of the looming tipping points, nonetheless, if the impacts of climate change are severe, Shue warns we may be faced with a Sophie's choice. Either we engage in BECCS at precisely a time when we are reeling from the impacts of climate change and cannot easily afford all the resources needed to engage in negative emissions at the needed scale, such that pushing ahead with BECCS would likely disproportionately place harmful impacts on the poor and vulnerable. Alternatively, we may be in such a dire situation that we may not be able or willing to adopt negative emissions at sufficient scale, thus having to allow climate change to continue unchecked.[91]

Another major worry about BECCS is the amount of energy needed to run it. For instance, Fajardy and Mac Dowell (2018) find that under current technologies, "more energy is used to operate BECCS than what is returned to society". The study identifies ways BECCS might be made more efficient, cheaper, and less energy intensive, but admits that the practical feasibility of those mechanisms is unclear and "the scope for unintended consequences is vast." As Holz (2018) highlights, other proposed non-natural CDR technologies share similar concerns, with direct air capture and enhanced weathering technologies requiring large amounts of energy to run, such that if they are run on fossil fuels they may produce more carbon than they capture. Alternatively, if they are run on renewable energy, they are using up a lot of renewable energy, which might be more effectively used to reduce carbon emissions in other parts of the economy. That's not to say that we should never use energy for such technologies, but until they become more efficient or we have a surplus of renewable energy, their energy use may draw away from other more beneficial uses of renewable energy.

[91] Another worry has to do with potential leakage from negative emissions technologies. Holz et al for instance. "find in some scenarios, storage loss trending to similar values as gross CDR, indicating that gross CDR would have to be maintained simply to offset the storage losses of CO2 sequestered earlier, without any additional net climate benefit." (Holz, Siegel, Johnston, Jones, & Sterman, 2018, p. 1). Such an eventuality would mean we would have to keep negative emissions going just to stay in place.

My brief overview of the difficulties of relying on a significant overshoot and drawdown of emissions should lead us to question whether those who model significant overshoots and drawdowns of emissions can really justify such a pathway on the basis of claiming that it is a more "politically realistic" pathway than reducing emissions now. It seems somewhat politically unrealistic or at least very optimistic to assume that we will be able to muster the resources to draw down almost as much emissions out of the atmosphere as we may be emitting over the next few decades. While renewable energy and climate action now can help ensure more robust development and has significant co-benefits, there is only a very limited amount of negative emissions technologies which also have co-benefits, and many of the speculative technologies would cost a significant amount, are highly uncertain, and have very little co-benefits. Given the expense and risks of negative emissions technologies, and the lack of broader benefits they bring, it is hard to believe that the world would invest such significant amounts in it, particularly if it comes at a time of a rapidly changing climate, which will drain public budgets and put significant strain on society. As such, we may worry that "political realism" may mask the fact that what we are actually doing is protecting current vested interests, who would prefer we pollute not and act later, over the interests of those who'll have to deal with this mess in the future.

The willingness to pass on a mess to future generations is likely compounded by the fact that most economic models assume problematically high discount rates which counts costs in the future as much less than costs now. As Nicholas Stern argues, most economic models of climate change make two flawed assumptions which justify their use of such high discount rates, namely, "that people will be much wealthier in the future and that lives in the future are less important than lives now". As Stern argues, "the former assumption ignores the great risks of severe damage and disruption to livelihoods from climate change. The latter assumption is 'discrimination by date of birth'. It is a value judgement that is rarely scrutinized, difficult to defend and in conflict with most moral codes." (Stern, 2016, p. 408).[92] Indeed, it seems hard

[92] For more on moral arguments against the discount rate see (Gardiner, 2011a; Parfit, 1983).

to justify discounting the future so heavily and leaving them with such a mess and a risky gamble, where they have to try ramp up risky and uncertain negative emissions technologies at the precise time when they are being hit with unprecedented and ravaging climate impacts. Such a legacy seems particularly despicable, given that we have all the tools needed to make a shift now, and to do it in ways that would provide great benefits to both our generation and future generations.

All-in-all claims that models with high levels of emissions overshoot and drawdown are being more politically realistic or economically efficient should be met with great skepticism. While my arguments above argue that we should take caution against relying heavily on negative emissions, it is important to emphasize that there are some potentially beneficial negative emissions solutions. For instance, a recent review paper examined the different ways that carbon could be captured through “natural climate solutions” (NCS) such as conservation, ecosystem restoration and improved land management across global forests, wetlands, grasslands and agricultural landscapes (Griscom et al., 2017). As Hausfather (2018b) highlights in a commentary on the study, NCS could also provide a sizable portion of required emissions reductions to get to 1.5°C and reduce the need for BECCS and other problematic negative emissions technologies. For instance, at a national scale, a team of nearly 40 researchers spent more than two years examining "natural climate solutions" and found that low-tech, low-cost projects to conserve and restore forest, farm and natural lands could cancel out as much as one fifth of the US’ annual emissions (Fargione et al., 2018).

Unlike other riskier and potentially harmful negative emissions solutions, most natural climate solutions can provide significant benefits apart from reducing carbon emissions, such helping improve water filtration, flood protection, soil health and biodiversity habitat as the latest IPCC report highlights (IPCC, 2018). Recognizing this, Cusack et al (2014) argue that while abatement remains the most desirable policy, certain climate engineering strategies, including forest and soil management for carbon sequestration, merit broad-scale application. They argue that other proposed strategies, such as biochar production and geological carbon capture and storage, are rated somewhat lower, but deserve further research and development. They base such a determination on a unique interdisciplinary framework for comparing climate engineering strategies using six criteria: (1) technical potential, (2) cost effectiveness, (3) ecological risk, (4) public acceptance, (5) institutional capacity, and (6) scope of ethical concerns.

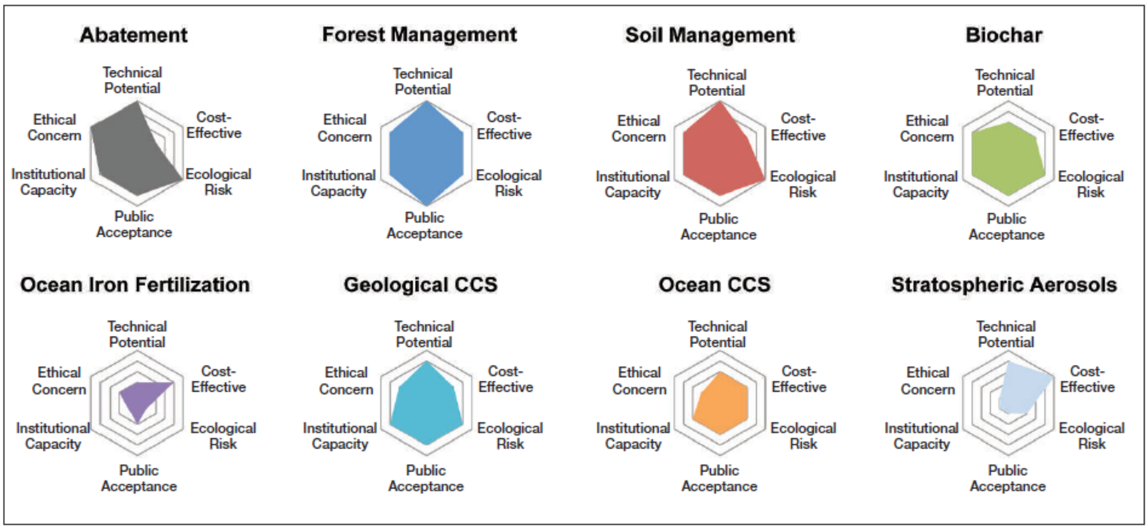


Figure 3. Results from the interdisciplinary analysis of abatement and climate engineering strategies are shown. All six criteria are scaled on radar charts so that a higher value is more likely to be an effective strategy, with abatement and forest and soil management receiving the highest all-around scores. Details on how scores were assessed are available in WebTables 1–3.

Natural climate solutions can be seen to be an important part of our climate arsenal. However, given that our wiggle room on 1.5°C is already incredibly small, if available at all, then it seems we should not use this as an excuse to emit more. Rather, we should use NCS as part of a host of strategies to try and keep warming as best as possible from rising above 1.5°C, or if we cannot avoid that, then from rising too far above 1.5°C. If we do use negative emissions technologies, even the more beneficial NCS kind, it is important that we work towards putting in place ethical governance systems to oversee how we implement negative emissions technologies, especially but not only the riskier versions. As Natalie Jones highlights, evidence from programs such a REDD+ and the Clean Development Mechanism indicate that even seemingly beneficial interventions can sometimes have detrimental impacts on local communities, particularly on indigenous and minority communities. As such, Jones argues, that when it comes to negative emissions we need to work to ensure that we are: "(a) enhancing linkages in implementing the Paris Agreement and the Sustainable Development Goals; (b) mainstreaming human rights, indigenous rights, gender and local communities at all levels of implementation; (c) ensuring participation of affected stakeholders, again at all levels of implementation; and (d) increased discussion of the implications of negative emissions technologies in policy fora" (Jones, 2018, pp. 23–4). Jones' list provides a good, albeit incomplete starting point for thinking about ethical governance. [93]

In sum, while negative emissions can help improve our chances of keeping warming to 1.5°C, relying too heavily on negative emissions may prove deeply costly, and put us at significant risk of not meeting needed climate action given their unproven and speculative nature. A similar line of reasoning applies to the possibility of solar geoengineering or solar radiation management strategies, such as stratospheric aerosol injection (SAI), cirrus cloud thinning (CCT), or marine cloud brightening (MCB). While some claim that solar geoengineering can reduce our need to reduce emissions (Horton & Keith, 2016; Lin, 2017), such a line of reasoning is (for good reason) in the minority with most agreeing that the possibility of solar geoengineering does not reduce the need to aggressively reduce fossil fuel emissions. [94]

There are three main reasons why the possibility of solar geoengineering should not reduce the need to rapidly reduce fossil fuel emissions. Firstly, solar geoengineering is a deeply uncertain, risky, and hard to govern technology, and it is unclear we could get to a point where we would have the requisite certainty about the effects of the technology to be able to ethically justify deploying it (Hulme, 2014; G. A. Lenferna, Tan, Gardiner, & Ackerman, 2017; MacMynowski, Keith, Caldeira, & Shin, 2011; Robock, 2008). Thus, relying on something so uncertain seems to be a huge gamble with the future of our planet. Secondly, as I have argued

[93] Gardiner and Fragniere's (2018) Tollgate Principles for the Governance of geoengineering provides a complimentary set of principles to consider.

[94] For instance, the Subcommittee on Environment and Subcommittee on Energy, had a hearing entitled Geoengineering: Innovation, Research, and Technology. The Chair of the committee, Texas' climate denying, fossil fuel funded Representative Lamar Smith, used the possibility of solar radiation management as a foil against which to argue against climate regulations. Here is an extract from his statement: "While we are not sure this is plausible, some scientists believe it could achieve substantial environmental benefits at a cheaper cost than regulations...Instead of forcing unworkable and costly government mandates on the American people, we should look to technology and innovation to lead the way to address climate change. Geoengineering should be considered when discussing technological advances to protect the environment" (L. Smith, 2017)

elsewhere (G. A. Lenferna, 2017b), even if we do implement solar geoengineering strategies, they serve only to imperfectly mask average surface temperatures, and thus only deal imperfectly with one of the harmful impacts of relying on fossil fuels. They would not however address the myriad other harms and costs of continued fossil fuel use, such as air and water pollution, ocean acidification, increased fuel costs, and more. And those harms and costs, as I detail in chapter one and two, are substantial.

Finally, unless we wanted to run solar geoengineering indefinitely, which would be a deeply risky and expensive exercise, we would need to engage in negative emission technologies before ending solar geoengineering, thus bringing us back to our earlier worry about the uncertain and deeply costly nature of negative emissions technologies. For instance, a recent study examining the effects of deploying a "cocktail" [sic] of geoengineering strategies, suggests that one plausible scenario for solar geoengineering is to implement solar geoengineering coupled with a ramp up of negative emissions technologies (Cao, Duan, Bala, & Caldeira, 2017; Ferreira, 2017). The ramp up in negative emissions could facilitate a ramp down of solar geoengineering, as the emissions that solar geoengineering were deployed to offset are drawn down out of the atmosphere. However, it also means that the more we delay reducing emissions the more expensive and riskier such solar geoengineering strategies would be, as the more we overshoot our carbon budget, the stronger the solar geoengineering strategy would have to be, and the higher the level of associated negative emissions technologies to end them would have to be too.

In sum, neither solar geoengineering nor negative emissions provide a get-out-of-jail free card when it comes to climate change and the broader harms of fossil fuels. The most effective and least risky approach to climate change and ending the fossil fuel era, involves rapidly and deeply reduce fossil fuel emissions now and taking broader actions needed to keep warming to 1.5°C without having to rely on problematic geoengineering technologies. Getting off fossil fuels and rapidly mitigating climate change is the sine qua non of ensuring we stay within our carbon budget and stand a good chance of averting extremely dangerous climate change. In the words of Baatz and Ott, "aggressive mitigation must be part of any pathway to climate justice" (Baatz & Ott, 2016). While certain beneficial forms of negative emissions solutions can be a compliment to mitigation, a properly precautionary approach would not rely heavily on risky and unproven negative emissions technologies or geoengineering interventions.

Radical Realism

As the previous sections have highlighted, there are many prosperous pathways that can allow us to meet the 1.5°C target while pursuing an inclusive growth model that brings significant benefits to the world's most vulnerable and communities that have been left behind and harmfully impacted by our fossil fueled status quo. However, some may still worry that highlighting such pathways is one thing but actually taking the paths is another thing altogether. Technical feasibility does not necessarily equal political feasibility. So, is such a pathway actually politically feasible? To explore the question of feasibility, let us begin with a conception of political feasibility:

> "Political feasibility refers to the collective belief within a domestic political system about the scale and speed of decarbonization that is seen to be desirable and plausible within that society. This is subjective, but also grounded in the material realities of a society (e.g. geography, infrastructure, wealth). What is deemed to be politically feasible also changes over time… Multiple factors may influence political feasibility, such as demonstrations of technical and economic feasibility… support of various civic actors (e.g. politicians, industry, media, citizens), and policy innovation." (Patterson et al., 2018, p. 2)

Examining Patterson et al.'s definition, we can see that we already have a number of factors needed for political feasibility. As I have demonstrated in previous chapters, in terms of the factors that make up political feasibility, we already have demonstrations of technical and economic feasibility of hitting the 1.5°C target under certain carbon budgets. As Project Drawdown (2017), the Wuppertal Institute for Climate Environment and Energy (Kofler et al., 2014), and a range of other studies highlighted through this thesis have shown, we already have most of the technical solutions we need to cut back on fossil fuels, and many of the more difficult solutions, such as energy storage, are in development and the more we roll them out, the more affordable they will become.

The global community collectively also has more than sufficient wealth to be able to enact the transition, given that it currently gives more away to fossil fuel subsidies than would be required to invest in order to hit the 1.5°C, as was highlighted in Chapter 3. Given that it is technically and economically feasible, if we follow Patterson's account of political feasibility, the central question of political feasibility then comes down to whether there will be sufficient policy innovation and support of various civic actors, i.e. it comes down to whether we can muster enough political will to put in place the needed policies and make the requisite social and economic changes to keep us to 1.5°C.

Some might argue that it is impossible to muster the social and political will to ensure a transition at that scale. While the Paris Climate Agreement represented a relative high point in climate politics, even that was not enough, as the emission reduction commitments made under it were too weak and need to be strengthened, as I explored in Chapter 1. Furthermore, a number of subsequent political developments have made matters worse with the election of fossil fuel loving and climate denying leaders in the form of Trump in America, Bolsanaro in Brazil, and Morrison in Australia. It is certainly true that such developments have made the task of reaching 1.5°C harder and may well have put it out of reach depending on how sensitive our climate is and how long the harmful impacts of such elected leaders last. However, they may also provide a rallying point around which the climate justice movement can push for more radical solutions of the scale needed to address climate change. Prior to such leaders coming into place, there was a significant and unjustified complacency when it came to climate change, particularly in the United States, the Obama-complacency if you will. However, with the release of the IPCC report, public attacks on climate action, and clear roadmaps to a decarbonized fossil free future, the climate justice movement has both a sparking point and the needed tools to turn this moment into pivot point to push for the radical change needed.

What's more the sorts of changes needed to implement 1.5°C provide a powerful vision of an inclusive growth paradigm which can combat the fearful vision being sold by fascist authoritarian leaders who resist climate action. It provides a unifying vision of a better world which can draw people together where fascist strongmen try to pull us apart. While some will say it can't be done, that we have lost already, and that climate catastrophe is probably inevitable (cf Haque, 2018), we must be wary of those who paint an avoidable future as unavoidable, and who in doing so may create self-fulfilling prophecies. As Iris Marion Young argues, drawing on Marx and Sartre, one of the processes by which those in power ensure the continuation of their power is through reification, which is the construction of the social pretense that the processes that produced undeserved harm are natural, a matter of bad luck, or otherwise inevitable and therefore unavoidable and unchangeable. Similarly, Professor of Political Science Robin Eckersley argues that narratives of reification, coupled with denial of the harms our actions create and our responsibility to others, "can arguably be far more politically potent in stalling effective action on climate change than the more blatant, and often desperate, propaganda strategies of the organized climate denial movement" (Eckersley, 2016, pp. 353–4). As such we should be wary of the role that claims of inevitability might play in reifying a pathway which may still be avoidable. [95]

In considering whether we can achieve 1.5°C it is useful to turn to civil society responses. For example, an assessment of the challenge of limiting global warming to 1.5°C was put forward

[95] In a comment, Michael Blake argues that when determining feasibility, we need to consider what human beings are really like and whether they are truly amenable or able to undertake the requisite changes needed to pursue such a path. In particular, he refers to John Rawls' idea of the strains of commitment, which holds that when attempting to determine whether we should pursue a particular vision of society, it is important not to take on commitments which strain the abilities of those undertaking them (Freeman, 2016; Rawls, 2001). I hesitate to make a determination of what is within the capacity of humanity. As explored in Chapter 3's discussion of the neoliberal imaginary, philosophers and economists have long put forward characterizations of human nature which did not necessarily reflect any universal truth about humans, but instead reflected particular prejudices they had about humanity. Such ideas may artificially constrain visions of what is possible. Thus, rather than making prognostications on human nature, on this point I defer to civil society leaders, who work together with movements and have a better sense of what the climate justice movement is capable of.

by the Heinrich Boell Foundation (2018). Their comprehensive eight-part dossier brought together the knowledge and experience of “a range of international groups, networks and organizations the Heinrich Böll Foundation has worked with over the past years, who in their political work, research and practice have developed the radical, social and environmental justice-based agendas political change we need across various sectors”. In the words of Barbara Unmüßig, President of the Heinrich Böll Foundation, there research found that “demanding such a transformation is not “naive” or “politically unfeasible.” It is radically realistic. In fact, it is the only way we can achieve social justice while protecting our environment from devastating climate change” (Unmüßig, 2018). Unmüßig added that the IPCC’s move to model 1.5°C pathways which do not rely on problematic geoengineering technologies “represents a move in the direction of the kind of “radical realism” that many civil-society actors have long advocated”. (ibid)

Of course, there are significant vested interests which have long held back action and we should not be complacent about the scale of the task ahead. However, we should be wary of accepting their power as unsurmountable. In the words of Ursula K Le Guin (2014): “We live in capitalism, its power seems inescapable – but then, so did the divine right of kings. Any human power can be resisted and changed by human beings”. Similarly, rather than taking the political power of the fossil fuel industry as inescapable, as Kofler et al highlight, “the success of an energy transformation will depend on whether a broad alliance of civil society, politics, science, and industry develops a convincing alternative and positive narratives – and implements them against resistances (2014, p. 2). Many outcomes in the past have seemed impossible, such as the end of slavery and apartheid, but it was the role of social movements to challenge the reification that made such outcomes seem inevitable and to build a better future in its place. To borrow the words of Elbert Young, “Of course it is Utopian and impossible until it is done. A thousand things which were impossible twenty years ago are so common today as to pass without comment” (Garson, 2016).

