COP26 Youth Policy Briefs

JUST ENERGY TRANSITIONS

Authors: Cullen Chosy, Chris Conrad, Morgan King, Sally Matson, Simantini Mitra-Behura, Claire Petersen, and Matthew Salah

We are an interdisciplinary group of scholars from the United Kingdom (UK) and United States (US) working across fields relevant to climate change policy. This document is intended to provide background on climate issues as they pertain to Just Energy Transitions, as well as our recommendations for how the UK and US might focus their relevant climate change policies.

The concept of a 'just transition'[1] has considerably broadened since it was first established in the 1990's by North American trade unionists hoping to lessen job losses from coal.[2] It has since shifted to include the priorities of both climate and labor activists as they push for a future that is both environmentally and economically liveable. The environmental justice movement — a response to systems of environmental racism that cause disproportionate harm to low-income and communities of color by pollutive practices — further strengthened (and widened) the goals of a just energy transition. The scope and ambition of the just transitions movement is perhaps best captured by the Climate Justice Alliance, which writes that the concept refers to "a host of strategies to transition whole communities to build thriving economies that provide dignified, productive and ecologically sustainable livelihoods, democratic governance, and ecological resilience."[3]

By no means will this metamorphosis be easy. The unprecedented and rapid transition before us requires much more than efficiency improvements and tax incentives, although those things will certainly be necessary. It requires a wholesale system transformation, especially amongst wealthy countries. The Intergovernmental Panel on Climate Change (IPCC) 2018 special report on 1.5°C is unambiguous: "limiting global warming to 1.5°C… require[s] rapid and far-reaching transitions in energy, land, urban and infrastructure… and industrial systems… These system transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors."[4] Scientists are typically hesitant to comment on questions of social organization, so the experts do not mean this lightly: the unfettered pursuit of profit and endlessly rising consumption is not compatible with a safe and liveable planet.

Policymakers must take this fact seriously; system change means adopting creative and revolutionary approaches, not piecemeal reforms that tinker around the edges. The remainder of this policy brief offers a glimpse at what some of those changes could look like. Part 1 focuses on gaps in current global discourse that are preventing and / or delaying decarbonization. Part 2 then looks beyond decarbonization targets to outline the broader demands of a sustainable

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[1] *For more information on the **COP26 Youth Policy Briefs**, visit marshallcop26.wordpress.com/*
[2] https://www.oecd.org/environment/cc/g20-climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf
[3] https://climatejusticealliance.org/just-transition/
[4] https://www.ipcc.ch/sr15/resources/headline-statements/

economy that rejects the destructive policies characterizing the fossil fuel era. Finally, Part 3 discusses the great opportunity afforded by the climate transition: the chance to rework our economic system to improve social outcomes all while maintaining a safe and stable environment.

Part 1: Confronting Reality

For humanity to survive the climate crisis, COP26 must mark a major turning point in international negotiations. The targets set in the Paris Agreement, even if met, would result in 3 to 4°C[5] Celsius of warming, producing sea level rise, crop failure,[6] and extreme weather events that endanger the lives of hundreds of million[7] — if not billions[8] — worldwide. The current trajectory towards 4°C of warming, to quote leading climate scientist Kevin Anderson, "is incompatible with an organized global community."

[9]Even the supposedly "safe" limit of 1.5°C will be too much for many plant and animal ecosystems to handle and will expose 350 million additional people to water scarcity, according to a forthcoming IPCC report.[10] Exceeding 1.5°C may trigger climatic tipping points that accelerate warming even absent of additional human induced CO2 emissions,[11] plunging Earth into a near-permanent "hothouse" state inimical to human survival.[12] Without immediate decarbonization, a 1.5°C temperature increase could be observed as early as 2026,[13] though a short window still remains to prevent such an outcome.[14]

Fortunately, the Paris Agreement includes a built-in "ratchet" mechanism for updating and strengthening countries' Nationally Determined Contributions (NDCs) every 5 years. This autumn marks the 5 year anniversary of the Paris Agreement, and nations must agree to aggressive action if humanity is to avert ecological catastrophe. Most scientists estimate that rich countries — those primarily responsible for historical emissions — have just one decade[15] to completely stop emitting carbon.

Despite scientists' warnings, the global community has proven especially slow to act. Excluding the extreme right, most have accepted the reality of climate science. Yet emissions continue to rise. Mainstream political parties, especially in the Global North, have thus adopted their own form of denialism: they accept the basic scientific facts, but rely on pseudoscience to justify their lack of action. This section highlights the danger of three technical but widely accepted ideas about climate change, specifically focusing on what international negotiators can do to bring global discourse in line with reality.