1.5°C: The Primary Pathway to Climate Justice

To conclude Part C, as African States, LDCs and Small Island States have long argued, contrary to Moellendorf, the 2°C is not safe, even 1.5°C contains dangerous climate impacts, and we are already seeing dangerous climate change at just a little over 1°C above pre-industrial levels. The unfortunate reality though is that the longer that arguments for the 2°C target hold sway, then the harder it will be to meet the 1.5°C target. The longer we delay, the smaller our window of action gets, and the more aggressive needed action becomes. That window, sadly, is rapidly shutting, with just a few years left to drastically change course (Figueres et al., 2017b). As such, Moellendorf's argument that the 1.5°C target is too expensive to meet, becomes increasingly true the longer we aim for weaker targets, and so in some ways it is becoming an increasingly self-fulfilling prophecy, and one that threatens to harm many of the world's most vulnerable populations, sadly while claiming to act in their interests.

Of course, many of the criticisms levelled at Moellendorf would hold equally and/or much more for those arguing against even the 2°C target. As such among a range of potential opponents, Moellendorf is perhaps a relatively friendly target to be arguing against, and far from the worst player in the climate discussions. Nonetheless, given how Moellendorf wraps his argument in the garb of caring for the poor, I believe it has been an important project to expose how underlying and invisibilized by his argument are significant forms of procedural, distributive, recognitional and epistemic injustices, which serve to marginalize the interests and voices of the global south and global poor who have long argued for 1.5°C. I hope to have demonstrated how epistemic injustice can hold up, support, and justify the interests of the powerful, thus creating broader injustices which harm the poor and marginalized, even in the hands of seemingly well-intentioned people.

Contrary to those who argue that achieving 1.5°C will inhibit development, throughout the past few chapters I have provided a range of evidence to show how we can meet the 1.5°C target while enhancing action on the sustainable development goals. The release of the latest IPCC report makes clear that there are major synergies between climate action and sustainable development. Given the devastating impacts that will fall on the world's poorest and most vulnerable if we push passed 1.5°C, a prioritarian position which aimed to elevate the interests of the poor and vulnerable would push for a just transition in line with the 1.5°C. Central to ensuring such a transition is just, is the need for international cooperation. Apart from ensuring a just transition at home, developed countries have a three-pronged international moral responsibility to rapidly reduce their emissions much more significantly, leave fossil fuels in the ground, and contribute financially and otherwise to help developing and least developed nations both to transition to a renewable energy future and to deal with impacts of the harmful climate change already locked in. Developing countries also have to increase their ambition, but without support from developed countries, such increases in ambition threaten to impose inequitable burdens on them.

International cooperation is just one of the moving parts needed for us to meet the 1.5°C target. The one element which is out of our control is how sensitive the climate is. The uncertainty that we face with the climate should lead us to take a precautionary approach, but not of the sort that Moellendorf advocates where our biggest worry is of a potential economic recession if we pursue 1.5°C – a possibility not well supported by the literature. Rather, because the harms of fossil fuels are immense, and because there are real tipping points in the climate system which could plunge us into climate chaos, a truly precautionary approach would mean we should push for as ambitious action as we can, within ethical constraints, as Lauren Hartzell Nichols advocates.

Another important element of a precautionary approach involves not gambling on the possibility for uncertain and risky geoengineering technologies to save us, whether they are negative emissions technologies or solar radiation management schemes. Solar radiation management technologies are far too uncertain to rely on in any meaningful way. Some natural climate solutions and other negative emissions technologies can play a complimentary role in our attempts to meet 1.5°C but their current applicability is quite limited such that our primary and most urgent task remains to deeply reduce greenhouse gas emissions, so as to not to take huge risks on uncertain and risky technologies which may not materialize, and which could impose significant costs on the world's poorest and vulnerable communities at the same time that deep climate impacts are harming them too.

The pathway that best serves the interests of the poor and vulnerable, and also best ensures a stable climate and prosperous future, is a pathway in line with 1.5°C that does not involve significant overshoot and relies as little as possible on future unproven technologies like carbon capture and storage, negative emissions or solar geoengineering. In the end though, it is important to remember that not only are we off track of that path, we are not even on course to hit 2°C. To get to 1.5°C or 2°C, CO^2 emissions need to be net zero within decades, and we are far from meeting that trajectory. As the UNEP Emissions Gap Report highlights, "there is an urgent need for accelerated short-term action and enhanced longer-term national ambition, if the goals of the Paris Agreement are to remain achievable". Delay is not our friend, for the longer we wait, the more disruptive the changes will have to be, the more we have to rely on expensive, risky and uncertain negative emissions solutions, and/or the worse the harms of climate change and fossil fuels will be.

By the time you read this, unless we have acted rapidly on climate, the window to stay within 1.5°C may well have closed. Even if it has or does close, the importance of knowing that the window was indeed once open is important. We need to know that we could have done otherwise, that pushing passed 1.5°C was not some reified unavoidable scenario. By recognizing this, we pay proper respect to the injustice that pushing passed it might bring, and the compensation owed to those who might suffer because of potential inaction. However, if we do push past the 1.5°C or even the 2°C target, that does not mean we throw in the towel, more than anything it increases the urgency of acting, for every bit of warming above the present levels increases the risks of truly widespread, global civilization undermining, catastrophic climate change. And every bit of warming above 1.5°C or 2°C puts us further into immensely dangerous territory where the risks of dangerous, irreversible, catastrophic, and civilization upending tipping points become much more likely.

While I am writing this though, with a little bit of luck on climate sensitivity, time may still remain to reach the 1.5°C target without having to rely on risky and problematic negative emissions technologies to bring us back down from a significant overshoot, likely at the same time that we are reeling from unprecedented and rapid climate change. As I have tried to make clear throughout this thesis, that window of opportunity is perhaps humanity's greatest moment to create a more prosperous and equitable future if we take hold of it correctly. We have many of the technologies and social solutions we need to avoid 100s of millions of deaths, increased poverty, conflict, and widespread ecological devastation. In its place we can build a much better future which brings energy to all, ends global poverty, and avoids the worst impacts of climate change.

Conclusion: Hopeful Defiance Against the Odds

To conclude, let us first briefly recap the ground we have covered, after which I aim to reflect on how the central argument of this dissertation, which advocates for a just transition to 1.5°C, fits into a context where the world clearly is not doing enough to get anywhere close to meeting that target.

In Part A we established the moral case for why we should transition away from fossil fuels. It argued for a Fossil Free Moral Imperative, which holds that there is a collective moral imperative to transition away from fossil fuels at least in line with the Paris Climate Agreement targets, if not more ambitiously. The first half of the imperative argues that we need to undergo such a transition in order to avoid grave, widespread, unnecessary harm. The second inter-connected half of the Fossil Free Imperative builds on the negative duty to avoid causing unnecessary harm and identifies an additional complimentary positive moral responsibility to create a more prosperous future. In defending the Fossil Free Moral Imperative, I developed a position I called the Great Multigenerational Reward with Some Immediate Costs Camp, which argues that transitioning away from fossil fuels, while it does incur some costs, nonetheless provides great benefits for both the current and future generations. To defend my position, I showed how if we move past greenhouse gas parochialism and outdated and conservative renewable energy analyses, that ending the fossil fuel era may be much more in the interests of the current generation than fossil fuel apologists and Intergenerational Sacrifice camp proponents suggest. I ended by reflecting on how the neo-liberal imaginary compounds the problems of greenhouse gas parochialism and outdated analyses, making it seem like acting is not in our interest by obscuring how a transformation in structures and policies can make acting to end the fossil fuel era more in the interest of individual people, communities and countries.

In Part B, I then established what the moral imperative established in Part A means in terms of individual moral responsibility to take action. I did so by situating our moral responsibility in the context of what I argue is an emergency situation where need to rapidly and comprehensively move away from fossil fuels to avert catastrophic climate change and the immense harms associated with continued fossil fuel dependence. I argued that in the face of this emergency we have a demanding moral responsibility to reduce our own personal emissions but also more importantly to push for comprehensive structural change away from fossil fuels. I developed and defended the Anti-Pollution Principle which holds that we should not use resources, especially limited resources, whose use contributes to the harms of others[96], unless there are sufficiently strong moral reasons for doing so. Appling the APP, I argued that if reducing individual emissions conflicts with the ability to pursue more effective climate action, or other more morally significant endeavors, then such considerations should typically outweigh the responsibility to reduce one's own emissions. While the APP provides a prima facie duty to reduce emissions, given the speed and scale at which we need to reduce emissions to meet the Paris Agreement goals, much broader and sweeping structural changes will be required than individual emission reductions alone can provide for and should be prioritized accordingly. Given this reality, I argue, based on a structural analysis of the fossil fuel economy, that those who understand the nature of the climate crisis and who are able to act, have significant and demanding moral responsibilities to: reduce their own emissions; promote collective action on climate change; transform structures and policies to effectively reduce emissions at the scale and speed required; and overcome vested interests that hold back the needed transition.

Part C then addressed a central objection to the moral imperative to transition away from fossil fuels, namely that it will detrimentally impact the poor and vulnerable. I argued in response to this objection that protecting the interests of the poor and vulnerable is best achieved through a rapid yet just transition away from fossil fuels in line with keeping global warming as close as possible to the Paris Climate Agreement's more stringent target of keeping global to 1.5°C above pre-industrial levels. We should do so, furthermore, while relying as little as possible on risky and uncertain negative emissions and geoengineering technologies in our

[96] The term "others" in the anti-pollution principle can extend both to human and non-human others.

planning for the future, as doing so might prolong the fossil fuel era at grave potential costs to the most vulnerable both in the present and future generations. I began my argument, by providing a critical analysis of Moellendorf's philosophical approach to climate and poverty, showing that his application of his Anti-Poverty Principle may be a self-defeating approach which ironically deepens poverty in the long run. I recommended rejecting Moellendorf's narrow Anti-Poverty Principle in favor of a more comprehensive principled approach which prioritizes poverty alleviation and development more broadly beyond just energy poverty. Such an approach would align with holding warming to 1.5°C.

I then showed how arguments against the 1.5°C target tend to marginalize the voices of the global south and commit four different yet interconnected forms of injustice, namely, procedural, recognitional, distributive and epistemic injustice. I argued contrary to Moellendorf that the 2°C is not supported by "science" as the safe limit for climate change, rather it is a product of politics and power, particularly from actors in the global north who are both more significant polluters than the global south, and who are also less vulnerable to the impacts of climate change. In line with Laruen Hartzell-Nichols, I argue that a truly precautionary approach would adhere at least to the 1.5°C target, and do its utmost to stop climate change as soon as possible within ethical constraints in order to avoid us going further into our already dangerous territory where we risk hitting tipping points on the climate system. However, to ensure this happens equitably, in line with widely accepted principles of common but differentiated responsibility, I outlined a three-pronged international moral responsibility for rich and developed nations to reduce their emissions much more significantly, leave fossil fuels in the ground, and contribute financially and otherwise to support developing and least developed nations both to transition to a renewable energy future and to deal with impacts of the harmful climate change already locked in. In addition, domestically each nation, state and community has a moral obligation to aspire towards a just transition which does not put the burdens of a transition on those who can least afford it, and which does not leave behind workers and those vulnerable to the transition.

Clearly, the sort of action I am calling for in this dissertation would require a pretty radical shift from the current trajectory we are on. Thus, I would like to end by contemplating how the arguments of this dissertation fit into our deeply non-ideal context where the world clearly is not doing enough to get anywhere close to meeting the targets this dissertation defends. Indeed, scientists have suggested that we have a very limited chance of meeting the Paris Climate Agreement targets. In a recent study Raftery et al (2017) use statistical evidence from 1960-2010 to suggest that based on past trends our chances of even keeping warming below 2°C is unlikely. The 1.5°C is even less likely, with "achieving the goal of less than 1.5°C warming will require carbon intensity to decline much faster than in the recent past" (Raftery et al., 2017, p. 637).

Many have likewise concluded from our past inaction that our chances of meeting the Paris Climate Agreements are indeed quite unlikely, a conclusion which has led some to a sense of resignation. If we are to take the study on its face, we may well be justified in feeling resigned. However, we should be wary of concluding from such studies that are chances are indeed unlikely, for as financial advisors constantly warn at the bottom of their financial literature "past performance is not an indicator of future outcomes" (Ro, 2014). We would be wise to adapt such advice into our thinking about whether we can meet the 1.5°C target, and not simply accept that because past evidence shows us not moving fast enough, that therefore we will not move fast enough in the future.

To expand on why we should not take the past as prologue to the future we can look to the roots of such a line of thinking, which arguably dates back to the Ancient Greek skeptic Sextus Empircus in 200 B.C. and had its most famous defense by the 18th century Scottish philosopher David Hume (Weintraub, 1995). Hume critiqued how scientific thinking typically relied on observations of the past in order to make inference about the future (Hume, 1978). The problem is whether we can safely and with certainty assume that the future will be the same as the past. Just because things have been a certain way in the past, does not guarantee that is how they will always be, and so there is room for some doubt. This problem has come to be known as the problem of induction.

We can think of the problem of induction in two different ways, one in terms of the problem of generalizing about the properties of a class of objects based on having observed a number of instances of that object. The famous example is that just because all swans I have seen before are white, therefore, all swans must be white. The eventual discovery of black swans shows the problem with such inferences, as the future may not always resemble the past. Similarly, but more profoundly skeptical, we can question whether the laws of nature themselves are constant, for just because the laws of nature may seem to have held constant in the past according to our observations, does not guarantee that they will behave the same way in the future. To assume that they do is to assume what David Hume called the principle of the uniformity of nature, which holds that the course of nature continues uniformly the same as in the past, but the only reason to accept that it will continue uniformly is because it has in the past, which is no guarantee that it will in the future.

Fortunately, we do not have to become deep sceptics and question whether the laws of nature themselves will hold constant in order to hold out hope that we might meet the 1.5°C target. Rather, we just need the level of skepticism that recognizes that just because we have failed to adequately act on climate change and ending the fossil fuel era in the past does not mean that we will not do so in the future. Past inaction and previous trends do not guarantee that we will act as such in the future. Indeed, there are many good reasons why we should not make such an assumption in this case, and why we should hold Raftery et al.'s conclusion that meeting the Paris Climate Agreement targets is unlikely with a significant amount of skepticism.

The first thing to note is that they used fifty years of data beginning in 1960 and ending in 2010. Their data arguably leaves out some of the most important developments on the climate and energy front, for the years since 2010 have seen a remarkable outperformance of renewable energy. Way ahead of expectations we have seen the crossing of tipping points where renewable energy has become cheaper than fossil fuels in many parts of the world, as detailed in chapters 2 and 10. Since and before 2010, renewable energy has consistently beaten expectations of future performance based on past predictions.

Energy models that look to the past have consistently and dramatically underestimated the speed and extent which renewable energy can both scale up and lower costs. A study that came out in *Nature Energy* attempted to correct the underestimations in energy modelling for solar PV. It shows that thanks to the incredible advances in renewable energy, if solar PV continues to grow as it has historically and then eventually hits a floor in how much its price can drop due to learning curves, solar PV alone, just one solar technology, could be on track to make up half of global energy by 2050 (Creutzig et al., 2017). That is huge because most scenarios that model how we might meet the goal of staying well below 2°C assume solar PV only makes up a meagre 5-17% by then.

Similarly, looking at wind power, research from the National Renewable Energy Laboratory demonstrates that with innovations in the pipeline, wind power prices could drop by an additional 50% by 2030 (Laurie, 2017). This is remarkable, as wind power already provides power at a cheaper price than coal in much of the world, and even provides power at a comparable or cheaper price than natural gas in the United States where natural gas prices are much cheaper than the rest of the world. As David Roberts highlights in commenting on these two reports:

> It's a little odd. Both of these reports offer forecasts that are wildly optimistic relative to the mainstream modelling community, but it's not because they predict wind and solar are going to have some unprecedented explosion. They simply predict that wind and solar are going to *keep doing what they're doing* — keep scaling up, keep improving, keep getting cheaper — at roughly the same rate they have been. If that happens, solar PV could provide 30 to 50 percent of global power. If that happens, wind power could be 50 percent cheaper by 2030. If those things happen, if the status quo continues, it will amount to a renewable energy revolution (D. Roberts, 2017a).

Recent trends in renewable energy are certainly outperforming what many had predicted. So much so that a recent study by two energy engineers, highlighted in Chapter 3, showed that despite all the roadblocks renewable energy faces from entrenched interests, it is still getting out ahead of fossil fuels, such that if renewable energy continues growing at current rates it could put the *entire* world on track "to reach 100% renewable electricity by 2032" (Blakers & Stocks, 2018). The only thing holding us back from this, they argued, would be politics…

Fortunately, technology is not the only revolution that can dramatically shift us away from past trends and onto a different future. Social movements have historically shifted what was taken to be inevitable by disrupting the powers that be and setting society on a dramatically different course. The Paris Climate Agreement marked an incredible milestone on the global diplomatic front, a universal agreement unlike any before it. While the lack of ambitious action to fulfil its agreed upon targets and the actions of fossil fuel despots like Trump certainly reveals the weakness of the Paris Agreement, the agreement has nonetheless put a marker in the sand for us, a direction of travel we can point to. And with that marker to point to, civil society across the globe is growing in power as it challenges the hold of the fossil fuel industry on our politics.

The fossil fuel divestment movement represents one part of a broader more powerful climate and environmental justice movement that is aiming to shift what we conceive to be politically possible and bring the fossil fuel era to an end. While it is difficult to predict the outcomes of such social movements, and whether they would be successful, it does not take a social movement historian to know that many movements have been told that what they are asking for is impossible. Together, the power of a growing global climate justice movement and the incredible transformations in renewable energy mean that the future we have ahead of us can be radically different to what we have seen in the past.