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[5]https://nymag.com/intelligencer/2019/11/u-n-states-world-on-track-for-3-9-degrees-warming-by-2100.html
[6]https://earth.org/ipcc-draft-report-warns-of-accelerating-climate-tipping-points/
[7]https://www.nature.com/articles/s41558-018-0108-y
[8]https://www.theguardian.com/environment/2019/may/18/climate-crisis-heat-is-on-global-heating-four-degrees-2100-change-way-we-live
[9]https://grist.org/climate-change/2011-12-05-the-brutal-logic-of-climate-change/
[10]https://earth.org/ipcc-draft-report-warns-of-accelerating-climate-tipping-points/
[11]https://www.theguardian.com/environment/2021/jun/23/climate-change-dangerous-thresholds-un-report
[12]https://www.pnas.org/content/115/33/8252
[13]https://news.yahoo.com/crushing-climate-impacts-hit-sooner-010253436.html
[14]https://www.nature.com/articles/s41467-021-22884-9
[15]Climate Equity Reference Project of EcoEquity and the Stockholm Environment Institute

Embrace Post-Growth

Perhaps the largest failure of our climate response is the continued obsession with economic growth. Despite the obvious fact that a larger economy brings more of the planet into cycles of extraction, requires more energy, and admits more waste, top policymakers and economists continue to insist that we can simultaneously grow GDP and heal the planet. Upon closer inspection, however, "green growth" proves to be nothing but a fantasy.

Growth-driven increases in energy demand amongst Global North countries takes us two steps backwards for every step forward in lowering emissions. The latest empirical data suggest that emissions cannot be "decoupled" quickly enough from economic growth to keep us within 1.5 or even 2°C while global GDP continues to rise.[14,16] While occasional instances of *relative decoupling* (emissions growing more slowly than GDP) and *absolute decoupling* (emissions falling while GDP rises) occur, *sufficient absolute decoupling* (emissions falling fast enough to prevent catastrophic warming while GDP rises) remains a pipe dream.[16,17] It is simply not possible to bring renewable energy capacity online quickly enough to replace existing fossil fuels *and* keep pace with economic growth-driven increases in energy demand. Unfortunately, existing UN and IPCC research on pathways to low emissions tends to assume continued growth in GDP and energy demand.[17]

Thus, we join the recent call by scholars to model post-growth climate mitigation pathways that would aim to reduce emissions by reducing energy demand in the Global North, while reorienting the economy to maximize well-being via more equitable public provisioning of basic goods.

Prioritize Technologically Feasible Pathways

If growth won't save us, many hope technology will. To be sure, innovation in nearly every sector will be necessary to avert climate catastrophe, but technological progress is far from a panacea. It is of particular concern that the IPCC and others rely on unproven and risk-laden strategies — specifically Carbon Capture and Storage (CCS) and Bioenergy CCS (BECCS) — in their plans for decarbonization, which diplomats use to benchmark negotiations. BECCS, which entails planting trees to capture CO2, cutting down the trees, burning them for energy, and capturing the emitted CO2 for storage, is a core component of the vast majority of existing scenarios modeled by the UN and IPCC.[18] However, continuing to emit CO2 and betting on BECCS to remove CO2 from the atmosphere later is an unacceptable transfer of risk to future generations, given BECCS has not been proven to be scalable[19]: if BECCS fails, future generations will be trapped in a world of extreme climate change. Moreover, continued emissions may result in the crossing of environmental tipping points that will not be undone by the removal of CO2 from the atmosphere by BECCS.[18]

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[16] https://www.tandfonline.com/doi/full/10.1080/08911916.2020.1778866
[17] https://static1.squarespace.com/static/59bc0e610abd04bd1e067ccc/t/610aad405ae4b220c99de20a/1628089673888/Hickel+et+al+-+Urgent+need+for+post-growth+climate+mitigation+scenarios.pdf
[18] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2940987
[19] https://www.nature.com/articles/nclimate2392

Most importantly, BECCS will be an ecological and human disaster if scaled up in line with existing IPCC scenarios. Scaling up BECCS sufficiently would require repurposing a *continent-sized* amount of arable land around *two times the size of India*.[20] Because usable arable land is finite, this would trade off with food crops, severely worsening famines, or require clear-cutting existing forests to create biomass plantations,[20] which would destroy biodiverse habitats and be ecologically catastrophic.[21] Even if the land could be found, sufficiently large BECCS deployment would quickly run into other planetary ecological boundaries (for example, freshwater use, biogeochemical flows, and biodiversity) by destructively altering the ecosystem of an enormous amount of land and massively increasing demand for water.[21] Other CCS options such as Direct Air Capture (DAC) are typically not modeled by the IPCC, but are nonetheless problematic. DAC is extremely cost-ineffective, even accounting for recent improvements in technology, and is likely to stay that way.[22] The largest DAC demonstration project to date was also found to massively undershoot key targets.[23]