While the fossil fuel industry may seem all powerful, cracks in its armor are already beginning to show. In the space of just a few years from 2010-14, the U.S. coal industry lost 90% of its value, saw widespread bankruptcies and virtually collapsed, thanks primarily to the rise of alternative cheaper energy sources along with increased energy efficiency and environmental and worker safety regulations (Gottesdiener, 2015; Houser, Bordoff, & Marsters, 2017). Then in 2014, the oil and gas industry saw what is arguably a taste of a future defined by stranded assets, when lower demand for their product driven by the growth of renewables and energy efficiency, among other factors, led to a vast wipe out of value across the oil and gas sector (Cunningham, 2016). These recent occurrences point to how a confluence of a rapidly shifting technological environment, increasing regulation, and the growing loss of the fossil fuel industry's social license lays the ground for radical and disruptive shifts. The last thing the fossil fuel industry wants us to know is that it is vulnerable and replaceable, but it is, and we must act on that realization while ensuring we do not leave behind workers and others who will be negatively impacted by the transition away from fossil fuels.

Thus, in sum, we should be appropriately skeptical of studies that tell us, based on data from 1960-2010, that meeting the Paris Climate Agreement targets is unlikely. Of course, we must not be overly optimistic and assume it can be easily done. This is not a message about simply holding out hope. Rather it is a message that we need to be defiant if we are to keep hope alive. Past inaction does not guarantee us to future inaction but neither does it guarantee we will succeed. Rather, with the incredible developments in renewable energy, and the emergence of a powerful climate justice movement, we have the potential, if we can grasp it, to shift the world dramatically from the path it is on.

My penultimate reflection will be on a line from Shakespeare's *The Tempest*. In the play, before Antonio and Sebastien are about to commit a murder, Antonio turns to Sebastien and proclaims: "(And by that destiny) to perform an act, Whereof what's past is prologue; what to come, In yours and my discharge." In saying that "what's past is prologue", Antonio is suggesting that all that has happened before that time, has led Sebastian and himself to this opportunity to do what they are about to do: commit murder, or make another choice. There is an ambiguity in saying that past is prologue, insofar as it is not clear whether it means that the past destines the protagonists to commit murder and that they have no other choice, or whether on the other hand it means that the past does not determine their future and instead the choice is still up to them.

Similarly, some will tell us that our past inactions may condemn us to climate chaos, that we are locked onto a path we cannot escape. However, we must question whether such proclamations are serving to create self-fulfilling prophecies which condemns us to a perilous fate which can still be avoided if only we were to collectively rise to the occasion. Our destiny is not preordained, and rather than giving in to those who may prematurely resign our fate to climate chaos, defiant hope and moral conscience calls on us to rise to meet this historic turning point in history. Against the odds, we are called on to act bravely in the closing window of time we have left to create a much better world for present and future generations, and especially for the poor and vulnerable, rather than resigning to the ravages we will face by staying locked in to a fossil fueled future. We are called upon to equitably and rapidly end the fossil fuel era.

To end, I would like to borrow the words of Nelson Mandela, who once called upon a generation to end poverty, a call which has renewed meaning in the climate context given the deep interconnections between acting on climate, alleviating poverty and ensuring development and prosperity. May his words help inspire us to rise up and have moral courage during this momentous point in history, where our actions may determine the fate of the planet and of numerous generations to come.

"Sometimes it falls upon a generation to be great. You can be that great generation... Let your greatness blossom. Of course, the task will not be easy. But not to do this would be a crime against humanity, against which I ask all humanity now to rise up" – Nelson Mandela.[97]

[97] Quoted in (G. A. Lenferna, 2013) which is an essay on Mandela's legacy for the climate movement.

Bibliography:

ABC News. (2015, May 11). UWA cancels contract for Consensus Centre involving controversial academic Bjorn Lomborg. *ABC News*. Retrieved from http://www.abc.net.au/news/2015-05-08/bjorn-lomborg-uwa-consensus-centre-contract-cancelled/6456708

Abeysinghe, A., & Huq, S. (2016). Climate Justice for LDCs through Global Decisions. In D. Roser & C. Heyward (Eds.), *Climate Justice in a Non-Ideal World* (pp. 189–207). Oxford: Oxford University Press.

Africa Progress Panel. (2011). *Transforming Africa's Development: Path What Durban Needs to Deliver*. Retrieved from http://www.africaprogresspanel.org/wp-content/uploads/2013/05/2011_POLICY_BRIEF_Durban_Transforming_Africas_Development_Path_ENG_HR.pdf

Ahmed, N. (2014). Nasa-funded study: industrial civilisation headed for "irreversible collapse"? Retrieved from http://www.theguardian.com/environment/earth-insight/2014/mar/14/nasa-civilisation-irreversible-collapse-study-scientists

Ahmed, N. (2018, October 15). The UN's Devastating Climate Change Report Was Too Optimistic. *Motherboard*. Retrieved from https://motherboard.vice.com/en_us/article/43e8yp/the-uns-devastating-climate-change-report-was-too-optimistic

Allen, M. R. (2013, June 25). Climate change: let's bury the CO2 problem. *The Guardian*. Retrieved from https://www.theguardian.com/commentisfree/2013/jun/05/bury-co2-problem-capture-store-carbon

Alvaredo, F., Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2018). *World Inequality Report*. Retrieved from http://wir2018.wid.world/

Anderson, K., & Bows, A. (2011). Beyond 'dangerous' climate change: emission scenarios for a new world. *Philosophical Transactions of the Royal Society A*, *369*, 20–44.

Anderson, K., & Peters, G. (2016). The trouble with negative emissions. *Science*, *354*(6309), 182–184.

Ansar, A., Caldecott, B., & Tilbury, J. (2013). *Stranded assets and the fossil fuel divestment campaign : what does divestment mean for the valuation of fossil fuel assets ?* Oxford. Retrieved from http://www.bsg.ox.ac.uk/stranded-assets-and-fossil-fuel-divestment-campaign-what-does-divestment-mean-valuation-fossil-fuel

Arbib, J., & Seba, T. (2017). *Rethinking Transportation 2020-2030: The Disruption of Transportation and the Collapse of the Internal-Combustion Vehicle and Oil Industries*. Retrieved from https://www.rethinkx.com/transportation

Archer, D. (2005). Fate of fossil fuel CO 2 in geologic time. *Journal of Geophysical Research*, *110*(C9), C09S05. https://doi.org/10.1029/2004JC002625

Aristotle. (1953). *Nicomachean Ethics* (trans. J.). Harmondsworth: Penguin.

Ash, K. (2015, July 9). President Obama announces new renewable energy targets, but we can and must do more. *Greenpeace International*. Retrieved from https://www.greenpeace.org/archive-international/en/news/Blogs/makingwaves/President-Obama-renewable-energy-climate-legacy/blog/53473/

Atkin, E. (2017, November 9). Trump to World: Fossil Fuels Are Good for You. *New Republic*. Retrieved from https://newrepublic.com/article/145667/trump-world-fossil-fuels-good

Aufrecht, M. (2011). Climate Change and Structural Emissions: Moral Obligations at the Individual Level. *International Journal of Applied Philosophy*, *25*(2), 201–213.

Ayling, J. (2017). A Contest for Legitimacy: The Divestment Movement and the Fossil Fuel Industry. *Law and Policy*, (Accepted Article). Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/lapo.12087/abstract

Baatz, C., & Ott, K. (2016). Why Aggressive Mitigation Must Be Part of Any Pathway to Climate Justice. In C. J. Preston (Ed.), *Climate Justice and Geoengineering*. Rowman & Littlefield.

Bade, G. (2018, October 25). Even in Indiana, new renewables are cheaper than existing coal plants. *Utility Dive*. Retrieved from https://www.utilitydive.com/news/even-in-indiana-new-renewables-are-cheaper-than-existing-coal-plants/540242/

Bajak, A. (2016, September 12). Oil and Water. *Undark*. Retrieved from https://undark.org/article/oil-pipeline-safety-dakota-access-standing-rock/

Ballard, B. (2018, November 19). Carbon-removal projects could turn back the clock on climate change. *The New Economy*. Retrieved from https://www.theneweconomy.com/energy/carbon-removal-projects-could-turn-back-the-clock-on-climate-change

Banerjee, N. (2015, December 22). Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too. *Inside Climate News*. Retrieved from http://insideclimatenews.org/news/22122015/exxon-mobil-oil-industry-peers-knew-about-climate-change-dangers-1970s-american-petroleum-institute-api-shell-chevron-texaco

Banerjee, N. (2017, December 22). How Big Oil Lost Control of Its Climate Misinformation Machine. *Inside Climate News*. Retrieved from https://insideclimatenews.org/news/22122017/big-oil-heartland-climate-science-misinformation-campaign-koch-api-trump-infographic

Battershill, C. (2016, July 28). Dear Leonardo DiCaprio, Are You Saving The World With SUVs, Private Jets And Yachts? *Huffington Post Blog*. Retrieved from https://www.huffingtonpost.ca/cody-battershill/leonardo-dicaprio-environmentalism_b_11233588.html

Battistoni, A. (2017). Within and Against Capitalism. *Jacobin*, 9–10. Retrieved from https://jacobinmag.com/2017/08/within-and-against-capitalism

BBC. (2017). Blue Planet II. United Kingdom: British Broadcasting Commission. Retrieved from http://www.bbcearth.com/blueplanet2/

Betts, R. A., Alfieri, L., Caesar, J., Feyen, L., Gohar, L., Koutroulis, A., … Wyser, K. (2018). Changes in climate extremes, freshwater availability and vulnerability to food insecurity projected at 1.5°C and 2°C globalwarming with a higher-resolution global climate model. *Phil. Trans. R. Soc. A*, *376*(20160452.). Retrieved from http://dx.doi.org/10.1098/rsta.2016.0452

Birch, K. (2017, November 2). What exactly is neoliberalism? *The Conversation*. Retrieved from https://theconversation.com/what-exactly-is-neoliberalism-84755

Blakers, A., & Stocks, M. (2018, April 5). Solar PV and wind are on track to replace all coal, oil and gas within two decades. *The Conversation*.

Blok, K., Exter, P. van, & Terlouw, W. (2018). *Energy transition within 1.5°C" A disruptive approach to 100% decarbonisation of the global energy system by 2050*. Utrecht. Retrieved from https://www.ecofys.com/files/files/ecofys-a-navigant-company-2018-energy-transition-within-1.5c.pdf

Bond, P. (2011). Politics of Climate Justice: Paralysis Above, Movement Below. Jinju.

Bonfiglio, M. (2017). *From the Ashes*. U.S.A.: National Geographic Channel. Retrieved from https://www.fromtheashesfilm.com/

Booth, C. (2012). Bystanding and climate change. *Environmental Values*, *21*(4), 397–416. https://doi.org/10.3197/096327112X13466893627987

Borenstein, S. (2011, November 5). Greenhouse emissions exceed worst case scenario. *Sydney Morning Herald*. Retrieved from https://www.smh.com.au/environment/climate-change/greenhouse-emissions-exceed-worst-case-scenario-20111104-1mzzh.html

Bradshaw, S. (2015). *Powering up against Poverty*. Retrieved from https://www.academia.edu/14544545/Powering_up_against_poverty_Why_renewable_energy_is_the_future

Bradshaw, S. (2017). *More coal equals more poverty: Transforming our world through renewable energy*. Retrieved from https://www.oxfam.org.au/wp-content/uploads/2017/05/More-Coal-Equals-More-Poverty.pdf

Brannen, P. (2017, July 9). When Life on Earth Was Nearly Extinguished. *The New York Times*. Retrieved from https://www.nytimes.com/2017/07/29/opinion/sunday/when-life-on-earth-was-nearly-extinguished.html?_r=0

Bratman, E., Brunette, K., Shelly, D. C., & Nicholson, S. (2016). Justice is the goal: divestment as climate change resistance. *Journal of Environmental Studies and Sciences*, *6*(4), 677–690. https://doi.org/10.1007/s13412-016-0377-6

Broome, J. (2012). *Climate Matters: Ethics in a Warming World*. New York: Norton.

Brown, L. R. (2009). *Plan B 4.0*. New York: Earth Policy Institute. Retrieved from http://www.earth-policy.org/images/uploads/book_files/pb4book.pdf

Brown, P. T., & Caldeira, K. (2017). Greater future global warming inferred from Earth's recent energy budget. *Nature*, *552*(7683), 45–50. https://doi.org/10.1038/nature24672

Brownlee, K. (2017). Civil Disobedience. In *Stanford Encyclopedia of Philosophy*. Edward N. Zalta (ed.). Retrieved from https://plato.stanford.edu/archives/fall2017/entries/civil-disobedience/

Brulle, R. J. (2014). Institutionalizing delay: foundation funding and the creation of U.S. climate change counter-movement organizations. *Climatic Change*, *122*(4), 681–694. https://doi.org/10.1007/s10584-013-1018-7

Brulle, R. J. (2018). The climate lobby: a sectoral analysis of lobbying spending on climate change in the USA, 2000 to 2016. *Climatic Change*, *149*, 289–303.

Buchanan, A. (2002). Social Moral Epistemology. *Social Philosophy & Policy*, *19*, 126–152.

Buckley, T. (2018, June 26). India is bringing the coal era to an end. *Asia Times*. Retrieved from 2018

Bullard, R. D. (1993). The Threat of Environmental Racism. *Natural Resources & Environment*, *3*(Winter), 23–26, 55–56.

Burke, M. B., Miguel, E., Satyanath, S., Dykema, J. a, & Lobell, D. B. (2009). Warming increases the risk of civil war in Africa. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(49), 20670–4. https://doi.org/10.1073/pnas.0907998106

Burke, M., Davis, M., & Diffenbaugh, N. S. (2018). Large potential reduction in economic damages under UN mitigation targets. *Nature*, *557*, 549–553. https://doi.org/10.1038/s41586-018-0071-9

Burkhardt, P. (2018, February 2). Revealed! How Brian Molefe sabotaged SA's world-class renewables industry. *BizNews*.

Business Leader. (2018, March 25). Good news about renewables: but the heat is still on to cut fossil fuel use. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2018/mar/25/renewables-good-news-heat-on-cut-fossil-fuel-use

Byers, E., Gidden, M., Leclere, D., Balkovic, J., Burek, P., Ebi, K., … Keywan Riahi. (2018). Global exposure and vulnerability to multi-sector climate change hotspots. *Environmental Research Letters*. https://doi.org/https://doi.org/10.1088/1748-9326/aabf45

Caldeira, K. (2018). How much ice is melted by each carbon dioxide emission? Retrieved March 24, 2018, from https://kencaldeira.wordpress.com/2018/03/24/how-much-ice-is-melted-by-each-carbon-dioxide-emission/

Calitz, J., Mushwana, C., & Bischof-Niemz, T. (2015). *Financial benefits of renewables in South Africa in 2015: Actual diesel- and coal-fuel savings and avoided "unserved energy" from the first operational 1.8 GW of wind and PV projects in a constrained South African power system*. Retrieved from http://www.csir.co.za/media_releases/docs/Financial benefits of Wind and PV 2015.pdf

Campbell, R. (2014). *All Talk, No Action: the Coal Industry and Energy Poverty*. Retrieved from http://www.tai.org.au/content/all-talk-no-action-coal-industry-and-energy-poverty

Caney, S. (n.d.). The Right to Resist Global Injustice. In T. Brooks (Ed.), *The Oxford Handbook of Global Justice* (Forthcomin). Not to be cited officially. Check for update. Retrieved from https://www.academia.edu/32064407/The_Right_to_Resist_Global_Injustice

Caney, S. (2009). Climate Change, Human Rights, and Moral Thresholds. In S. Humphreys (Ed.), *Human Rights and Climate Change* (pp. 69–90). Cambridge: Cambridge University Press.

Caney, S. (2014). Two Kinds of Climate Justice: Avoiding Harm and Sharing Burdens. *The Journal of Political Philosophy*, *22*(2), 125–149. https://doi.org/10.1002/9781119110132.ch3

Caney, S. (2016a). *Climate change, equity, and stranded assets*. Oxfam America Research Backgrounder series. Retrieved from http://www.oxfamamerica.org/explore

Caney, S. (2016b). Climate Change and Non-Ideal Theory: Six Ways of Responding to Non-Compliance`. In D. Roser & C. Heyward (Eds.), *Climate Justice in a Non-Ideal World* (pp. 21–42). Oxford: Oxford University Press.

Caney, S., & Bell, D. (n.d.). *Global Justice and Climate Change*. Oxford University Press. Retrieved from https://simoncaney.weebly.com/global-justice-and-climate-change.html

Cao, L., Duan, L., Bala, G., & Caldeira, K. (2017). Simultaneous stabilization of global temperature and precipitation through cocktail geoengineering. *Geophysical Research Letters*, *44*(14), 7429–7437.

Carrington, D. (2017, February 25). Electric cars "will be cheaper than conventional vehicles by 2022." *The Guardian*. Retrieved from https://www.theguardian.com/environment/2016/feb/25/electric-cars-will-be-cheaper-than-conventional-vehicles-by-2022

Center for International Environmental Law. (2018). *Fossils, Plastics, & Petrochemical Feedstocks*. Retrieved from https://www.ciel.org/wp-content/uploads/2017/09/Fueling-Plastics-Fossils-Plastics-Petrochemical-Feedstocks.pdf

Chandler, D. L. (2017, October 11). Will metal supplies limit battery expansion? *MIT News*. Retrieved from http://news.mit.edu/2017/will-metal-supplies-limit-battery-expansion-1011

Chapman, B. (2017, October 27). BP and Shell planning for catastrophic 5°C global warming despite publicly backing Paris climate agreement. *The Independent*. Retrieved from https://www.independent.co.uk/news/business/news/bp-shell-oil-global-warming-5-degree-paris-climate-agreement-fossil-fuels-temperature-rise-a8022511.html

Chenoweth, E. (2017). It may only take 3.5% of the population to topple a dictator – with civil resistance. *The Guardian*. Retrieved from https://www.theguardian.com/commentisfree/2017/feb/01/worried-american-democracy-study-activist-techniques

Chenoweth, E., & Stephan, M. J. (2012). *Why Civil Resistance Works: The Strategic Logic of Nonviolent Conflict*. Columbia University Press.

Cherry, M. (2016). Meena Krishnamurthy on Political Distrust. Unmute Podcast. Retrieved from http://www.unmutepodcast.co/season-2/212016/episode-013-meena-krishnamurthy-on-political-distrust

Chibvongodze, D. T. (2016). Ubuntu is Not Only about the Human! An Analysis of the Role of African

Philosophy and Ethics in Environment Management. *Journal of Human Ecology*, *53*(2), 157–166. https://doi.org/10.1080/09709274.2016.11906968

Chomsky, N. (2013). *Power Systems: Conversations on Global Democratic Uprisings and the New Challenges to U.S. Empire* (Interviews). New York: Metropolitan Books.

Cilento, C. (2015, December 10). "1.5 to Stay Alive": When to Stop the Warming? *Huffington Post*. Retrieved from https://www.huffingtonpost.com/christina-cilento/15-to-stay-alive-when-to-_b_8763376.html

Citi. (2014). *Energy 2020: The Revolution Will Not Be Televised as Disruptors Multiply*. Retrieved from http://tecsol.blogs.com/files/citi--rapport-énergie-08-14.pdf

Clements, M., Coady, D., & Fabrizio, M. (2013). Energy Subsidy Reform: Lessons and Implications. *International Monetary Fund*, (iii), 68. https://doi.org/http://dx.doi.org/10.5089/9781475558111.071

Cleveland, C. J. (2015, March 2). Why Divest? The Substantial Harm of Fossil Fuels. *Energy in Context*. Retrieved from http://energyincontext.com/2015/03/why-divest-the-substantial-harm-of-fossil-fuels/

Cleveland, C. J., & Reibstein, R. (2015). *The Path to Fossil Fuel Divestment for Universities: Climate Responsible Investment*. Boston, MA.

Climate Action Network. (2018, April 27). 7 European Countries Step Up Fight Against Climate Change, Call For Higher Ambition By EU Countries. *Clean Technica*. Retrieved from https://cleantechnica.com/2018/04/27/7-european-countries-step-up-fight-against-climate-change-call-for-higher-ambition-by-eu-countries/

Climate Action Tracker. (2016, November). Effect of current pledges and policies on global temperature. Retrieved from http://climateactiontracker.org/global.html

Climate Action Tracker. (2017). *Foot Off the Gas: Increased Reliance on Natural Gas in the Power Sector Risks an Emissions Lock-in. CAT Decarbonisation Series*. Retrieved from http://climateactiontracker.org/assets/publications/briefing_papers/CAT-2017-06-16-DecarbonisationSeries-NaturalGas.pdf

Climate Action Tracker. (2018). Countries. Retrieved December 12, 2018, from https://climateactiontracker.org/countries/#

Comberti, C., Thornton, T. F., & Korodimou, M. (2016). *Addressing Indigenous Peopless Marginalisation at International Climate Negotiations: Adaptation and Resilience at the Margins*. https://doi.org/10.2139/ssrn.2870412

Committee on Climate Change. (2018). *Biomass in a low-carbon economy*. Retrieved from https://www.theccc.org.uk/wp-content/uploads/2018/11/Biomass-in-a-low-carbon-economy-CCC-2018.pdf

Connolly, L., Rosa, L. Di, Elivo, R., Francis, T., Griep, C., Ito, C., & Palmier, M. (2017). *The Carbon Underground 2017: Managing Energy Transition Risk in Investment Portfolios*. Retrieved from http://fossilfreeindexes.com/research/the-carbon-underground/

Connor, S. (2015, April 21). Global warming: Scientists say temperatures could rise by 6C by 2100 and call for action ahead of UN meeting in Paris. *The Independent*. Retrieved from https://www.independent.co.uk/environment/climate-change/global-warming-experts-say-temperatures-could-rise-by-6c-by-2100-with-cataclysmic-results-10193506.html

Conway, E. M., & Oreskes, N. (2010). *Merchants of Doubt*. New York: Bloomsbury Press.

Coplan, K. S. (2016). Fossil Fuel Abolition: Legal and Social Issues. *Columbia Journal of Environmental Law*, *41*(2), 223–312.

Coronel, B., Dayaneni, G., Hayakawa, J. G.-B. S., Henson, C., Jones, H., Mascarenhas-Swan, M., …

Network, D. S. (2016). *Reinvestment Toolkit*. Retrieved from https://d3n8a8pro7vhmx.cloudfront.net/themes/550a18732213934e51000001/attachments/original/1463103231/ToolkitForPriorityCampaigns.pdf

Creutzig, F., Agoston, P., Goldschmidt, J. C., Luderer, G., Nemet, G., & Pietzcker, R. C. (2017). The underestimated potential of solar energy to mitigate climate change, (August). https://doi.org/10.1038/nenergy.2017.140

Cripps, E. (2013). *Climate Change and the Moral Agent: Individual Duties in an Interdependent World*. Oxford University Press.

CSO Review. (2016). *Setting the path towards 1.5°C: A civil society equity review of pre-2020 ambition report*. Retrieved from civilsocietyreview.org/report2016

CTI. (2012). *Unburnable Carbon – Are the world's financial markets carrying a carbon bubble?* London. Retrieved from http://www.carbontracker.org/wp-content/uploads/downloads/2012/08/Unburnable-Carbon-Full1.pdf

CTI. (2013). *Unburnable Carbon 2013: Wasted capital and stranded assets*. London. Retrieved from http://www.carbontracker.org/wastedcapital

CTI. (2014a). *Energy Access: A Guide to Why Coal is Not the Way Out of Poverty*. London. Retrieved from http://www.carbontracker.org/wp-content/uploads/2014/11/Coal-Energy-Access-111014-final.pdf

CTI. (2014b). *Energy Access: why coal is not the way out of energy poverty*. London. Retrieved from http://www.carbontracker.org/wp-content/uploads/2014/11/Coal-Energy-Access-111014-final.pdf

Cunningham, N. (2016, September 14). Oil And Gas Industry Dealing With An 'Unprecedented' Decline In Investment. *The Fuse*.

Cuomo, C. J. (2011). Climate Change, Vulnerability and Responsibility. *Hypatia*, *26*(4), 690–711.

Cusack, D. F., Axsen, J., Shwom, R., Hartzell-Nichols, L., White, S., & Mackey, K. R. (2014). An interdisciplinary assessment of climate engineering strategies. *Frontiers in Ecology*, *12*(5), 280–7.

Cushman Jr., J. H. (2018, January 12). 1.5 Degrees Warming and the Search for Climate Justice for the Poor. *Inside Climate News*. Retrieved from https://insideclimatenews.org/news/12012018/ipcc-climate-change-1.5-degrees-poverty-environmental-justice-draft-report

Darby, M. (2018, October 5). Climate Weekly: Saudis push back as IPCC talks head into overtime. *Climate Home News*. Retrieved from http://www.climatechangenews.com/2018/10/05/climate-weekly-saudis-push-back-ipcc-talks-head-overtime/

Davies, A. (2017, October 2). General Motors is Going All Electric. *Wired*. Retrieved from https://www.wired.com/story/general-motors-electric-cars-plan-gm/

Deemer, B. R., Harrison, J. A., Li, S., Beaulieu, J. J., Delsontro, T., Barros, N., ... Vonk, J. A. (2016). Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis. *Bioscience*, *66*(11), 949–964. https://doi.org/10.1093/biosci/biw117

Deep Decarbonization Pathways Project. (2014). *Pathways to Deep Decarbonization*. Retrieved from http://unsdsn.org/wp-content/uploads/2014/09/DDPP_Digit.pdf

Denniss, R. (2018, June 3). The big con: how neoliberals convinced us there wasn't enough to go around. *The Guardian*.

Doell, P., Trautmann, T., Gerten, D., Muller-Schmied, H., Ostberg, S., Saeed, F., & Schleussner, C.-F. (2018). Risks for the global freshwater system at 1.5 °C and 2 °C global warming. *Environmental*

Research Letters, *13*(044038). https://doi.org/10.1088/1748-9326/aab792

Dolsak, N., & Prakash, A. (2018, March 31). The Climate Change Hypocrisy Of Jet-Setting Academics. *Huffington Post*. Retrieved from https://www.huffingtonpost.com/entry/opinion-dolsak-prakash-carbon-tax_us_5abe746ae4b055e50acd5c80?4ud

Dooley, K., & Kartha, S. (2017). Land-based negative emissions: risks for climate mitigation and impacts on sustainable development. *Int Environ Agreements*. Retrieved from https://doi.org/10.1007/s10784-017-9382-9

Dotson, K. (2012). A Cautionary Tale: On Limiting Epistemic Oppression. *Frontiers*, *33*(1), 24–47.

Dotson, K., & Whyte, K. (2013). Environmental Justice, Unknowability and Unqualified Affectability. *Ethics & the Environment*, *18*(2), 55–79. https://doi.org/10.2979/ethicsenviro.18.2.55

Eckersley, R. (2016). Responsibility for Climate Change as a Structural Injustice. In T. Gabrielson, C. Hall, J. M. Meyer, & D. Schlosberg (Eds.), *The Oxford Handbook of Environmental Political Theory*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199685271.013.37

Eckersley, R. (2017). The tyranny of the minority. Retrieved December 30, 2017, from https://www.humansandnature.org/democracy-robyn-eckersley

EcoEquity. (2015). *Fair Shares: A Civil Society Equity Review of INDS's*. Retrieved from https://decorrespondent.nl/3705/Hoeveel-klimaatactie-moeten-rijke-landen-nemen-als-ze-hun-eerlijke-aandeel-willen-doen-/408324345-fab73cb8%5Cnpapers3://publication/uuid/A9831D33-8CB8-4A12-9357-6EFF957C05D0

EIA. (2015). Oil Crude and Petroleum Projects Explained. Retrieved January 4, 2016, from http://www.eia.gov/energyexplained/index.cfm?page=oil_home

Elliott, B. (2016). *Natural Catastrophe: Climate Change and Neoliberal Governance*. Edinburgh: Edinburgh University Press.

Endalew, G. J. (2018, October 8). Reactions of the Least Developed Countries to the IPCC 1.5°C Special Report. *Counter Currents*. Retrieved from https://countercurrents.org/2018/10/08/reactions-of-the-least-developed-countries-to-the-ipcc-1-5c-special-report/

Energy Transitions Commission. (2018). *Mission Possible: Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century*. Retrieved from http://www.energy-transitions.org/mission-possible

Engler, M., & Engler, P. (2016). *This Is an Uprising: How Nonviolent Revolt Is Shaping the Twenty-First Century*. New York, NY: Nation Books.

Epstein, A. (2013). *The Moral Case for Fossil Fuels*. Retrieved from http://industrialprogress.com/moralcase/

Erickson, P., Down, A., Lazarus, M., & Koplow, D. (2017). United States crude oil production. *Nature Energy*, *2*(November). https://doi.org/10.1038/s41560-017-0009-8

Evans, S. (2014, June 3). IEA: The marginal cost of two degrees. *Carbon Brief*.

Evans, S. (2017, December 18). IEA says world coal demand will rise, despite slashing forecast growth in India. *Carbon Brief*. Retrieved from https://www.carbonbrief.org/iea-world-coal-demand-will-rise-despite-slashing-growth-india

Eyre, N., Darby, S. J., Grünewald, P., Mckenna, E., & Ford, R. (2018). Reaching a 1.5C target: Socio-technical challenges for a rapid transition to low carbon electricity systems. *Phil. Trans. R. Soc. A*, *376*(20160462), 1–20. https://doi.org/10.1098/rsta.2016.0462

Faeth, P., & Sovacool, B. K. (2014). *Capturing Synergies Between Water Conservation and Carbon Dioxide Emissions in the Power Sector*. Retrieved from http://www.cna.org/research/2014/water-conservation-carbon-dioxide#sthash.rjTDeaVd.dpuf

Faeth, P., Sovacool, B. K., Thorkildsen, Z., Rao, A., Purcell, D., Eidsness, J., … Gilbert, A. (2014). *A Clash of Competing Necessities: Water Adequacy and Electric Reliability in China, India, France, and Texas*. Retrieved from http://www.cna.org/sites/default/files/research/EWCEWNCaseStudiesJuly2014FINAL.pdf

Fajardy, M., & Dowell, N. Mac. (2018). The energy return on investment of BECCS: is BECCS a threat to energy security? Bioenergy. *Energy & Environment Science*, *11*, 1581–1594. https://doi.org/10.1039/c7ee03610h

Fargione, J., Bassett, S., Boucher, T., Bridgham, S., Conant, R. T., Cook-Patton, S., … Griscom, B. W. (2018). Natural Climate Solutions for the United States. *Science Advances*, *In Press*(November), 1–14. https://doi.org/10.1126/sciadv.aat1869

Ferguson, A. (2018). Socialist-Feminist Transitions and Visions. *Radical Philosophy Review*, *21*(1), 177–200.

Ferreira, B. (2017). A “geoengineering cocktail” is the latest last-ditch proposal to reverse climate change. Retrieved September 27, 2017, from https://www.cnet.com/news/a-geoengineering-cocktail-is-the-latest-last-ditch-proposal-to-reverse-climate-change/

Figueres, C. (2016). The inside story of the Paris climate agreement. Retrieved February 15, 2016, from https://www.ted.com/talks/christiana_figueres_the_inside_story_of_the_paris_climate_agreement/transcript?language=en

Figueres, C., Schellnhuber, H. J., Whiteman, G., Rockström, J., Hobley, A., & Rahmstorf, S. (2017a). Three years to safeguard our climate. *Nature*, *546*, 593–5.

Figueres, C., Schellnhuber, H. J., Whiteman, G., Rockström, J., Hobley, A., & Rahmstorf, S. (2017b). Three years to safeguard our climate. *Nature*, *546*(7660), 593–595. https://doi.org/10.1038/546593a

First Peoples Worldwide. (2013). *First Peoples Worldwide’s: Indigenouc Rights Tisk Report for the Extractive Industry (U.S.).* Retrieved from http://www.firstpeoples.org/images/uploads/R1K Report(2).pdf

Fleischman, L., & Franklin, M. (2017). *Fumes Across the Fence-Line: The Health Impacts of Air Pollution from Oil & Gas Facilities on African American Communities*. Retrieved from http://catf.us/resources/publications/files/FumesAcrossTheFenceLine.pdf

Fong, B. Y. (2017, November 20). The Climate Crisis? It’s Capitalism, Stupid. *The New York Times*. Retrieved from https://www.nytimes.com/2017/11/20/opinion/climate-capitalism-crisis.html

Fragnière, A. (2016). Climate change and individual duties. *Wiley Interdisciplinary Reviews: Climate Change*, *7*(December). https://doi.org/10.1002/wcc.422

Fragnière, A. (2018). How demanding is our climate duty? An application of the no-harm principle to individual emissions. *Environmental Values*, *Forthcomin*, 1–27.

Franta, B. (2017). Litigation in the Fossil Fuel Divestment Movement. *Law and Policy*, (Accepted Article).

Franta, B. (2018). Early oil industry knowledge of CO 2 and global warming. *Nature Climate Change*. https://doi.org/10.1038/s41558-018-0349-9

Freeman, S. (2016). Original Position. In *Stanford Encyclopedia of Philosophy* (Winter). Edward N. Zalta (ed.). Retrieved from https://plato.stanford.edu/archives/win2016/entries/original-position/

Fricker, M. (2007). *Epistemic Injustice: Power & the Ethics of Knowing*. New York, NY: Oxford University Press.

Gaffney, O., & Steffen, W. (2017). The Anthropocene equation. *Anthropocene Review*, *4*(1), 53–61.

https://doi.org/10.1177/2053019616688022

Gardiner, S. M. (2004a). Ethics and Global Climate Change. *Ethics*, *114*(3), 555–600.

Gardiner, S. M. (2004b). The Global Warming Tragedy and the Dangerous Illusion of the Kyoto Protocol. *Ethics & International Affairs*. https://doi.org/10.1111/j.1747-7093.2004.tb00448.x

Gardiner, S. M. (2006). A Perfect Moral Storm: Climate Change, Intergenerational Ethics, and the Problem of Corruption. *Environmental Values*, *15*(3), 397–413. Retrieved from http://www.prairiestewardship.org/Resources/Gardiner.pdf

Gardiner, S. M. (2010). Is "arming the future" with geoengineering really the lesser evil? Some doubts about the ethics of intentionally manipulating the climate system. In S. M. Gardiner, S. Caney, D. Jamieson, & H. Shue (Eds.), *Climate Ethics: Essential Readings* (pp. 284–314). Oxford University Press. Retrieved from http://ssrn.com/abstract=1357162

Gardiner, S. M. (2011a). *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*. *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*. New York: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195379440.001.0001

Gardiner, S. M. (2011b). *A Perfect Moral Storm*. New York: Oxford University Press.

Gardiner, S. M. (2012). Are We the Scum of the Earth? Climate Change, Geoengineering, and Humanity's Challenge. In A. Thompson & J. Bendik-Keymer (Eds.), *Ethical Adaptation to Climate Change: Human Virtues of the Future*. MIT Press.

Gardiner, S. M. (2014). A Call for a Global Constitutional Convention Focused on Future Generations. *Ethics & International Affairs*, *28*(3), 299–315.

Gardiner, S. M. (2017a). Accepting Collective Responsibility for the Future. *Journal of Practical Ethics*, *5*(1), 22–52.

Gardiner, S. M. (2017b). Climate Ethics in a Dark and Dangerous Time. *Ethics*, *127*(2).

Gardiner, S. M. (2017c). The threat of intergenerational extortion: on the temptation to become the climate mafia, masquerading as an intergenerational Robin Hood. *Canadian Journal of Philosophy*, *47*(2–3), 368–394.

Gardiner, S. M., & Fragnière, A. (2018). The Tollgate Principles for the Governance of Geoengineering : Moving Beyond the Oxford Principles to an Ethically More Robust Approach The Tollgate Principles for the Governance of Geoengineering : Moving Beyond the Oxford Principles to an Ethically More. *Ethics, Policy & Environment*, *21*(2), 143–174. https://doi.org/10.1080/21550085.2018.1509472

Gardiner, S. M., & Weisbach, D. A. (2016). *Debating Climate Ethics*. New York: Oxford University Press.

Garrett, J. (2004). A Simple and Usable (Although Incomplete) Ethical Theory Based on the Ethics of W. D. Ross. Retrieved April 3, 2018, from http://people.wku.edu/jan.garrett/ethics/rossethc.htm

Garson. (2016). It Always Seems Impossible Until It's Done. Retrieved November 23, 2018, from https://quoteinvestigator.com/2016/01/05/done/

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Jan, E. (2017). The Circular Economy e A new sustainability paradigm ? *Journal of Cleaner Production*, *143*, 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

Ghosh, A. (2016). *The Great Derangement: Climate Change and the Unthinkable*. Chicago: The University of Chicago Press. https://doi.org/10.7208/chicago/9780226323176.001.0001

Gibon, T., Hertwich, E. G., Arvesen, A., Singh, B., & Verones, F. (2017). Health benefits, ecological threats of low-carbon electricity. *Environmental Research Letters*, *12*(3), 034023. https://doi.org/10.1088/1748-9326/aa6047

Golden, K. (2018, November 12). Partying alone: Big Oil's dismal "victory" over Initiative 1631. *Climate Solutions*.

Gottesdiener, L. (2015, August 25). King Coal Is Dead! *Common Dream*. Retrieved from https://www.commondreams.org/views/2015/08/25/king-coal-dead#

Grady-Benson, J., & Sarathy, B. (2016). Fossil fuel divestment in US higher education: student-led organising for climate justice. *Local Environment*, *21*(6), 661–681.

Grasswick, H. (2014). Climate Change Science and Responsible Trust: A Situated Approach. *Hypatia*, *29*(3), 541–557.

Graves, R. (2010, March 18). Champion for justice, Archbishop Desmond Tutu, says "We can swim or sink only together" in Copenhagen headshot. *Huffington Post*. Retrieved from https://www.huffingtonpost.com/richard-graves/champion-for-justice-arch_b_393941.html

Green, F. (2015). *Nationally Unified Self-Interested Climate Change Mitigation: A Unified Conceptual Framework* (No. 224).