All of this explains why a growing chorus of scientists argue that any option that proposes to let humanity emit CO2 longer by removing CO2 from the atmosphere later is a dangerous distraction from the crucial task of cutting emissions to zero and bringing renewable energy online as quickly as possible to phase out fossil fuels.[24,19] The IPCC, negotiators, and policymakers must therefore stop relying on CCS and BECCS in plans for decarbonization.

Revamp Climate Models

Flawed climate models are yet another factor explaining the complacency of policymakers. While state-of-the-art science continues to portray climate change as a dire crisis, mainstream models (usually created by economists) tend to tell the opposite story, justifying an otherwise unacceptable status-quo. These models, known as Integrated Assessment Models (IAMs), are what the IPCC and others use to forecast the costs and benefits of decarbonization.

To be sure, no model is perfect, but many IAMs, most famously Dynamic Integrated Climate Change (DICE), rely on assumptions so spurious that the models fail to provide any useful information. Absurdly, DICE assumes 90% of global economic production will remain unaffected by climate change because it occurs indoors.[25] It also completely ignores the deaths climate change will cause, estimated at over 1 billion people at 2°C.[26] Even including a more conservative mortality estimate results in a Social Cost of Carbon (SCC) that is 7 times higher than the one produced by DICE.[27] DICE also fails on more technical matters. For one, it is highly sensitive to small changes in input parameters, such as the discount rate (the amount one is

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[20] https://www.scientificamerican.com/article/how-climate-change-strategies-that-use-biomass-can-be-more-realistic/
[21] https://www.nature.com/articles/s41558-017-0064-y
[22] https://www.vox.com/energy-and-environment/2018/6/14/17445622/direct-air-capture-air-to-fuels-carbon-dioxide-engineering
[23] https://www.smh.com.au/environment/climate-change/australia-s-giant-carbon-capture-project-fails-to-meet-key-targets-20210719-p58b3i.html
[24] https://science.sciencemag.org/content/354/6309/182
[25] https://www.tandfonline.com/doi/abs/10.1080/14747731.2020.1807856
[26] https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02323/full
[27] https://www.axios.com/high-cost-of-carbon-emissions-measured-in-mortality-c65ba576-e301-40ae-b708-cf3a37e5eed5.html

willing to trade-off future costs for current benefits), leading different people to produce widely disparate results using the same model.[28] Erroneously, DICE measures future climate impacts by examining hot geographic locales in the present day,[29] dangerously ignoring tipping points and feedback loops. It also overlooks interactions between climate impacts and assumes climate losses can be compensated for with other consumption. Its unscientific approach is perhaps best exemplified by its reliance on survey data that dilutes expert scientific testimony with baseless, overly-optimistic guesses by economists.[25]

Predictably, such an unreliable model has led to preposterous conclusions, such as the result that "a century of climate change is about as good / bad for welfare as a year of economic growth"[30] or that 19°C of warming would only cut global GDP in half[31] even though scientists estimate that warming beyond 5°C poses an existential threat to human civilization.[32] "Correcting for these errors," writes ecological economist Steve Keen, "makes it feasible that the economic damages from climate change are at least an order of magnitude worse than forecast by economists."[25] Moreover, many other IAMs differ from DICE in name but not content; using the same bankrupt assumptions and research methods to estimate future climate impacts.

Fortunately, some recent studies have begun to adapt to these critiques, adjusting the SCC sharply upwards.[33,34] UN and IPCC research should embrace these changes and use scientifically accurate estimates of the SCC to replace dangerously unscientific IAMs (particularly DICE), and countries should stop using inaccurate IAMs when performing cost-benefit calculations on climate policies. Finally, even if new and better models manage to produce accurate estimates of the mean expected damages, policymakers should remain skeptical: as economist Martin Weitzman's work on "fat tail" scenarios has demonstrated, in cases of high uncertainty (such as climate change), traditional models skew policy recommendations by ignoring low-probability, high-damage outcomes. Models are an important part of the policymaking picture, but we must proceed with extreme caution.