Green, J. (2018, November 2). IPCC bets on the renewables revolution. *The Ecologist*. Retrieved from https://theecologist.org/2018/nov/02/ipcc-bets-renewables-revolution

Greenblatt, J. B., & Saxena, S. (2015). Autonomous taxis could greatly reduce greenhouse-gas emissions of US light-duty vehicles. *Nature Climate Change*, *5*, 860–863. https://doi.org/10.1038/nclimate2685

Griffin, A. (2017, January 4). Solar and wind power cheaper than fossil fuels for the first time. *The Independent*. Retrieved from https://www.independent.co.uk/environment/solar-and-wind-power-cheaper-than-fossil-fuels-for-the-first-time-a7509251.html

Griscom, B. W., Adams, J., Ellis, P. W., Houghton, R. A., Lomax, G., Miteva, D. A., … Fargione, J. (2017). Natural climate solutions. *Proceedings of the National Academy of Sciences*, *114*(44), 11645–11650. https://doi.org/10.1073/pnas.1710465114

Grubler, A., Wilson, C., Bento, N., Boza-kiss, B., Krey, V., Mccollum, D. L., … Valin, H. (2018). A low energy demand scenario for meeting the 1.5°C target and sustainable development goals without negative emission technologies. *Nature Energy*, *3*(June), 515–527. https://doi.org/10.1038/s41560-018-0172-6

Guin, U. K. Le. (2014). *Books aren't just commodities*. The Guardian. Retrieved from https://www.theguardian.com/books/2014/nov/20/ursula-k-le-guin-national-book-awards-speech

Hackel, L., & Sparkman, G. (2018, October 26). Reducing Your Carbon Footprint Still Matters. *Slate*. Retrieved from https://slate.com/technology/2018/10/carbon-footprint-climate-change-personal-action-collective-action.html

Hall, C. (2013). What Will it Mean to be Green? Envisioning Positive Possibilities Without Dismissing Loss. *Ethics, Policy & Environment*, *16*(2), 125–41.

Hansen, J., Kharecha, P., Sato, M., Masson-Delmotte, V., Ackerman, F., Beerling, D. J., … Zachos, J. C. (2013). Assessing "dangerous climate change": required reduction of carbon emissions to protect young people, future generations and nature. *PloS One*, *8*(12), e81648. https://doi.org/10.1371/journal.pone.0081648

Hansen, J., Sato, M., Hearty, P., Ruedy, R., Kelley, M., Masson-Delmotte, V., … Bauer, M. (2016). Ice melt, sea level rise and superstorms: Evidence from paleoclimate data, climate modeling, and modern observations that 2 °c global warming could be dangerous. *Atmospheric Chemistry and Physics*, *16*(6), 3761–3812. https://doi.org/10.5194/acp-16-3761-2016

Hansen, J., Sato, M., Kharecha, P., Schuckmann, K. Von, David, J., Cao, J., … Smith, P. (2017). Young People's Burden: Requirement of Negative CO2 Emissions. *Earth System Dynamics*, *8*, 577–616. https://doi.org/10.5194/esd-2016-42

Haque, U. (2018, October 10). Why Catastrophic Climate Change is Probably Inevitable Now: How Capitalism Torched the Planet by Imploding Into Fascism. *Eudaimonia*.

Hardin, G. (1968). The Tragedy of the Commons. *Science*, *162*, 1243–1248.

Hartzell-Nichols, L. (2014). Adaptation as Precaution. *Environmental Values*, *23*, 149–64.

Hartzell-Nichols, L. (2017). *A Climate of Risk: Precautionary Principles, Catastrophes, and Climate Change*. New York: Routledge.

Haszeldine, R. S., Flude, S., Johson, G., & Scott, V. (2018). Negative emissions technologies and carbon capture and storage to achieve the Paris Agreement commitments. *Phil. Trans. R. Soc. A*, *376*(20160447). https://doi.org/10.1098/rsta.2016.0447

Hausfather, Z. (2018a, April 9). Analysis: How much 'carbon budget' is left to limit global warming to 1.5C? *Carbon Brief*. Retrieved from https://www.carbonbrief.org/analysis-how-much-carbon-budget-is-left-to-limit-global-warming-to-1-5c

Hausfather, Z. (2018b, May 21). Analysis: How 'natural climate solutions' can reduce the need for BECCS. *Carbon Brief*. Retrieved from https://www.carbonbrief.org/analysis-how-natural-climate-solutions-can-reduce-the-need-for-beccs

Healy, N., & Barry, J. (2017). Politicizing energy justice and energy system transitions : Fossil fuel divestment and a "just transition." *Energy Policy*, *108*(June), 451–459.

Healy, N., & Debski, J. (2016). Fossil fuel divestment: implications for the future of sustainability discourse and action within higher education. *Local Environment*, 1–26. https://doi.org/10.1080/13549839.2016.1256382

Hearps, P., & Cossar-Gilbert, S. (2015). *An Energy Revolution is Possible*.

Heck, V., Gerten, D., Lucht, W., & Popp, A. (2018). Biomass-based negative emissions difficult to reconcile with planetary boundaries. *Nature Climate Change*, *8*, 151–155. https://doi.org/10.1038/s41558-017-0064-y

Hedberg, T. (2018). Climate Change, Moral Integrity, and Obligations to Reduce Individual Greenhouse Gas Emissions. *Ethics, Policy & Environment*, *0085*, 1–17. https://doi.org/10.1080/21550085.2018.1448039

Heinrich Boll Foundation. (2018). *Radical Realism for Climate Justice A Civil Society Response to the Challenge of Limiting Global Warming to 1.5°C* (Vol. 44). Retrieved from https://www.boell.de/en/2018/09/17/radical-realism-climate-justice?dimension1=ds_radicalrealism

Helliwell, J., Layard, R., & Sachs, J. (2018). *World Happiness Report 2018*. New York. Retrieved from http://worldhappiness.report/ed/2018/

Helm, D. (2012). *Carbon Crunch: How we're getting climate change wrong -- and how to fix it*. Cumberland: Yale University Press. Retrieved from http://site.ebrary.com/lib/kansas/Doc?id=10607291&ppg=24

Hertsgaard, M. (2009, December 21). The Ugly Truth About Obama's "Copenhagen" Accord. *Vanity Fair*.

Hertwich, E. G., Arvesen, A., Suh, S., & Gibon, T. (2017, March 20). Does 'green energy' have hidden health and environmental costs? *The Conversation*. Retrieved from https://theconversation.com/does-green-energy-have-hidden-health-and-environmental-costs-52484

Hertwich, E. G., Gibon, T., Bouman, E. A., Arvesen, A., Suh, S., Heath, G. A., … Shi, L. (2015). Integrated life-cycle assessment of electricity-supply scenarios confirms global environmental benefit of low-carbon technologies. *Proceedings of the National Academy of Sciences*, *112*(20), 6277–6282. https://doi.org/10.1073/pnas.1312753111

Holtug, N. (2017). Prioritarianism. In *Oxford Research Encylopedia: Politics* (Online). Oxford. Retrieved from http://politics.oxfordre.com/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-232

Holz, C. (2018). *Modelling 1.5°C - Compliant Mitigation Scenarios Without Carbon Dioxide Removal* (Vol. 44.8). Retrieved from https://www.boell.de/sites/default/files/radical_realism_for_climate_justice_volume_44_8.pdf

Holz, C., Kartha, S., & Athanasiou, T. (2017). Fairly sharing 1.5: national fair shares of a 1.5 °C-compliant global mitigation effort. *International Environmental Agreements: Politics, Law and Economics*. https://doi.org/10.1007/s10784-017-9371-z

Holz, C., Siegel, L., Johnston, E. B., Jones, A. D., & Sterman, J. (2018). Ratcheting Ambition to Limit Warming to 1.5°C – Trade-offs Between Emission Reductions and Carbon Dioxide Removal. *Environ. Res. Lett*, *in review*(In Press). Retrieved from https://doi.org/10.1088/1748-9326/aac0c1 Manuscript

Hood, M. (2018, April 2). Two degrees no longer seen as global warming guardrail. *Phys.Org*.

Horton, J., & Keith, D. (2016). Solar Geoengineering and Obligations to the Global Poor. *Climate Justice and Geoengineering: Ethics and Policy in the Atmospheric Anthropocene*, 79–92.

Hourdequin, M. (2010). Climate, Collective Action and Individual Ethical Obligations. *Environmental Values*, *19*(4), 443–464. https://doi.org/10.3197/096327110X531552

Hourdequin, M. (2011). Climate Change and Individual Responsibility: A Reply to Johnson. *Environmental Values*, *20*(2), 157–162. https://doi.org/10.3197/096327111X12997574391643

Hourdequin, M. (2016). Justice, Recognition and Climate Change. In C. Preston (Ed.), *Climate Justice and Geoengineering: Ethics and Policy in the Atmospheric Anthropocene* (pp. 33–48). Lanman, Md: Rowman & Littlefield.

Hourdequin, M. (2018). Climate Change, Climate Engineering, and the "Global Poor": What Does Justice Require? *Ethics, Policy & Environment*, (Forthcoming), 1–34.

Houser, T., Bordoff, J., & Marsters, P. (2017). *Can Coal Make a Comeback?* Retrieved from https://energypolicy.columbia.edu/sites/default/files/Center_on_Global_Energy_Policy_Can_Coal_Make_Comeback_April_2017.pdf

Howard, E. (2015, April 13). Harvard divestment campaigners gear up for a week of action. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2015/apr/13/harvard-divestment-campaigners-gear-up-for-a-week-of-action

Howarth, R. W., Santoro, R., & Ingraffea, A. (2011). Methane and the greenhouse-gas footprint of natural gas from shale formations. *Climatic Change*, *106*(4), 679–690. https://doi.org/10.1007/s10584-011-0061-5

Hrala, J. (2016, November 23). 47 of The World's Poorest Countries Are Aiming to Hit 100% Renewable Energy. *Science Alert*. Retrieved from https://www.sciencealert.com/the-world-s-poorest-countries-aim-to-jump-straight-to-100-percent-green-energy

Hulme, M. (2014). *Can Science Fix Climate Change?: A Case Against Geoengineering*. Cambridge: Polity Press.

Hume, D. (1978). *Enquiries Concerning Human Understanding*. (L. A. Selby-Bigge, Ed.) (3rd ed.). Oxford: Clarendon Press.

Hursthouse, L., & Pettigrove, G. (2016). Virtue Ethics. In *Stanford Encyclopedia of Philosophy* (Winter). Edward N. Zalta (ed.). Retrieved from https://plato.stanford.edu/archives/win2016/entries/ethics-virtue/

IEA. (2014a). *Energy Technology Perspectives 2014: Harnessing Electricity's Potential*. Paris. Retrieved from http://www.iea.org/etp/

IEA. (2014b). *World Energy Outlook 2014*. Paris. Retrieved from http://www.iea.org/publications/freepublications/publication/WEO_2014_ES_English_WEB.pdf

IEA. (2018). *Energy Efficiency 2018*. Retrieved from https://webstore.iea.org/market-report-series-energy-efficiency-2018

Ingraham, C. (2017, March 31). The entire coal industry employs fewer people than Arby's. *The Washington Post*. Retrieved from https://www.washingtonpost.com/news/wonk/wp/2017/03/31/8-surprisingly-small-industries-that-employ-more-people-than-coal/

International Energy Agency. (2012). *World energy outlook*. Retrieved from http://www.smithschool.ox.ac.uk/wp-content/uploads/2010/06/Fatih-Birol.pdf

IPCC. (2013). *AR5*. Retrieved from http://www.ipcc.ch/report/ar5/wg1/#.UlWi71Csim4

IPCC. (2014). *Summary for Policymakers. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Retrieved from http://mitigation2014.org/

IPCC. (2018). IPCC special report on the impacts of global warming of 1.5 °C - Summary for policy makers, (October 2018). Retrieved from http://www.ipcc.ch/report/sr15/

Islam, N. (2016, April 26). The Huge Impact Driverless Cars Will Have On Parking & Urban Landscapes. *Clean Technica*. Retrieved from https://cleantechnica.com/2016/04/11/the-huge-impact-driverless-cars-will-have-on-parking-urban-landscapes/

Jacobson, M. Z., & Delucchi, M. a. (2011). Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials. *Energy Policy*, *39*(3), 1154–1169. https://doi.org/10.1016/j.enpol.2010.11.040

Jagger, B. (2015, April 24). The fossil fuel industry is condemning us to climate disaster. *The Guardian*. Retrieved from https://www.theguardian.com/commentisfree/2015/apr/24/fossil-fuel-industry-bianca-jagger-renewable-energy-revolution

Jahn, B. (2005). Barbarian thoughts: Imperialism in the philosophy of John Stuart Mill. *Review of International Studies*, *31*(3), 599–618. https://doi.org/10.1017/S0260210505006650

Jakob, M., & Steckel, J. C. (2016). *The Just Energy Transition*. WWF. Retrieved from http://awsassets.wwfit.panda.org/downloads/jakobsteckel_2016_jet.pdf

Jamieson, D. (2010). When Utilitarians Should Be Virtue Ethicists. In S. M. Gardiner, S. Caney, D. Jamieson, & H. Shue (Eds.), *Climate Ethics: Essential Readings*. Oxford: Oxford University Press.

Jamieson, D. (2014). *Reason in a Dark Time: Why the Struggle Against Climate Change Failed - and What it Means for Our Future*. New York: Oxford University Press.

Jamieson, D. (2016). Slavery, Carbon, and Moral Progress. *Ethical Theory and Moral Practice*, *20*, 1–15. https://doi.org/10.1007/s10677-016-9746-1

Jasanoff, S. (2015). Future Imperfect: Science, Technology, and the Imaginations of Modernity. In S. Jasanoff & S.-H. Kim (Eds.), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. University of Chicago Press.

Jiang, M., Hendrickson, C. T., & Vanbriesen, J. M. (2014). Life cycle water consumption and wastewater generation impacts of a Marcellus shale gas well. *Environmental Science and Technology*, *48*(3), 1911–1920. https://doi.org/10.1021/es4047654

Johnson, B. (2003). Ethical Obligations in a Tragedy of the Commons. *Environmental Values*, *12*(3), 271–287.

Johnson, N. (2016a, December 15). Costa Rica modernized without wrecking the environment. Here's how. *Grist*.

Johnson, N. (2016b, December 15). How do we fight poverty without wrecking the planet? *Grist*. Retrieved from https://grist.org/article/how-do-we-fight-poverty-without-wrecking-the-planet/

Johnston, E. (2018, February 16). The Darkness and the Needle. *Medium*. Retrieved from https://medium.com/@enjohnston/the-darkness-and-the-needle-4abec6ff8792

Jones, N. (2018). Safeguarding Against Environmental Injustice: 1.5°C Scenarios, Negative Emissions, and Unintended Consequences. *Carbon & Climate Law Review*, *12*(1), 23–30. https://doi.org/10.21552/cclr/2018/1/6

Jotzo, F., Depledge, J., & Winkler, H. (2018). US and international climate policy under President Trump. *Climate Policy*, *18*(7), 813–817. https://doi.org/10.1080/14693062.2018.1490051

Karp, P. (2017, May 21). Experts reject Bjørn Lomborg's view on 2C warming target. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2017/may/21/experts-reject-bjorn-lomborg-centres-view-that-2c-warming-target-not-worth-it

Kartha, S., Baer, P., Athanasiou, T., & Kemp-Benedict, E. (2009). *The Greenhouse Development Rights framework*. *Climate and Development* (Vol. 1). https://doi.org/10.3763/cdev.2009.0010

Kartha, S., Caney, S., Dubash, N. K., & Muttitt, G. (2018). Whose carbon is burnable? Equity considerations in the allocation of a "right to extract." *Climatic Change*.

Kaufman, A. (2018, November 13). 2018's Voters Support Green Jobs Guarantee And Climate Polluter Fees: Poll. *Huffington Post*. Retrieved from https://www.huffingtonpost.com/entry/green-new-deal-poll_us_5beb03a5e4b044bbb1a98559?ncid=tweetlnkushpmg00000067

Kawall, J. (2012). Rethinking Greed. In A. Thompson & J. Bendik-Keymer (Eds.), *Ethical Adaptation to Climate Change: Human Virtues of the Future* (pp. 223–240). MIT Press.

Kelly, R. (2012). *The hunger grains*. Retrieved from https://www.oxfam.org/en/research/hunger-grains

Kendall, H. W. (Union of C. S. (1992). World Scientists' Warning to Humanity. https://doi.org/10.1017/S1052703600004573

Kharas, H., Hamel, K., & Hofer, M. (2018, June 19). The start of a new poverty narrative. *Brookings*. Retrieved from https://www.brookings.edu/blog/future-development/2018/06/19/the-start-of-a-new-poverty-narrative/

Kharin, V. V., Flato, G. M., Zhang, X., Gillett, N. P., Zwiers, F., & Anderson, K. J. (2018). Risks from climate extremes change differently from 1.5°C to 2.0°C depending on rarity. *Earth's Future*, *6*. https://doi.org/https://doi.org/10.1002/2018EF000813

Kim, J. Y. (2015, December 16). Climate Action After Paris. *Project Syndicate*. Retrieved from https://www.project-syndicate.org/commentary/paris-climate-accord-further-action-by-jim-yong-kim-2015-12?barrier=accesspaylog

Kingston, E., & Sinnott-Armstrong, W. (2018). What's Wrong with Joyguzzling? *Ethical Theory and Moral Practice*, *21*(1), 169–186. https://doi.org/10.1371/journal.pbio.1002535

Klein, N. (2014). *This Changes Everything: Capitalism Vs. The Climate*. New York: Simon & Schuster.