Conclusions

The fact that deep decarbonization on the timescale required is incredibly challenging should give negotiators all the more reason to take these recommendations seriously and prioritize our collective futures over pseudoscientific approaches like green growth, CCS, or DICE. The steps outlined above — recognizing the fallacy of green growth, ending reliance on moonshot technologies, and rejecting pseudoscientific models — represent the bare minimum international negotiators can do to stave off the largest and perhaps most existential crisis humanity has ever faced. Scientists have sounded the alarm bells: we need wholesale system change. Indeed, as we argue in the next section, even if decarbonization proves possible under the current extractivist framework, the planet will continue to suffer, regardless of the amount of CO2 in the air.

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[28] https://www.ft.com/content/90716398-91a3-3796-acb9-6c70f0b85c16
[29] https://www.nature.com/articles/nclimate3411
[30] https://www.journals.uchicago.edu/doi/abs/10.1093/reep/rex027
[31] https://www.lse.ac.uk/granthaminstitute/news/a-nobel-prize-for-the-creator-of-an-economic-model-that-underestimates-the-risks-of-climate-change/
[32] https://www.pnas.org/content/114/39/10315.full
[33] https://www.nature.com/articles/nature15725
[34] https://www.nature.com/articles/s41558-018-0282-y

Part 2: Beyond CO2

It is well established that the burning of fossil fuels degrades our air and warms the planet. But fossil fuels begin to damage ecosystems and devastate human communities long before they are released into the atmosphere: oil pipelines explode or spill, fracking contaminates groundwater, mining destabilizes local ecosystems, and so on. The extraction process has always been a violent one, treating both the earth and its people as resources to be used up and then left behind. The remnants of this process, including the staggering amounts of plastic made from fossil fuels, are then carelessly discarded into ever-growing landfills or found amongst one of the ocean's giant trash islands. This section focuses on the local communities discarded during our relentless quest for consumption — areas Naomi Klein calls 'sacrifice zones'.[35]

Sacrifice zones are by no means unique to fossil fuels. Even the pursuit of carbon-free energy will poison our environment unless we undertake radical changes in how we relate to and protect the earth. Renewable energies require select minerals and metals including lithium, cobalt, nickel, manganese, and rare earth elements, all of which are often extracted and processed in destructive ways. The message is not to abandon renewable energy, but rather to prioritize care and stewardship while reducing demand in energy and material intensive sectors — central elements of the wholesale system transformation scientists have called for.

End Exploitative Extraction

Renewable energy systems, like any form of infrastructure, require resources to construct. Given the enormous transition before us, we must pay particular attention to this problem: overall mineral demands for energy technologies will increase six-fold by 2040[36] if we are to reach global carbon neutrality by 2050. Demand for lithium, central to the batteries that power our electric vehicles and consumer electronics, must increase by approximately 40 times by 2050[36] in order to produce enough renewable energy technology to meet net zero goals.

Unfortunately, the extraction of these materials often comes at a great social and ecological cost. A planned lithium mine in Nevada,[37] for instance, threatens to contaminate ground water for hundreds of years, degrade almost 5,000 acres of wild land, and generate 354 million cubic yards of toxic waste, sparking resistance from local farmers and Native American groups. Mining for Cobalt, a key component of lithium ion batteries, has also wreaked havoc on local communities. In the Democratic Republic of the Congo, cobalt mining pollutes drinking water and degrades human and environmental health as well as promotes the exploitation of child labor.[38] Sacrifice zones from Nevada to the DRC remain hidden to the end consumers of renewable energy, giving rising to what Sovacool *et al.* have termed the 'decarbonization divide': "While decarbonization may … contribute to cleaner air and cleaner [energy] production in the Global North, much of the environmental and social harm is simply made invisible and

[35] https://www.lrb.co.uk/the-paper/v38/n11/naomi-klein/let-them-drown
[36] https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions
[37] https://www.nytimes.com/2021/05/06/business/lithium-mining-race.html
[38] https://linkinghub.elsevier.com/retrieve/pii/S0959378019305886

displaced, or spatially externalized, to the Global South."[39] Or, we might add, to marginalized communities within the developed world.

The dangers of overlooking such profound injustices can be forewarned by considering the historical example of coal mining. In mountaintop removal coal mining in the Appalachian region of the United States, residents living in proximity to surface mines face higher rates of death from cancer, respiratory diseases, and cardiovascular diseases.[40] The air and water pollution from coal produce direct health and ecosystem impacts, and remnants of the 20th century 'company town' concept further exacerbate shortened life expectancies and outmigration in coal communities.

The damage caused by coal mining does not automatically reverse when we transition to renewable energy, either. In addition to ensuring we do not continue the same destructive practices in the production of renewable energy, policymakers must prioritize the cleanup of abandoned mines and the construction and maintenance of impacted water infrastructure. The remediation of abandoned mine land can restore balance to ecosystems, reduce public health harm, and create jobs in regions with high unemployment.[41] An estimated $20.9 billion is necessary to reclaim abandoned mine land across the United States.[42] This is a stark difference from the federal database claiming the cost to be at only half $11.3 billion, which neglects to account for inflation, numerous abandoned mine lands, and the maintenance of water treatment systems.

Create a Circular Economy

Renewable technologies can be environmentally hazardous at the end of their lifetimes, too. Current e-waste processing carries many issues that will only be exacerbated as discarded solar panels, wind turbines, and electric vehicle batteries become more prevalent in e-waste streams. For example, the global fleet of electric vehicles is projected to exceed 100 million within the next decade,[43] resulting in tens of millions of tonnes of battery pack waste once those vehicles are retired.[44] Furthermore, there is little precedent for how to responsibly deal with this waste as few batteries have yet reached their end of life. Only eight companies in North America currently participate in lithium-ion battery recycling,[45] leaving some spent batteries to be exported to scrapyards in Africa and Asia where waste disposal regulations are far less stringent.

Amongst the largest sites is the Agbogbloshie scrap yard in Accra, Ghana, which was studied by Sovacool *et al.*[39] to illustrate the many hazards of e-waste processing. E-waste streams from the United States, Europe, and within Ghana itself arrive at Agbogbloshie, where they are processed by rudimentary means. An interviewee from the School of Public Health at the University of Ghana describes how "acid leaching, manual dismantling, and burning" are widespread, such that "e-waste acts as one of the most potent sources of morbidity" for those in the surrounding community. Part of the problem is that the health hazards are not limited to the

[39] https://doi.org/10.1016/j.gloenvcha.2019.102028
[40] https://appvoices.org/end-mountaintop-removal/health-impacts/
[41] https://ohiorivervalleyinstitute.org/repairing-the-damage/
[42] https://www.downstreamstrategies.com/wp-content/uploads/2021/07/Memo-3-Abandoned-mine-reclamation-over-the-coming-years.pdf
[43] https://www.iea.org/reports/global-ev-outlook-2021
[44] https://www.nature.com/articles/s41586-019-1682-5
[45] https://pubs.usgs.gov/periodicals/mcs2021/mcs2021-lithium.pdf

scrap workers themselves, as smoke from e-waste incineration hangs over the adjacent residential communities and food markets, and heavy metals are leached into the surrounding soil and water.[46] Finally, both child labor and exploitation of ethnic minorities are prevalent at Agbogbloshie. Interviews conducted with children scavenging and dismantling e-waste revealed they had been doing so from the age of less than 10, drawn in by the prospect of higher wages than those earned from agricultural work. Refugees and migrants make up another vulnerable group working in e-waste processing at Agbogbloshie. Facing a combination of discrimination, language barriers, and lacking social ties, these new arrivals are invariably given the most hazardous and undesirable roles such as waste burning.

Therefore, countries must enact the regulations and incentives necessary to establish a circular economy for critical energy materials. Within a circular economy, products are designed for a long functional lifetime, after which they are reused or recycled wherever possible. In doing so, the input of raw materials and the generation of waste are both minimized, leading to a more sustainable process. This circular economy approach is particularly beneficial for renewable energy technologies as it mitigates the environmental and social costs of mining and e-waste disposal discussed above.

However, early efforts at lithium-ion battery recycling have revealed a number of technical as well as regulatory barriers. First, variations in battery architecture and chemistry between different manufacturers have prevented automation and standardization of recycling facilities.[44] Research efforts should therefore build on current hydrometallurgy and pyrometallurgy practices to achieve more efficient, low-cost, and versatile battery recycling methods. A second barrier consists of cumbersome regulations and the lack of economic incentives for reusing or recycling as opposed to disposing of batteries.[47] Addressing the incoherent and variable treatment of lithium-ion batteries in fire, building, and electrical regulations could open up additional markets and prompt investment in secondary uses of batteries. A variety of incentives and mandates can similarly be put in place to make recycling more competitive. Already, California has appointed an advisory group[48] within the state's Environmental Protection Agency to develop a set of policies to reach a goal of 100% reuse and recycling of lithium-ion batteries from electric vehicles.

Conclusions

Countries must adopt an immediate moratorium on new fossil fuel extraction projects while cleaning up the environmental and social harm imposed from extraction, and ensure that workers and communities surrounding mines and e-waste disposal facilities are protected from harm caused by these activities. The reduction of overall energy demand to minimize total extractive impacts and waste generation, while placing an emphasis on efficiency technology to maximize the output of extracted minerals, is essential for renewable energy generation. The inevitability of the clean energy transition offers an unparalleled opportunity to recenter power once held by extractive industry to the people most affected by extraction, as we explore in the following and final section.