Klinsky, S., & Winkler, H. (2018). Building equity in: strategies for integrating equity into modelling for a 1.5°C world. *Phil. Trans. R. Soc. A*, *376*(20160461), 1–18. https://doi.org/10.1098/rsta.2016.0461

Knutti, R., Rogelj, J., Sedláček, J., & Fischer, E. M. (2015). A scientific critique of the two-degree climate change target. *Nature Geoscience*, *9*(1), 13–18. https://doi.org/10.1038/ngeo2595

Kofler, B., Netzer, N., Beuermann, C., Hermwille, L., Burck, J., Schinke, B., & Marten, F. (2014). *Towards a Global Energy Transformation*. Retrieved from http://library.fes.de/pdf-files/iez/10817.pdf

Kraaijenbrink, P. D. A., Bierkens, M. F. P., Lutz, A. F., & Immerzeel, W. W. (2017). Impact of a global temperature rise of 1.5 degrees Celsius on Asia's glaciers. *Nature*, *549*, 257–260. https://doi.org/10.1038/nature23878

Kriegler, E., Bauer, N., Baumstark, L., Fujimori, S., Luderer, G., Rogelj, J., … Vuuren, D. P. Van. (2018). Pathways limiting warming to 1.5°C: A tale of turning around in no time ? *Phil. Trans. R. Soc. A*, *376*(20160457). https://doi.org/10.1098/rsta.2016.0457

Krugman, P. (2015, October 5). Enemies of the Sun. *The New York Times*. Retrieved from https://www.nytimes.com/2015/10/05/opinion/paul-krugman-enemies-of-the-sun.html%60

Kuramochi, T., Höhne, N., Hagemann, M., Sterl, S., El-Laboudy, T., Mir, G. U. R., … Parra, P. Y. (2016). *10 Steps: The Ten Most Important Short-Term Steps to Limit Warming to 1.5°C*. Retrieved from http://www.ecofys.com/files/files/climate-action-tracker-2016-10-steps-for-1-point-5-goal.pdf

Kuramochi, T., Höhne, N., Schaeffer, M., Cantzler, J., Deng, Y., Sterl, S., … Deryng, D. (2018). Ten key short-term sectoral benchmarks to limit warming to 1.5°C. *Climate Policy*, *18*(3), 287–305. https://doi.org/10.1080/14693062.2017.1397495

Kyte, R. (2015, August 10). World Bank: clean energy is the solution to poverty, not coal. *The Guardian*. Retrieved from https://www.theguardian.com/sustainable-business/2015/aug/07/world-bank-clean-energy-is-the-solution-to-poverty-not-coal

Lacey, S. (2012, August 31). Free-market hypocrisy: Why do we hold renewables to different standards? *Grist*. Retrieved from https://grist.org/climate-energy/free-market-hypocrisy-why-do-we-hold-renewables-to-different-standards/

Landrigan, P. J., Fuller, R., Acosta, N. J. R., Adeyi, O., Arnold, R., Basu, N., … Zhong, M. (2017). The Lancet Commission on pollution and health. *The Lancet*, *6736*(17). https://doi.org/10.1016/S0140-6736(17)32345-0

Latane, B., & Darley, J. M. (1968). Group inhibition of bystander intervention in emergencies. *Journal of Personality and Social Psychology*, *10*(3), 215–221.

Laurie, C. (2017, August 23). Science-Driven Innovation Can Reduce Wind Energy Costs by 50% by 2030. *National Renewable Enegy Laboratory*. Retrieved from https://www.nrel.gov/news/program/2017/science-driven-innovation-can-reduce-wind-energy-costs-by-50-percent-by-2030.html

Lavelle, M. (2016, September 25). Fossil Fuel Money to GOP Grows, and So Does Climate Divide. *Inside Climate News*. Retrieved from https://insideclimatenews.org/news/15092016/fossil-fuel-funding-gop-grows-climate-divide-republican-donald-trump-hillary-clinton

Lawford-Smith, H. (2016). Climate Matters Pro Tanto, Does It Matter All-Things-Considered? *Midwest Studies in Philosophy*, *40*(1), 129–142.

Lawrence, M. G., Schäfer, S., Muri, H., Scott, V., Oschlies, A., Vaughan, N. E., … Scheffran, J. (2018). Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals. *Nature Communications*, *9*(1), 3734. https://doi.org/10.1038/s41467-018-05938-3

Lazard. (2018, November 8). ANNUAL LEVELIZED COST OF ENERGY AND LEVELIZED COST OF STORAGE ANALYSES. *LAZARD RELEASES*. Retrieved from https://www.lazard.com/media/450781/11-18-lcoelcos-press-release-2018_final.pdf

Lazarus, M., & Asselt, H. Van. (2018). Fossil fuel supply and climate policy: exploring the road less taken. *Climatic Change*. https://doi.org/https://doi.org/10.1007/s10584-018-2266-3

Le Quere, C., Andrew, R. M., Canadell, J. G., Sitch, S., Ivar Korsbakken, J., Peters, G. P., … Zaehle, S. (2016). Global Carbon Budget 2016. *Earth System Science Data*, *8*(2), 605–649. https://doi.org/10.5194/essd-8-605-2016

Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Feinberg, G. (2013). *How Americans communicate about global warming in April 2013*. Retrieved from http://climatecommunication.yale.edu/wp-content/uploads/2016/02/2013_08_How-Americans-Communicate-About-Global-Warming-April-2013.pdf

Lenferna, A. (2018, August 23). Australia's fossil fuel export trilemma. *Renew Economy*.

Lenferna, G. A. (2013, December 6). Nelson Mandela's legacy to climate change activists. *Climate Home*. Retrieved from http://www.climatechangenews.com/2013/12/06/nelson-mandelas-legacy-to-climate-change-activists/

Lenferna, G. A. (2016a, February 5). Why Africa doesn't need Bjorn Lomborg's fossil fuel PR. *Thought Leader*. Retrieved from http://thoughtleader.co.za/alexlenferna/2016/02/05/why-africa-doesnt-need-bjorn-lomborgs-fossil-fuel-pr/

Lenferna, G. A. (2016b, March 1). How Africa could leapfrog fossil fuels to clean energy alternatives. *The Conversation*. Retrieved from https://theconversation.com/how-africa-could-leapfrog-fossil-fuels-to-clean-energy-alternatives-55044

Lenferna, G. A. (2017a, April 30). Don't Believe Trump — The fossil fuel era is ending, the real question is how fast. *Medium*. Retrieved from https://medium.com/@AlexLenferna/dont-believe-trump-the-fossil-fuel-industry-is-going-under-the-real-question-is-how-fast-505b116dda24

Lenferna, G. A. (2017b, July 24). The Costs of Solar Geoengineering. *Ethics & International Affair*. Retrieved from https://www.ethicsandinternationalaffairs.org/2017/costs-of-geoengineering/

Lenferna, G. A. (2018a). Can we equitably manage the end of the fossil fuel era? *Energy Research & Social Science*, *35*, 217–223. https://doi.org/https://doi.org/10.1016/j.erss.2017.11.007

Lenferna, G. A. (2018b). Divest-Invest: A Moral Case for Fossil Fuel Divestment. In H. Shue & R. Kanbur (Eds.), *Climate Justice: Economics and Philosophy*. Oxford University Press. Retrieved from http://bit.ly/AMoralEndowment

Lenferna, G. A. (2018c). Divestment as Climate Justice: Weighing the Power of the Fossil Fuel Divestment Movement. In S. G. Jacobsen (Ed.), *Climate Justice and the Economy: Social mobilization, knowledge and the political*. Routledge Earth Scan. Retrieved from https://www.academia.edu/22236651/Divestment_as_Climate_Justice_Weighing_the_Power_of_the_Fossil_Fuel_Divestment_Movement

Lenferna, G. A. (2018d). If You're 'Still In' the Paris Climate Agreement, Then Show Us the Money. *Ethics, Policy & Environment*, *21*(1), 52–55. https://doi.org/10.1080/21550085.2018.1463626

Lenferna, G. A., Tan, R. R. A., Gardiner, S., & Ackerman, T. (2017). Relevant Climate Response Tests for Stratospheric Aerosol Injection: A Combined Ethical and Scientific Analysis. *Earth's Future*.

Lewis, M. C. (2014). *Stranded assets, fossilised revenues*. Retrieved from http://www.keplercheuvreux.com/pdf/research/EG_EG_253208.pdf

Lewis, S. (2015, December 12). Five things you need to know about the Paris climate deal. *The Conversation*. Retrieved from https://theconversation.com/five-things-you-need-to-know-about-the-paris-climate-deal-52256

Lichtenberg, J. (2010). Negative Duties, Positive Duties, and the "New Harms." *Ethics*, *120*(3), 557–578. https://doi.org/10.1086/652294

Liebrich, M. (2015, August 18). An energy sector transformed must be an energy sector reformed. *Bloomberg New Energy Finance*. Retrieved from https://about.bnef.com/blog/liebreich-energy-sector-transformed-must-energy-sector-reformed/

Lin, A. C. (2017, December 21). A potentially disastrous distraction to climate change. *San Francisco Chronical*.

Lomborg, B. (2001). *The Skeptical Environmentalist: Measuring the Real State of the World*. Cambridge University Press.

Lomborg, B. (2017, December 20). A Climate Cure Worse than the Disease. *Project Syndicate*. Retrieved from https://www.project-syndicate.org/commentary/paris-climate-accord-too-expensive-by-bjorn-lomborg-2017-12

Lomborg, B. (2018, January 19). Billions Wasted While the Poor Starve. *The Australian*. Retrieved from https://www.theaustralian.com.au/opinion/columnists/bjorn-lomborg/climatechange-policies-may-be-making-world-hunger-worse/news-story/1731c0124e3b89c57001afcd84c9537c

Lovins, A. (2008, November 26). Amory Lovins on Why Energy Efficiency is the Key. *Yale Environment 360*.

Lovins, A. (2016, January 13). Nuclear no match for renewables. *Business Day*.

Lovins, A. (2018). How big is the energy efficiency resource? *Environ. Res. Lett*, *13*(090401).

Low Carbon Monitor. (2016). *Pursuing the 1.5°C Limit: Benefits and Opportunities*. Retrieved from http://www.thecvf.org/wp-content/uploads/low-carbon-monitor-lowres.pdf

Lu, C. (2011). Colonialism as Structural Injustice: Historical Responsibility and Contemporary Redress. *Journal of Political Philosophy*, *19*(3), 261–81.

Lukacs, M. (2017, July 17). Neoliberalism has conned us into fighting climate change as individuals. *The Guardian*. Retrieved from https://www.theguardian.com/environment/true-north/2017/jul/17/neoliberalism-has-conned-us-into-fighting-climate-change-as-individuals

Lynas, M. (2008). *Six Degrees: Our Future on a Hotter Planet*. Washington DC: National Geographic.

Lynch, M. (2018, June 29). What Ever Happened To Peak Oil? *Forbes*. Retrieved from https://www.forbes.com/sites/michaellynch/2018/06/29/what-ever-happened-to-peak-oil/

MacDonald, A. E., Clack, C. T. M., Alexander, A., Dunbar, A., Wilczak, J., & Xie, Y. (2016). Future cost-competitive electricity systems and their impact on US CO2 emissions. *Nature Climate Change*, *6*(5), 526–531. https://doi.org/10.1038/nclimate2921

Mackay, K. (2017). *Radical Transformation: Oligarchy, Collapse, and the Crisis of Civilization*. Toronto: Between the Lines.

Mackay, K. (2018, September 25). The Ecological Crisis is a Political Crisis. *MAHB*. Retrieved from https://mahb.stanford.edu/blog/ecological-crisis-political-crisis/

MacMynowski, D. G., Keith, D. W., Caldeira, K., & Shin, H.-J. (2011). Can we test geoengineering? *Energy & Environmental Science*, *4*.

Mahapatra, S. (2017, May 25). New Solar Projects In India Are Cheaper Than 92% Of All Thermal Power Plants In The Country. *Clean Technica*. Retrieved from https://cleantechnica.com/2017/05/25/new-solar-projects-india-cheaper-92-thermal-power-plants-country/

Maltais, A. (2016). A Climate of Disorder: What to Do About the Obstacles to Effective Climate Policies. In D. Roser & C. Heyward (Eds.), *Climate Justice in a Non-Ideal World* (pp. 43–63). Oxford: Oxford University Press.

Markandya, A., Sampedro, J., Smith, S. J., Van Dingenen, R., Pizarro-Irizar, C., Arto, I., & González-Eguino, M. (2018). Health co-benefits from air pollution and mitigation costs of the Paris Agreement: a modelling study. *The Lancet Planetary Health*, *2*(3), e126–e133. https://doi.org/10.1016/S2542-5196(18)30029-9

Market Forces. (2018). Public money propping up fossil fuels. Retrieved August 30, 2018, from https://www.marketforces.org.au/campaigns/ffs/

Marshall, G. (2014). *Don't Even Think About It: Why Our Brains Are Wired to Ignore Climate Change*. USA: Bloomsbury Press.

Mathews, J. A., & Tan, H. (2014). Economics: Manufacture renewables to build energy security. *Nature*, *September*. Retrieved from http://www.nature.com/news/economics-manufacture-renewables-to-build-energy-security-1.15847

Mathiesen, K., Darby, M., & Apparicio, S. (2018, June 27). Warming of 2C 'substantially' more harmful than 1.5C – draft UN report. *Climate Home*. Retrieved from http://www.climatechangenews.com/2018/06/27/warming-2c-substantially-harmful-1-5c-draft-un-report/

Mccollum, D. L., Zhou, W., Bertram, C., Boer, H. De, Bosetti, V., Busch, S., … Rozenberg, J. (2018). Energy investment needs for fulfilling the Paris Development Goals. *Nature Energy*, *3*(July). https://doi.org/10.1038/s41560-018-0179-z

McCrone, A., Moslener, U., D'Estais, F., & Grünig, C. (2017). *Global Trends in Renewable Energy Investment 2017. Frankfurt School UNEP Collaborating Centre for Climate and Sustainable Energy Finance*. Retrieved from http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2017.pdf%0Ahttp://fs-unep-centre.org/publications/global-trends-renewable-energy-investment-2017

McGlade, C., & Ekins, P. (2015). The geographical distribution of fossil fuels unused when limiting global warming to 2 °C. *Nature*, *517*(7533), 187–190. https://doi.org/10.1038/nature14016

McKibben, B. (2012). Global Warming's Terrifying New Math. Retrieved from http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719

McKibben, B. (2016). Why We Need to Keep 80 Percent of Fossil Fuels in the Ground. *Yes!* Retrieved from http://www.yesmagazine.org/issues/life-after-oil/why-we-need-to-keep-80-percent-of-fossil-fuels-in-the-ground-20160215/

McKibben, B. (2017, December 1). Winning Slowly Is the Same as Losing. *Rolling Stone*. Retrieved from https://www.rollingstone.com/politics/news/bill-mckibben-winning-slowly-is-the-same-as-losing-w512967

McKibben, B. (2018, May 30). Say hello to Justin Trudeau, the world's newest oil executive. *The Guardian*.

McKinnon, C. (2016). Should We Tolerate Climate Change Denial ? *Midwest Studies in Philosophy*, *XL*, 205–216.

McQuaig, L. (2006). *War, Big Oil, and the Fight For the Planet: It's the Crude, Dude*. Anchor, Canada: Random House.

Mearian, L. (2017, April 17). Unsubsidized wind and solar now the cheapest source for new electric power. *ComputerWorld*. Retrieved from https://www.computerworld.com/article/3190409/sustainable-it/unsubsidized-wind-and-solar-now-the-cheapest-source-for-new-electric-power.html

Meinshausen, M., Meinshausen, N., Hare, W., Raper, S. C. B., Frieler, K., Knutti, R., … Allen, M. R. (2009). Greenhouse-gas emission targets for limiting global warming to 2 degrees C. *Nature*, *458*(7242), 1158–62. https://doi.org/10.1038/nature08017

Mercator Research Institute on Global Commons on Climate Change. (2018). That's how fast the carbon clock is ticking. Retrieved April 2, 2018, from https://www.mcc-berlin.net/en/research/co2-budget.html

Meyer, R. (2018, November 16). The New Politics of Climate Change. *The Atlantic*. Retrieved from https://www.theatlantic.com/science/archive/2018/11/midterms-2018-now-nobody-has-perfect-climate-strategy/575422/

Mills, C. W. (1997). *The Racial Contract*. Ithaca: Cornell University Press.

Mills, C. W. (2017). Ideology. In I. J. Kidd, J. Medina, & J. Gaile Pohlhaus (Eds.), *The Routledge Handbook of Epistemic Injustice*. London and New York: Routledge.

Moellendorf, D. (2014). *The moral challenge of dangerous climate change: values, poverty, and policy*. New York, NY: Cambridge University Press.

Molina, M., Ramanathan, V., & Zaelke, D. J. (2018, October 9). Climate report understates threat. *Bulletin of the Atomic Scientists*. Retrieved from https://thebulletin.org/2018/10/climate-report-understates-threat

Monbiot, G. (2015, January 7). Why leaving fossil fuels in the ground is good for everyone. *The Guardian*. Retrieved from https://www.theguardian.com/environment/georgemonbiot/2015/jan/07/why-leaving-fossil-fuels-in-ground-good-for-everyone

Monbiot, G. (2017). *Out of the Wreckage: A New Politics for an Age of Crisis*. Vero.

Monbiot, G. (2018, November 14). The Earth is in a death spiral. It will take radical action to save us. *The Guardian*.

Montgomery, S. (2010). *The Powers That Be: Global Energy for the Twenty-First Century and Beyond*. Chicago: The University of Chicago Press.

Mufson, S. (2018, January 17). Rick Perry hugged a coal baron. This photographer got the picture. Then he was placed on leave. *The Washington Post*. Retrieved from https://www.washingtonpost.com/business/economy/rick-perry-hugged-a-coal-baron-this-photographer-got-the-picture-then-he-lost-his-job/2018/01/17/ac52a2a8-fbd0-11e7-ad8c-ecbb62019393_story.html

Murphy, K. (2018, November 15). Underwriting coal power exposes taxpayers to billions, industry group says. *The Guardian*. Retrieved from https://www.theguardian.com/australia-news/2018/nov/16/underwriting-coal-power-exposes-taxpayers-to-billions-industry-group-says

Murphy, L. (1993). The Demands of Beneficence. *Philosophy & Public Affairs*, *22*(4), 267–292.

Muttitt, G. (2012). *Fuel on the fire : oil and politics in occupied Iraq*. New York: New Press.

Muttitt, G. (2016). *The Sky's Limit: Why the Paris climate goals require a managed decline of fossil fuel production*. Washington, DC.

Muttitt, G. (2017a). *Forecasting Failure: Why Investors Should Treat Oil Company Energy Forecasts With Caution*. Retrieved from http://priceofoil.org/content/uploads/2017/03/forecasting-failure.pdf

Muttitt, G. (2017b, April 1). The IEA Still Gets It Wrong on Fossil Fuels. *RealClear Energy*. Retrieved from http://www.realclearenergy.org/2017/04/01/the_iea_still_gets_it_wrong_on_fossil_fuels_282469.html

Naam, R. (2013). *The Infinite Resource: The Power of Ideas on a Finite Planet*. Hanover: University Press of New England.

Naam, R. (2017). Exponential Energy. In *Singularity University South Africa*. Retrieved from https://www.youtube.com/watch?v=fwSkQa1tNmE

Nangombe, S., Zhou, T., Zhang, W., Wu, B., Hu, S., Zou, L., & Li, D. (2018). Record-breaking climate extremes in Africa under stabilized 1.5 °C and 2 °C global warming scenarios. *Nature Climate Change*, *8*(May). https://doi.org/10.1038/s41558-018-0145-6

NASA. (2017). Understanding Sea Level Projections. Retrieved December 18, 2017, from https://sealevel.nasa.gov/understanding-sea-level/projections/empirical-projections

National Academy of Sciences. (2015). *Climate Intervention: Carbon Dioxide Removal and Reliable Sequestration*. Washington, DC.

Nield, D. (2016, December 23). Solar Power Is Now The Cheapest Form of Energy in Almost 60 Countries. *Science Alert*. Retrieved from https://www.sciencealert.com/solar-power-is-now-the-cheapest-energy-in-the-world

Nijhuis, M. (2018, February 13). 'I'm Just More Afraid of Climate Change Than I Am of Prison'. *The New York Times Magazine*. Retrieved from https://www.nytimes.com/2018/02/13/magazine/afraid-climate-change-prison-valve-turners-global-warming.html

Nolt, J. (2011a). How Harmful Are the Average American's Greenhouse Gas Emissions? *Ethics, Policy & Environment*, *14*(1), 3–10. https://doi.org/10.1080/21550085.2011.561584

Nolt, J. (2011b). Nonanthropocentric climate ethics. *WIRES Climate Change*, *2*, 701–11.

Nolt, J. (2013). The Individual's Obligation to Relinquish Unnecessary Greenhouse- Gas-Emitting Devices. *Philosophy and Public Issues*, *3*(1), 139–65.

Nordhaus, W. D., & Boyer, J. (2000). *Warming the World: Economic Models of Global Warming*. Cambridge, MA: MIT Press.

Norman, J. (2015, October 19). Carmichael mine: No federal subsidies for Adani but "strong moral case" for coal, Energy Minister Josh Frydenberg says. *ABC News*. Retrieved from http://www.abc.net.au/news/2015-10-18/no-federal-subsidies-carmichael-mine-strong-moral-case-for-coal/6863702

O'Connor, B. (2017, August 8). How Fossil Fuel Money Made Climate Change Denial the Word of God. *Splinter*. Retrieved from http://splinternews.com/how-fossil-fuel-money-made-climate-denial-the-word-of-g-1797466298

Ocasio-Cortez, A. (2018). Select Committee on a Green New Deal: Draft Text for Proposed Addendum to House Rules For 116th Congress of the United States. Retrieved November 16, 2018, from https://ocasio2018.com/green-new-deal

Okereke, C. (2011). Moral Foundations for Global Environmental and Climate Justice. *Royal Institute of Philosophy Supplement*, *69*, 117–135. https://doi.org/10.1017/S1358246111000245

Orvis, R. (2014, November 17). What China's Climate Commitment Means for Its Electricity Sector. *Greentech Media*.

Osann, E., & Hayat, B. (2014). *Protecting Our Waters from Toxic Power Plant Discharges and Reducing Water Use in the Process*. Retrieved from https://www.nrdc.org/sites/default/files/power-plant-cooling-FS.pdf

Osborne, J. (2018, March 7). Perry calls shift away from fossil fuels "immoral." *The Houston Chronicle*. Retrieved from https://www.chron.com/business/energy/article/Perry-drops-in-on-CERA-12734786.php

Ostrom, E. (1990). *Governing the Commons*. Cambridge: Cambridge University Press.

Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change*, *20*(4), 550–557. https://doi.org/10.1016/j.gloenvcha.2010.07.004

Oxfam. (2015). *Extreme carbon inequality*. Retrieved from https://www.oxfamamerica.org/explore/research-publications/extreme-carbon-inequality/

Palmer, B. (2015, March 27). An Argument of Degree. *Natural Resource Defence Council*. Retrieved from https://www.nrdc.org/onearth/argument-degree

Palmer, K., Tate, J. E., Wadud, Z., & Nellthorp, J. (2018). Total cost of ownership and market share for hybrid and electric vehicles in the UK, US and Japan. *Applied Energy*, *209*(October 2017), 108–119. https://doi.org/10.1016/j.apenergy.2017.10.089

Parfit, D. (1983). Energy Policy and the Further Future : The Social Discount Rate. In N. . Totowa (Ed.), *Energy and the Future* (pp. 31–7). Rowman & Littlefield.

Parfit, D. (1984). *Reasons and Persons*. Oxford: Clarendon Press.

Park, C.-E., Jeong, S.-J., Joshi, M., Osborn, T. J., Ho, C.-H., Piao, S., … Feng, S. (2018). Keeping global warming within 1.5 °C constrains emergence of aridification. *Nature Climate Change*, *8*, 70–74. https://doi.org/10.1038/s41558-017-0034-4

Parkinson, G. (2016, February 25). The Myth About Renewable Energy Subsidies. *Clean Technica*.

Parkinson, G. (2017, January 14). Deutsche Bank Predicts Solar Grid Parity In 80% Of Global Market By 2017. *Clean Technica*. Retrieved from https://cleantechnica.com/2015/01/14/deutsche-bank-predicts-solar-grid-parity-80-global-market-2017/

Parkinson, G. (2018, November 20). Unsubsidised wind and solar now cheapest form of bulk energy. *Renew Economy*. Retrieved from https://reneweconomy.com.au/unsubsidised-wind-and-solar-now-cheapest-form-of-bulk-energy-96453/

Parry, I., Veung, C., & Heine, D. (2014). *How Much Carbon Pricing Is in Countries' Own Interests? The Critical Role of Co-Benefits. IMF Working Paper*. https://doi.org/10.1142/S2010007815500190

Patterson, J. J., Thaler, T., Hoffmann, M., Hughes, S., Oels, A., Chu, E., … Jordan, A. (2018). Political feasibility of 1.5°C societal transformations: the role of social justice. *Current Opinion in Environmental Sustainability*, *31*, 1–9. https://doi.org/10.1016/j.cosust.2017.11.002

Paun, A., Night, Z., & Chan, W.-S. (2015). *Stranded Assets: What Next?* Retrieved from http://www.businessgreen.com/digital_assets/8779/hsbc_Stranded_assets_what_next.pdf

Paxson, C. H. (2013). Coal Divestment Update. Retrieved from http://brown.edu/about/administration/president/2013-10-27-coal-divestment-update

Pehl, M., Arvesen, A., Humpenöder, F., Popp, A., Hertwich, E. G., & Luderer, G. (2017). Understanding future emissions from low-carbon power systems by integration of life-cycle assessment and integrated energy modelling. *Nature Energy*, *2*(12), 939–945. https://doi.org/10.1038/s41560-017-0032-9

Peters, G. P., Andrew, R. M., Canadell, J. G., Fuss, S., Jackson, R. B., Korsbakken, J. I., … Nakicenovic, N. (2017). Key indicators to track current progress and future ambition of the Paris Agreement. *Nature Climate Change*, *7*(118). https://doi.org/10.1038/nclimate3202

Pidcock, R. (2015, June 23). Tackling climate change will reap benefits for human health. *Carbon Brief*. Retrieved from https://www.carbonbrief.org/tackling-climate-change-will-reap-benefits-for-human-health

Pierre-Louis, K. (2018, January 3). Climate Fwd: *The New York Times*. Retrieved from https://www.nytimes.com/newsletters/2018/01/03/climate-change?nlid=67730819

Pogge, T. (2005). Severe Poverty as a Violation of Negative Duties. *Ethics & International Affairs*, *19*(1), 55–83. https://doi.org/10.1111/j.1747-7093.2005.tb00490.x

Pohlhaus, G. (2017). Varieties of Epistemic Injustice. In Ian James Kidd, J. Medina, & J. Gaile Pohlhaus (Eds.), *The Routledge Handbook of Epistemic Injustice*. London and New York: Routledge.

Pollin, R., Heintz, J., & Garrett-Peltier, H. (2009). *The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment*. Amherst. Retrieved from http://www.americanprogress.org/wp-content/uploads/issues/2009/06/pdf/peri_report_execsumm.pdf

Pope Francis. (2015). *Laudato Si: On Care for Our Common Home*. Vatican: The Word Among Us

Press.

Prehoda, E. W., & Pearce, J. M. (2017). Potential lives saved by replacing coal with solar photovoltaic electricity production in the U.S. *Renewable and Sustainable Energy Reviews*, *80*(June 2016), 710–715. https://doi.org/10.1016/j.rser.2017.05.119

Pretis, F., Schwarz, M., Tang, K., Haustein, K., & Allen, M. R. (2018). Uncertain impacts on economic growth when stabilizing global temperatures at 1.5°C or 2°C warming. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *376*(2119), 20160460. https://doi.org/10.1098/rsta.2016.0460

Price, T. (2017, July 17). The Last Auto Mechanic. *Medium*. Retrieved from https://medium.com/@tomprice_22461/the-last-auto-mechanic-841adec75498

Project DrawDown. (2017). Summary of Solutions by Overall Rank. Retrieved December 18, 2017, from http://www.drawdown.org/solutions-summary-by-rank

Pulido, L. (2000). Rethinking Environmental Racism: White Privilege and Urban Development in Southern California. *Annals of the Association of American Geographers*, *90*(1), 12–40.

Raftery, A. E., Zimmer, A., Frierson, D. M. W., Startz, R., & Liu, P. (2017). Less than 2 °c warming by 2100 unlikely. *Nature Climate Change*, *7*(9), 637–641. https://doi.org/10.1038/nclimate3352

Ram, M., Bogdanov, D., Aghahosseini, A., Oyewo, S., Gulagi, A., Child, M., … Fell, H.-J. (2017). *Global Energy System Based on 100% Renewable Energy Power Sector*. Retrieved from https://energywatchgroup.org/wp-content/uploads/2017/11/Full-Study-100-Renewable-Energy-Worldwide-Power-Sector.pdf

Rawls, J. (2001). *Justice as Fairness: A Restatement*. (E. Kelly, Ed.). Cambridge, MA: Harvard University Press.

Redman, J. (2017). *Dirty Energy Dominance: Dependent on Denial – How the U.S. Fossil Fuel Industry Depends on Subsidies and Climate Denial*. Retrieved from http://priceofoil.org/content/uploads/2017/10/OCI_US-Fossil-Fuel-Subs-2015-16_Final_Oct2017.pdf

Resesz, R. L. (2017, March 25). Why Coal Can't Compete on a True Level Playing Field. *Wall Street Journal*.

Ressler, L., & Schellentrager, M. (2011). *A Complete Guide to Reinvestment*. Retrieved from https://s3.amazonaws.com/s3.350.org/images/Reivestment_Guide.pdf

Revill, C., & Harris, V. (2017). *2020 The Climate Turning Point*. Retrieved from http://www.mission2020.global/2020 The Climate Turning Point.pdf

Ripple, W. J., Wolf, C., Newsome, T. M., Galetti, M., Alamgir, M., Crist, E., … Laurance, W. F. (2017). World Scientists' Warning to Humanity: A Second Notice. *BioScience*, *67*(12), 2017–2019. https://doi.org/10.1093/biosci/bix125

Ritter, D. (2018). *The Coal Truth*. Crawley: UWA Publishing.

Ro, S. (2014, July 13). The Past Performance Of A Mutual Fund Is Not An Indicator Of Future Outcomes … 96% Of The Time. *Business Insider*. Retrieved from https://www.businessinsider.com/mutual-fund-performance-persistence-2014-7

Roberts, A. (2009). Introduction. In A. Roberts & T. G. Ash (Eds.), *Civil Resistance and Power Politics: The Experience of Non-violent Action from Gandhi to the Present*. Oxford University Press.

Roberts, D. (2015a, October 12). The International Energy Agency consistently underestimates wind and solar power. Why? *Vox*.

Roberts, D. (2015b, November 8). What critics of the Keystone campaign misunderstand about climate activism. *Vox*. Retrieved from http://www.vox.com/2015/11/8/9690654/keystone-climate-activism

Roberts, D. (2017a, August 31). Wind power costs could drop 50%. Solar PV could provide up to 50% of global power. Damn. *Vox*. Retrieved from https://www.vox.com/energy-and-environment/2017/8/30/16224582/wind-solar-exceed-expectations-again

Roberts, D. (2017b, September 13). The world's largest car market just announced an imminent end to gas and diesel cars. *Vox*. Retrieved from https://www.vox.com/energy-and-environment/2017/9/13/16293258/ev-revolution

Roberts, D. (2017c, November 10). Conservatives probably can't be persuaded on climate change. So now what? *Vox*. Retrieved from https://www.vox.com/energy-and-environment/2017/11/10/16627256/conservatives-climate-change-persuasion

Roberts, D. (2018a, March 30). Shell's vision of a zero carbon world by 2070, explained. *Vox*.

Roberts, D. (2018b, April 19). UK emissions are falling fast. Now the country might try for zero. *Vox*. Retrieved from https://www.vox.com/energy-and-environment/2018/4/18/17185496/uk-climate-change-g7-coal-emissions

Roberts, D. (2018c, April 28). Electric buses are coming, and they're going to help fix 4 big urban problems. *Vox*. Retrieved from https://www.vox.com/energy-and-environment/2017/10/24/16519364/electric-buses

Roberts, D. (2018d, November 15). Alexandria Ocasio-Cortez is already pressuring Nancy Pelosi on climate change. *Vox*. Retrieved from https://www.vox.com/energy-and-environment/2018/11/14/18094452/alexandria-ocasio-cortez-nancy-pelosi-protest-climate-change-2020?fbclid=IwAR17Xpuh-gt4Odpd4uDpUVkRTEk6NzR0SDJjQ85bb4auzlAUgADZNWHgwqk

Robock, A. (2008). 20 reasons why geoengineering may be a bad idea. *Bulletin of the Atomic Scientists*, *64*(2), 14–18.

Rodriguez, J. (2014). Water scarcity: Another good reason to shift to renewables. Retrieved from http://reneweconomy.com.au/2014/water-scarcity-another-good-reason-to-shift-to-renewables-92358

Rogelj, J., Luderer, G., Pietzcker, R. C., Kriegler, E., Schaeffer, M., Krey, V., & Riahi, K. (2015). Energy system transformations for limiting end-of-century warming to below 1.5 °C. *Nature Climate Change*, *5*, 519–527. Retrieved from http://www.nature.com/nclimate/journal/v5/n6/full/nclimate2572.html

Rogers, S. (2012, May 24). Bobby Kennedy on GDP: "measures everything except that which is worthwhile." *The Guardian*.

Romm, J. (2016, June 17). The battery miracle will transform both transportation and power generation. *Think Progress*. Retrieved from https://thinkprogress.org/the-battery-miracle-will-transform-both-transportation-and-power-generation-3ac934e9f2c5/

Roser, D., & Heyward, C. (2016). Introduction. In C. Heyward & D. Roser (Eds.), *Climate Justice in a Non-Ideal World*. Oxford: Oxford University Press.

Roser, D., & Seidel, C. (2017). *Climate Justice: An Introduction*. New York: Routledge.

Ryall, J. (2014, October 14). Australia's Prime Minister: "Coal Is Good for Humanity." *Mashable*.

Ryan, J. (2018, March 26). Half of All U.S. Coal Plants Would Lose Money Without Regulation. *Bloomberg*.

Sachs, J. (2016, October 31). Investment for Sustainable Growth. *Project Syndicate*. Retrieved from https://www.project-syndicate.org/commentary/investment-for-sustainable-growth-by-jeffrey-d-sachs-2016-10?barrier=accesspaylog

Sanford, T., Frumhoff, P. C., Luers, A., & Gulledge, J. (2014). The climate policy narrative for a dangerously warming world. *Nature Climate Change*, *4*(3), 164–166. https://doi.org/10.1038/nclimate2148

Scavenius, T. (2018). Climate Change and Moral Excuse: The Difficulty of Assigning Responsibility to Individuals. *Journal of Agricultural and Environmental Ethics*, *31*(1), 1–15. https://doi.org/10.1007/s10806-018-9705-z

Scheffler, S. (2006). Is the Basic Structure Basic? In C. Sypnowich (Ed.), *The Egalitarian Conscience: Essays in Honour of G. A. Cohen* (pp. 102–129). New York: Oxford University Press. https://doi.org/10.1093/0199281688.001.0001

Schleussner, C. F., Lissner, T. K., Fischer, E. M., Wohland, J., Perrette, M., Golly, A., … Schaeffer, M. (2016). Differential climate impacts for policy-relevant limits to global warming: The case of 1.5 °c and 2 °c. *Earth System Dynamics*, *7*(2), 327–351. https://doi.org/10.5194/esd-7-327-2016

Schlosberg, D. (2007). *Defining Environmental Justice: Theories, Movements, and Nature*. United Kingdom: Oxford University Press.

Schlosberg, D., & Carruthers, D. (2010). Indigenous Struggles, Environmental Justice, and Community Capabilities. *Global Environmental Politics*, *10*(4), 12–35.

Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: Climate change and the discourse of environmental justice. *WIRES Climate Change*, *5*, 359–74.

Schwartz, J. D. (2011a). Americans Work 2 Hours Each Day To Pay For Their Cars. Retrieved November 18, 2018, from http://www.theurbancountry.com/2011/05/americans-work-2-hours-each-day-to-pay.html

Schwartz, J. D. (2011b). Motorists Prime Beneficiaries of Socialism. Retrieved November 18, 2018, from http://www.theurbancountry.com/2011/08/motorists-prime-beneficiaries-of.html

Schwerhoff, G., & Sy, M. (2018). Developing Africa's energy mix. *Climate Policy*, *0*(0), 1–17. https://doi.org/10.1080/14693062.2018.1459293

Scott, V., Haszeldine, R. S., Tett, S. F. B., & Oschlies, A. (2015). Fossil fuels in a trillion tonne world. *Nature Climate Change*, *5*(May).

Seager, J. (2009). Death by degrees: Taking a Feminist Hard Look at the 2 Degree Climate Policy. *Women, Gender & Research*, *18*(3–4), 11–21. https://doi.org/10.1136/bmj.295.6613.1599

Seba, T. (2014). *Clean Disruption of Energy and Transportation: How Silicon Valley Will Make Oil, Nuclear, Natural Gas, Coal, Electric Utilities and Conventional Cars Obsolete by 2030*. Silicon Valley, CA: Clean Planet Ventures.

Shankleman, J. (2016, October 15). Two Charts That Show How Renewable Energy Has Blown Away Expectations. *Bloomberg*. Retrieved from https://www.bloomberg.com/news/articles/2016-10-15/iea-to-lift-solar-wind-outlook-after-decade-of-underestimates

Sharife, K. (2010, May 25). South Africa's dirty secret: Eskom and the Medupi power plant. *Huffington Post*. Retrieved from http://www.huffingtonpost.com/khadija-sharife/south-africas-dirty-secre_b_576996.html

Shepherd, J. (2015, August 3). Can't we just remove carbon dioxide from the air to fix climate change? Not yet. *The Conversation*. Retrieved from https://theconversation.com/cant-we-just-remove-carbon-dioxide-from-the-air-to-fix-climate-change-not-yet-45621

Sheppard, K. (2014, March 27). World's Biggest Coal Company, World's Biggest PR Firm Pair Up To Promote Coal For Poor People. *Huffington Post*. Retrieved from https://www.huffingtonpost.com/2014/03/27/peabody-burson-marstellar-coal_n_5044962.html

Sherwin, S. (2012). Relational Autonomy and Global Threats. In D. Z. Llewellyn (Ed.), *Being Relational*. UBC Press.

Shindell, D., Faluvegi, G., Seltzer, K., & Shindell, C. (2018). Quantified, Localized Health Benefits of Accelerated Carbon Dioxide Emissions Reductions. *NCC Submitted*, 1–49. https://doi.org/10.1038/s41558-018-0108-y

Shrader-Frechette, K. (2017). Ethical Energy Choices. In S. M. Gardiner & A. Thompson (Eds.), *The Oxford Handbook of Environmental Ethics* (pp. 391–403). Oxford University Press.