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[46] https://doi.org/10.1016/j.scitotenv.2017.05.283
[47] https://www.nrel.gov/docs/fy21osti/77035.pdf
[48] https://calepa.ca.gov/lithium-ion-car-battery-recycling-advisory-group/

Part 3: Recentering Power

Transitions at the scale of decarbonization inevitably produce winners and losers in the process, and ensuring that preexisting inequities are not perpetuated in the process is essential. The intersectionalities of class, race, and gender must be accounted for structurally in transition policies. As France's 2018 yellow vest protests demonstrated,[49] climate policy will rest on shaky foundations if it comes at the expense of the working class or other marginalized communities. Such considerations should be viewed not just as a necessary challenge, but instead as an opportunity to revamp the social and economic systems that have largely failed the great majority. As it stands now, low-income communities and communities of color disproportionately live in energy inefficient housing[50] or near pollution caused by fossil fuel,[51] and rates of women and Black Americans in the clean energy economy are well below national averages.[52] Such inequities, in addition to the grossly unequal distribution of wealth between the Global North and South, should be considered in every decarbonization initiative. This section highlights actions which combat climate change while redistributing economic welfare and providing people with opportunities to regain power over their role in the market.

Enforce Global Wealth Redistribution

The most widespread climate injustice is the stark contrast between the past actions of, and future consequences in store for, the Global North compared to the Global South. Although climate change will impact the entirety of human civilization, 98% of climate change related mortality and over 80%of the economic costs are expected to occur in poor countries.[53] Yet, from 1850 to 2015, these very same countries contributed only 8% of excess global carbon emissions.[54] It is this doubly-unequal nature of the climate crisis that necessitates an emphasis on global economic justice.[55]

Rich countries, however, are failing to live up to their responsibilities. At COP15 in 2009, the developed world pledged to provide $100 billion in annual climate change finance for developing nations by 2020. But even though the UN's own estimates suggest that $100 billion is far too little,[56] the rich countries themselves have admitted to only reaching two-thirds of this goal.[57] Poor countries will not sign on to new agreements on carbon emissions without assurance

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[49] https://www.npr.org/2018/12/03/672862353/who-are-frances-yellow-vest-protesters-and-what-do-they-want
[50] https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf
[51] https://www.scientificamerican.com/article/people-poor-neighborhoods-breate-more-hazardous-particles/
[52] https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf
[53] https://daraint.org/wp-content/uploads/2012/09/CVM2ndEd-FrontMatter.pdf
[54] https://www.sciencedirect.com/science/article/pii/S2542519620301960
[55] https://static1.squarespace.com/static/59bc0e610abd04bd1e067ccc/t/5e2c350de605b23055e8a1ae/1579955475878/Hickel+-+Global+Inequality+and+Human+Rights.pdf
[56] https://www.un.org/sustainabledevelopment/blog/2016/05/unep-report-cost-of-adapting-to-climate-change-could-hit-500b-per-year-by-2050/
[57] https://www.oecd.org/environment/cc/Projecting%20Climate%20Change%202020%20WEB.pdf

that rich countries can meet their legal commitments,[58] nor should they, given the extreme injustice of the status-quo.

To create a just and politically stable climate future, then, the Global North must go beyond its failed $100 billion promise and undertake a sweeping program of global wealth redistribution to counteract the regressive impacts of climate change. This could include anything from a global basic income, funded by a wealth tax on the 26 individuals who own more than the poorest 50%,[59] to an overhaul in the international tax regime that would eliminate tax havens and allow poor countries to capture their share of multinational corporate profits.

Another means of financing climate change management in developing countries could be the implementation of carbon taxes across a myriad of countries. Economists generally consider carbon taxes to be the most efficient form of a price signal for the private and public sector to act sustainably,[60] though there is pushback regarding the potentially regressive effects of such a policy. However, if a carbon tax is paired with a set of rebates or financial transfers aimed at benefiting poor- and middle-class households, such concerns could be alleviated.[61] Moreover, a sufficient percentage of the revenue associated with a carbon tax could be put into climate financing for developing countries and R&D spending.

Measure Well-Being, Not Output

Throughout this brief, we have referred to the need to lower energy and material demand, especially amongst the rich. This may slow down (or even reverse) economic growth in the Global North, but we can do so while making the vast majority better off. A wealth of empirical evidence demonstrates that beyond a certain point, the relationship between GDP and well-being breaks down[62,63]: GDP per capita continues to rise, but population-level well-being does not. For instance, many European countries with 50% the GDP per capita of the US score higher on most measurements of well-being.[62] Part of the explanation for this phenomena is that, just as with most goods, there are decreasing marginal returns to economic growth. Additionally, because GDP exclusively measures commodified activities, aspects of well-being (such as clean air and ecosystem services) are not directly included, while industries which generate pollution and excessive emissions are considered positively. As economist Kate Raworth puts it, “We have an economy that needs to grow, whether or not it makes us thrive. We need an economy that makes us thrive, whether or not it grows.”[64]

Moving forward, countries should rely less on misleading models when making policy decisions. Economists tend to agree that all models are wrong, but some are useful. Thus, it is time to move to a metric that is less wrong and more useful. This brief recommends considering

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[58] https://chinadialogue.net/en/climate/cop26-climate-negotiations-still-stuck-on-finance/
[59] https://www.theguardian.com/business/2019/jan/21/world-26-richest-people-own-as-much-as-poorest-50-per-cent-oxfam-report
[60] https://www.oecd.org/tax/tax-policy/tax-policy-and-climate-change-imf-oecd-g20-report-april-2021.pdf
[61] https://www.imf.org/external/pubs/ft/fandd/2019/12/the-case-for-carbon-taxation-and-putting-a-price-on-pollution-parry.htm
[62] http://www.paecon.net/PAEReview/issue87/whole87.pdf#page=54
[63] https://www.tandfonline.com/doi/abs/10.1080/09644016.2012.671569
[64] Raworth, *Donut Economics,* 2018.

metrics, such as the Genuine Progress Indicator (GPI), which more accurately reflects human well-being.[62]

Create Good Jobs

The creation of new jobs to fill employment gaps as coal phase-outs occur will be essential in the energy transition. However, these jobs must be long-lasting and promote climate initiatives for decarbonization, so investments in clean energy development have proven promising. There is hopeful research suggesting that unemployment and an energy transition need not be coupled. For example, one study found that $1 million spending shifted from brown energy to green energy can lead to the generation of five new jobs, because such an investment created only 2.65 full-time-equivalent jobs in the fossil fuels industries, compared to 7.49 full-time-equivalent jobs in the renewable energy industries.[65]

However, such statistics downplay when one industry is replaced by another. Most workers in the fossil fuel industry do not have the job training to carry out the shift in employment to renewable energy jobs, and oftentimes such new jobs are not located within the affected communities. Across the United States, from Wyoming to Kentucky to West Virginia, the closure of coal plants and mines leads to immediate unemployment, emigration, and a decrease in local tax revenue,[66] which in turn cripples the local community relying on their incomes and involvement. Furthermore, declarations of bankruptcy allow the complete abandonment of deep coal mines and their associated systems such as water utilities[67] and health care benefits[68] without any corporate liability. It is no surprise that political figures in such counties and states stall and dismantle mitigation policies, when their reelection depends on the livelihood of such communities.

Despite this impasse, there is hope for compromise. In the past, the US Department of Labor has given out grants to support the transition of fossil fuel workers to new employment.[69] The intention of such financing is to provide job training, diversify economies, create jobs, and attract new investment in the affected communities. Such measures must be expanded proactively, both to assist everyday people, and to generate political support for future renewable energy projects.

Finally, we must ensure that adequate protection remains in place for the next generation of energy workers. Historically, extractive industries have used their market power to manipulate and exploit workers. To counter the obvious and severe health harms of working in or living in proximity to a coal mine, coal companies in West Virginia, for example, have funded media campaigns to construct the image that the state's cultural and economic identities center around coal by the "the appropriation of cultural icons that exploit the hegemonic masculinity of the region."[70] Yet, the 'company town' model is reemerging in the form of a modern 'factory

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[65] https://www.sciencedirect.com/science/article/abs/pii/S026499931630709X
[66] https://www.edf.org/how-clean-energy-transition-affects-workers-and-communities
[67] https://www.wvpublic.org/news/2017-02-17/drinking-water-from-an-abandoned-mine-really
[68] https://theconversation.com/the-struggle-for-coal-miners-health-care-and-pension-benefits-continues-112906
[69] https://www.greenbiz.com/article/new-initiative-help-coal-workers-transition-clean-economy-jobs
[70] https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1549-0831.2009.00004.x

town'[71] as corporate giants, like Amazon and Tesla, seek to take advantage of fewer worker protections and environmental regulations in vulnerable locations. This foreshadows a repeat of the same exploitative harm imposed by coal companies for over a century. The jobs created in the new green economy must not fall into this trap; fair pay, health and safety standards, and anti-trust action must remain legislative priorities.