Shue, H. (1993). Subsistence Emissions and Luxury Emissions. *Law and Policy*, *15*(1), 39–60. https://doi.org/10.3366/ajicl.2011.0005

Shue, H. (2014a). Avoidable Necessity: global warming, international fairness and alternative energy. In *Climate Justice: Vulnerability and Protection*. Oxford: Oxford University Press.

Shue, H. (2014b). *Climate Justice: Vulnerability and Protection*. Oxford: Oxford University Press.

Shue, H. (2016). High Stakes : Inertia or Transformation? *Midwest Studies In Philosophy*, *XL*, 63–75.

Shue, H. (2017). Climate Dreaming: Negative Emissions, Risk Transfer, and Irreversibility. *Journal of Human Rights and the Environment*, *Forthcomin*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2940987

Singer, P. (1972). Famine, Affluence and Morality. *Philosophy & Public Affairs*, *1*(3), 229–243.

Singer, P. (2002). *One World: The Ethics of Globalization*. New Haven & London: Yale University Press.

Singer, P. (2010). One Atmosphere. In S. M. Gardiner, S. Caney, D. Jamieson, & H. Shue (Eds.), *Climate Ethics: Essential Readings*. New York: Oxford University Press.

Sinnott-Armstrong, W. (2010). It's Not My Fault. In S. M. Gardiner, H. Shue, D. Jamieson, & S. Caney (Eds.), *Climate Ethics: Essential Readings* (pp. 332–346). New York: Oxford University Press.

Sirota, D. (2018, November 15). Big Oil v the planet is the fight of our lives. Democrats must choose a side. *The Guardian*. Retrieved from https://www.theguardian.com/commentisfree/2018/nov/15/climate-change-democrats-oil-gas

Sjöstrand, M., Eriksson, S., Juth, N., & Helgesson, G. (2013). Paternalism in the Name of Autonomy. *Journal of Medicine and Philosophy*, *38*, 710–724. https://doi.org/10.1093/jmp/jht049

Skuce, A. (2013, June 11). A Miss by Myles: Why Professor Allen is wrong to think carbon capture and storage will solve the climate crisis. *Skeptical Science*. Retrieved from https://www.skepticalscience.com/MissbyMyles.html

Slezak, M. (2017, December 3). Adani coalmine project: China Construction Bank won't grant loan, PR firm says. *The Guardian*.

Smith, A. (2013). *The Climate Bonus: co-benefits of climate policy*. Routledge.

Smith, L. (2017, November 8). Statement from Chairman Lamar Smith (R-Texas): Geoengineering: Innovation, Research, and Technology. *Committee on Science, Space and Technology*. Retrieved from https://science.house.gov/sites/republicans.science.house.gov/files/documents/HHRG-115-SY18-WState-S000583-20171108_0.pdf

Smith, O. (2017, July 26). How does Britain compare with the rest of the world when it comes to pollution? *The Telegraph*. Retrieved from https://www.telegraph.co.uk/travel/maps-and-graphics/co2-emissions-per-capita-ranking/

Smith, R. (2015, June 21). China's Communist-Capitalist Ecological Apocalypse. *Truthout*.

Smith, S. (2013, August 28). Hippies and libertarians have become unlikely allies in a war against solar power. *Quartz*. Retrieved from https://qz.com/119215/hippies-and-libertarians-have-become-unlikely-allies-in-a-war-against-solar-power/

Sobrevila, C. (2008). The Role of Indigenous Peoples in Biodiversity Conservation; The Natural but

Often Forgotten Partners. *The World Bank*, (44300), 102. Retrieved from https://scholar.google.es/scholar?hl=es&as_sdt=0%2C5&q=The+role+of+indigenous+peoples+in+biodiversity+conservation%3A+the+natural+but+often+forgotten+partners.&btnG=%0Ahttp://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSit

Solnit, R. (2006). *Hope in the Dark*. New York, NY: Nation Books.

Solomon, J. (2015, December 11). The Rise, Fall, and Return of 1.5°C in the Global Climate Negotiations. *Common Dreams*. Retrieved from https://www.commondreams.org/views/2015/10/21/rise-fall-and-return-15degc-global-climate-negotiations

Sovacool, B. K. (2016). How long will it take? Conceptualizing the temporal dynamics of energy transitions. *Energy Research & Social Science*, *13*, 202–215. https://doi.org/10.1016/j.erss.2015.12.020

Spivak, G. C. (1988). Can the Subaltern Speak? In C. Nelson & L. Grossberg (Eds.), *Marxism and the Interpretation of Culture* (pp. 271–313). Basingstoke: Macmillan Education.

Stanley, J. (2015). *How Propaganda Works*. Princeton, NJ: Princeton University Press.

Starr, D. (2016, August 25). Just 90 companies are to blame for most climate change, this “carbon accountant” says. *Science Magazine*.

Steffen, A. (2017a). If people actually understood the speed with which humanity’s windows of opportunity are closing, the young would be rioting in the streets. Retrieved March 24, 2017, from https://twitter.com/AlexSteffen/status/845337674466676741

Steffen, A. (2017b, December 7). On Climate, Speed is Everything. *Medium*. Retrieved from https://thenearlynow.com/on-climate-speed-is-everything-5bc47203bc7a

Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., … Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences*, *115*(33), 8252–8259. https://doi.org/10.1073/pnas.1810141115

Stern, N. (2013). Fostering Growth and Poverty Reduction in a World of Immense Risk. Retrieved from http://www.wri.org/event/2013/04/fostering-growth-and-poverty-reduction-world-immense-risk

Stern, N. (2015). *Why Are We Waiting? The Logic, Urgency, and Promise of Tackling Climate Change*. Cambridge, MA: MIT Press.

Stern, N. (2016). Economics: Current climate models are grossly misleading. *Nature*, *530*(7591), 407–409. https://doi.org/10.1038/530407a

Stiglitz, J. (2018, May 8). How Costa Rica Gets It Right. *Project Syndicate*. Retrieved from https://www.project-syndicate.org/commentary/costa-rica-enlightenment-model-by-joseph-e--stiglitz-2018-05

Stoerk, T., Wagner, G., & Ward, R. E. T. (2018). Recommendations for Improving the Treatment of Risk and Uncertainty in Economic Estimates of Climate Impacts in the Sixth Intergovernmental Panel on Climate Change Assessment Report. *Review of Environmental Economics and Policy*, (June), 1–7. https://doi.org/10.1093/reep/rey005

Supran, G., & Oreskes, N. (2017). Assessing ExxonMobil’s climate change communications (1977-2014). *Environ. Res. Lett*, *12*(084019).

Sussams, L., & Leaton, J. (2017). *Expect the Unexpected: The Disruptive Power of Low-Carbon Technology*. London. Retrieved from http://www.carbontracker.org/wp-content/uploads/2017/02/Expect-the-Unexpected_CTI_Imperial.pdf

Suzuki, D. (2018, January 21). Large dams fail on climate change and Indigenous rights. *Cowichan*

Valley Citizen. Retrieved from https://www.cowichanvalleycitizen.com/community/column-david-suzuki-large-dams-fail-on-climate-change-and-indigenous-rights/

Tabuchi, H. (2017, July 8). Rooftop Solar Dims Under Pressure From Utility Lobbyists. *The New York Times*.

Tan, K.-C. (2015). Individual duties of climate justice under non-ideal conditions. In J. Moss (Ed.), *Climate Change and Justice* (pp. 129–147). Cambridge. Retrieved from Cambrige University Press

Tanaka, K., & O'Neill, B. C. (2018). The Paris Agreement zero-emissions goal is not always consistent with the 1.5 °C and 2 °C temperature. *Nature Climate Change*. https://doi.org/10.1038/s41558-018-0097-x

Terstein, Z. (2018, November 12). This teen activist dropped out of high school to focus on climate. *Grist*. Retrieved from https://grist.org/article/this-teen-activist-dropped-out-of-high-school-to-focus-on-climate

Tessman, L. (2005). *Burdened Virtues: Virtue Ethics for Liberatory Struggles*. Oxford University Press.

The Movement for Black Lives. (2016). Invest-Divest. Retrieved August 13, 2016, from https://policy.m4bl.org/invest-divest/

The New Climate Economy. (2018). Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action In Urgent Times, 207. Retrieved from https://newclimateeconomy.report/2018/

The Royal Society. (2017). *Climate updates: What have we learnt since the IPCC 5th Assessment Report?* Retrieved from https://royalsociety.org/~/media/policy/Publications/2017/27-11-2017-Climate-change-updates-report.pdf

The World Bank. (2012). *Turn Down the Heat: Why a 4 Degree Celsius World Must Be Avoided*. Washington DC. Retrieved from http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf

Thompson, A. (2010). Radical hope for living well in a warmer world. *Journal of Agricultural and Environmental Ethics*, *23*(1–2), 43–59. https://doi.org/10.1007/s10806-009-9185-2

Thompson, A., & Bendik-Keymer, J. (2012). Introduction: Adapting Humanity. In A. Thompson & J. Bendik-Keymer (Eds.), *Ethical Adaptation to Climate Change: Human Virtues of the Future* (pp. 1–24). MIT Press.

Thompson, C. (2016). No Parking Here. *Mother Jones*. Retrieved from http://www.motherjones.com/environment/2016/01/future-parking-self-driving-cars/

Thompson, T. M., Rausch, S., Saari, R. K., & Selin, N. E. (2014). A systems approach to evaluating the air quality co-benefits of US carbon policies. *Nature Climate Change*. https://doi.org/10.1038/nclimate2342

Tol, R. S. J. (2007). Europe's long-term climate target: A critical evaluation. *Energy Policy*, *35*(1), 424–432. https://doi.org/10.1016/j.enpol.2005.12.003

Trinks, A., Scholtens, B., Mulder, M., & Dam, L. (2018). Fossil Fuel Divestment and Portfolio Performance. *Ecological Economics*, *146*(July 2017), 740–748. https://doi.org/10.1016/j.ecolecon.2017.11.036

Tschakert, P. (2015). 1.5°C or 2°C: a conduit's view from the science-policy interface at COP20 in Lima, Peru. *Climate Change Responses*, *2*(1), 3. https://doi.org/10.1186/s40665-015-0010-z

Turner, A. (2018, November 23). A zero-carbon economy is both feasible and affordable. *Financial Times*. Retrieved from https://www.ft.com/content/1b56f762-ec08-11e8-89c8-d36339d835c0

Ullmann, K. (2013). Simply, we ought to divest. Retrieved from http://www.insidevandy.com/opinion/article_21f3fd92-a3af-11e2-be92-0019bb30f31a.html

UNFCCC. (1992). *United Nations Framework Convention on Climate Change*. Retrieved from http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf

UNFCCC. Adoption of the Paris Agreement: Draft Decision, Pub. L. No. FCCC/CP/2015/L.9/Rev.1 (2015). United Nations Framework Convention on Climate Change. Retrieved from http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

Union of Concerned Scientists. (2017). *Going from Pump to Plug: Adding Up the Savings from Electric Vehicles*. Retrieved from www.ucsusa.org/EV-savings

United Nations Development Programme. (2013). *Human Development Report 2013*. New York. Retrieved from http://hdr.undp.org/hdr4press/press/report/summaries/HDR2013_EN_Summary.pdf

United Nations Development Programme. (2016). Table 1: Human Development Index and its components. *UNDP Human Development Reports*. Retrieved from http://hdr.undp.org/en/composite/HDI

Unmüßig, B. (2018, November 1). A Radically Realistic Climate Vision. *Project Syndicate*. Retrieved from https://www.project-syndicate.org/commentary/ipcc-report-overcoming-climate-crisis-by-barbara-unmuessig-2018-11

Valentini, L. (2012). Ideal vs. Non-ideal Theory: A Conceptual Map. *Philosophy Compass*, *7*(9), 654–664. https://doi.org/10.1111/j.1747-9991.2012.00500.x

van Vuuren, D. P., Stehfest, E., Gernaat, D. E. H. J., van den Berg, M., Bijl, D. L., de Boer, H. S., … van Sluisveld, M. A. E. (2018). Alternative pathways to the 1.5 °C target reduce the need for negative emission technologies. *Nature Climate Change*, 1. https://doi.org/10.1038/s41558-018-0119-8

Vaughan, A. (2018, March 18). Ban new petrol and diesel cars in 2030, not 2040, says thinktank. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2018/mar/18/uk-should-bring-2040-petrol-and-diesel-car-ban-forward-2030-green-alliance

Vaughan, N. E., Gough, C., K, A., K, A., Azar C, J. D. J. A. and M. N., al, B. M. et, … Wiltshire A, D.-B. T. and J. C. D. (2016). Expert assessment concludes negative emissions scenarios may not deliver. *Environmental Research Letters*, *11*(9), 095003. https://doi.org/10.1088/1748-9326/11/9/095003

Vorrath, S. (2017, December 6). The insanity of burning coal for power as solar costs plunge to 1c/kWh by 2020. *Renew Economy*. Retrieved from http://reneweconomy.com.au/the-insanity-of-burning-coal-for-power-as-solar-costs-plunge-to-1ckwh-by-2020-47928/

Wallace-Wells, D. (2018, October 10). UN Says Climate Genocide Is Coming. It's Actually Worse Than That. *New York Magazine*. Retrieved from https://nymag.com/intelligencer/2018/10/un-says-climate-genocide-coming-but-its-worse-than-that.html

Warren, R., Price, J., Graham, E., Forstenhaeusler, N., & Van Der Wal, J. (2018). The projected effect on insects, vertebrates, and plants of limiting global warming to 1.5°C rather than 2°C. *Science*, *360*(6390), 791–795. https://doi.org/10.1126/science.aar3646

Washington, N., & Kelly, D. (2016). Who's Responsible for This? Moral Responsibility, Externalism, and Knowledge about Implicit Bias. In M. Brownstein & J. Saul (Eds.), *Implicit Bias and Philosophy: Moral Responsibility, Structural Injustice, and Ethics* (Vol. 2). Oxford University Press.

Watson Institute for International Studies. (2012). *The Climate Paradox*. United States: Brown University. Retrieved from http://vimeo.com/45150620

Watts, J. (2017, November 16). Indigenous groups win greater climate recognition at Bonn summit.

The Guardian. Retrieved from https://www.theguardian.com/environment/2017/nov/15/indigenous-groups-win-greater-climate-recognition-at-bonn-summit

Watts, N., Adger, W. N., Agnolucci, P., Blackstock, J., Byass, P., Cai, W., … Costello, A. (2015). Health and climate change: Policy responses to protect public health. *The Lancet*, *386*(10006), 1861–1914. https://doi.org/10.1016/S0140-6736(15)60854-6

Watts, N., Adger, W. N., Ayeb-Karlsson, S., Bai, Y., Byass, P., Campbell-Lendrum, D., … Costello, A. (2017). The Lancet Countdown: tracking progress on health and climate change. *The Lancet*, *389*(10074), 1151–1164. https://doi.org/10.1016/S0140-6736(16)32124-9

Weber, B. (2014, February 20). Federal study says oil sands toxins are leaching into groundwater, Athabasca River. *The Globe and Mail*. Retrieved from https://beta.theglobeandmail.com/news/national/federal-study-says-oil-sands-toxins-are-leaching-into-groundwater-athabasca-river/article17016054/

Weintraub, R. (1995). What Was Hume's Contribution to the Problem of Induction? *The Philosophical Quarterly*, *45*(181), 460–470. Retrieved from https://www.businessinsider.com/mutual-fund-performance-persistence-2014-7

Wenar, L. (2016). *Blood Oil: Tyrants, Violence, and the Rules that Run the World*. New York, NY: Oxford University Press.

West, J. J., Smith, S. J., Silva, R. A., Naik, V., Zhang, Y., Adelman, Z., … Lamarque, J.-F. (2013). Co-benefits of mitigating global greenhouse gas emissions for future air quality and human health. *Nature Climate Change*, *3*(10), 885–889. https://doi.org/10.1038/nclimate2009

Westervelt, A. (2018a). Drilled: A True Crime Podcast About Climate Change. Retrieved November 18, 2018, from https://www.stitcher.com/podcast/range/drilled

Westervelt, A. (2018b, November 17). Exploiting Scientists Kyryponite. *Drilled*. Retrieved from https://podtail.com/podcast/drilled/exploiting-scientists-kryptonite-certainty/

Whitehouse, S. (2018). The Koch Brothers & Trump. In *Living on Earth*. Steve Curwood. Retrieved from https://www.loe.org/shows/segments.html?programID=18-P13-00019&segmentID=1

Whyte, K. (2017). Way Beyond the Lifeboat : An Indigenous Allegory of Climate Justice. In D. Munshi, K.-K. Bhavnani, J. Foran, & P. Kurian (Eds.), *Climate Futures: Reimagining Global Climate Justice*. University of California Press.

Whyte, K. P. (2011). The Recognition Dimensions of Environmental Justice in Indian Country. *Environmental Justice*, *4*(4). https://doi.org/10.1089/env.2011.0036

Whyte, K. P. (2016a). Is it Colonial Déjà Vu? Indigenous Peoples and Climate Injustice. In J. Adamson, M. Davis, & H. Huang (Eds.), *Humanities for the Environment: Integrating Knowledge, Forging New Constellations of Practice* (pp. 88–104). Earthscan. Retrieved from https://www.routledge.com/Humanities-for-the-Environment-Integrating-knowledge-forging-new-constellations/Adamson-Davis/p/book/9781138188167

Whyte, K. P. (2016b, September 16). Why the Native American pipeline resistance in North Dakota is about climate justice. *The Conversation*. Retrieved from https://theconversation.com/why-the-native-american-pipeline-resistance-in-north-dakota-is-about-climate-justice-64714

Williston, B. (2012). Climate Change and Radical Hope. *Ethics & the Environment*, *17*(2).

Williston, B. (2015). *The Anthropocene Project: Virtue in the Age of Climate Change*. Oxford University Press.

World Bank. (2018a). CO2 emissions (metric tons per capita). Retrieved June 19, 2018, from https://data.worldbank.org/indicator/EN.ATM.CO2E.PC

World Bank. (2018b). World Development Indicators. Retrieved June 19, 2018, from https://datacatalog.worldbank.org/dataset/world-development-indicators

World Health Organization. (2014). 7 million premature deaths annually linked to air pollution. Retrieved from http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/

Wright, J., Bischof-Niemz, T., Calitz, J., & Mushwana, C. (2016). *Least-cost electricity mix for South Africa until 2040*. Cape Town. Retrieved from https://www.researchgate.net/publication/309576629_Least-cost_electricity_mix_for_South_Africa_by_2040

Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, *12*(7). https://doi.org/10.1088/1748-9326/aa7541

Xu, Y., & Ramanathan, V. (2017). Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes. *Proceedings of the National Academy of Sciences*, 1–9. https://doi.org/10.1073/pnas.1618481114

Young, I. M. (2011). *Responsibility for Justice*. New York: Oxford University Press.

Zagzebski, L. (2011). Exemplarist Virtue Theory. *Virtue and Vice, Moral and Epistemic*, *41*(1–2), 39–55. https://doi.org/10.1002/9781444391398.ch3

Zaitchik, A. (2017, December 27). Water is Life. *The Intercept*. Retrieved from https://theintercept.com/2017/12/27/peru-amazon-oil-pollution-indigenous-protest/