Prioritize Participation and Equity

Although government funding in communities negatively affected by the energy transition is a crucial step, it is not the whole solution. A just transition "can underestimate the extent to which current technologies are embedded in power relations that require more than rational arguments to transform."[72] Evident in once dominant coal producing regions is the ideological attachment of society to coal, despite a sharp decline in employment and production, suggesting that even if new industries are introduced with quantifiable potential for employment and economic success, the culture could still reject it. Therefore, it is essential to gain the trust of constituents through social dialogue and participatory measures that increase the local representation of affected communities.[73] Furthermore, self-determination is a principle of the just transition framework by the Climate Justice Alliance, which asserts that individuals have the right to participate in decisions affecting their lives. To prioritize participation and build trust, those affected by the transition must be heard through national initiatives that adequately uplift and consider constituent feedback through stakeholder engagement and citizen assemblies.

After announcing in 2016 the phase out of coal-fired electricity by 2030, Canada joined the "Powering Past Coal Alliance,"[74] which seeks to bring together actors in the public and private sectors and civil society to accelerate climate protection and inclusive opportunities for workers and communities. Specifically, Canada is promoting a 'just transition' via the creation of a taskforce and an investment initiative. After public calls for participation in the process, the task force (drawing members from unions, utilities, local government, and environmental organizations) produced a report shaping the country's approach to supporting coal workers and communities.[75] The report was informed by a complementary document developed after travelling to the four affected provinces and meeting with more than 80 stakeholder groups in coal communities. Similarly, the Government of Scotland created a Just Transition Commission in 2018 with a two-year mandate to offer recommendations to ministers related to achieving a just transition.[76] In doing so, Scotland utilized an economy-wide and long-term approach, paired with inclusive stakeholder engagement and whole-of-government support. Recommendations

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[71] https://www.100daysinappalachia.com/2021/09/commentary-appalachia-can-prove-company-towns-dont-lift-the-working-class/
[72] https://www.taylorfrancis.com/books/mono/10.4324/9781315732220/workers-trade-unions-climate-solidarity-paul-hampton
[73] https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_432859.pdf
[74] https://www.poweringpastcoal.org/
[75] https://www.canada.ca/en/environment-climate-change/services/climate-change/task-force-just-transition.html
[76] https://www.gov.scot/publications/transition-commission-national-mission-fairer-greener-scotland/

centered around the linkage between emission reduction with job and skill investment through stakeholder engagement.

Institute a Right to Repair and End Planned Obsolescence

Recentering power includes empowering consumers who are often at the whim of large corporations. In the electronics sector, planned obsolescence is a common business strategy[77] whereby companies deliberately ensure that a product will become out of date or useless within a known time period, thereby increasing profits by forcing consumers to purchase an updated model of the same product.[78] For example, companies may depreciate the software on older models of products despite the continued integrity of the product's hardware, making a device so slow it becomes effectively unuseable. Firms also often make products very difficult, if not impossible, to repair at home, requiring expensive new parts at upcharged prices that are only available through the firm, or requiring expert, technical knowledge which ordinary consumers lack access to.[78]

These issues can be addressed by "right to repair" laws which require companies to enable easy repairs, make spare parts available, and increase the longevity of electronics to at least 10 years.[79] This is especially needed for batteries, which, when degraded, often require buying a new device, as many products are designed to make battery replacement near impossible, or as expensive as buying a replacement. Not only would right to repair laws and regulations against planned obsolescence empower everyday people, they would also reduce e-waste disposal and significantly reduce the carbon and material footprint of consumption.

Conclusions

A just transition must promote distributional, procedural, and restorative justice. As a principle of the Climate Justice Alliance, such a transition must encourage the equitable redistribution of resources and power to "transform current and historic social inequities based on race, class, gender, immigrant status and other forms of oppression."[80] To effectively navigate this transition, policymakers must put aside visions of never-ending growth and instead take steps to genuinely expand well-being. In doing so, the exploitation of the Earth's lands and communities must be replaced with a circular and cooperative economy.

The greatest opportunity to improve our world is on the doorstep. A just energy transition will rectify the uneven distribution of burdens across the globe, all while spreading access to employment, decision-making, and low carbon and efficient technologies. It is our responsibility to act, while we still can.

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[77] https://www.theguardian.com/technology/2020/apr/15/the-right-to-repair-planned-obsolescence-electronic-waste-mountain
[78] https://www.sciencedirect.com/topics/computer-science/planned-obsolescence
[79] https://www.bbc.co.uk/news/business-56340077
[80] https://climatejusticealliance.org/