The Fiscal Implications of the US Transition away from Fossil Fuels

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Abstract

Achieving greenhouse gas reduction goals requires curtailing coal, oil, and natural gas production and consumption. However, these fuels are major revenue sources for governments. Here we develop a novel estimate of the revenues generated by fossil fuels for all governments in the United States, then estimate how those revenues change under three stylized scenarios through 2050: Business-as-usual, 2°Celsius, and 1.5°Celsius. We estimate that fossil fuels generate $138 billion annually for US governments, and that these revenues are likely to decline even in the absence of new climate policy. Taxes on petroleum product sales (e.g., gasoline taxes) are the largest source and decline under all scenarios. Revenues from oil and gas production (e.g., severance taxes, federal and state royalties) are the second largest and are relatively stable under the BAU and 2°C Scenarios but decline rapidly under the 1.5°C scenario. Under all scenarios, revenues from coal production decline rapidly, approaching zero by 2040 under the 1.5°C and 2°C scenarios. Although revenue losses are substantial under these scenarios, we do not view them as justification to delay action on emissions mitigation. Instead, they highlight the need to address revenue shortfalls, which will be concentrated in certain regions, alongside policies to deeply reduce emissions. The policy tools to accomplish both goals are relatively straightforward but implementing them will require overcoming considerable political challenges.

Contents

1. Introduction

As the world seeks to deeply reduce emissions to prevent the worst consequences of climate change, the production and consumption of all fossil fuels—coal, oil, and natural gas—will need to decline (National Academies of Sciences 2021). A large body of research has arisen to examine the equity implications of the transition to cleaner energy sources (Carley and Konisky 2020), and political discourse has focused on the potential employment effects of a shift away from fossil fuels (Weber 2020; IEA 2021).

However, little research and even less public attention have been devoted to the sizable implications of the energy transition for government finances and fiscal policies. In the United States and dozens of other nations, fossil fuels are a major source of revenue, supporting public services at every level of government. And although these fuels are often subsidized, primarily through the failure to appropriately price externalities (Coady et al. 2019), their contributions to government coffers remain considerable.

For certain fuels and geographies, such as coal in West Virginia or oil in Alaska, fossil fuel revenues have already declined substantially, even in the absence of robust climate policy. As society seeks to achieve a "Just Transition," addressing the revenue shortfalls that arise from the reduction in fossil energy will be critical, particularly for the rural communities where such activities are highly concentrated. Well-designed policies can address this challenge but require a credible estimate of the scale of revenue derived from fossil fuels.

In this paper, we develop such an estimate by gathering data from hundreds of sources that detail revenues from coal, oil, and natural gas production, transportation, processing, and consumption for every level of government in the United States. We then use three stylized energy policy scenarios to provide a general estimate for how these revenues may change in the future. Finally, we identify a range of policy instruments to replace declining fossil fuel revenues and discuss their relative merits.

2. Social Science Research into Just Transitions

Scholars from a wide range of fields have examined the implications of the energy transition, often using the term Just Transition. This term, initially developed in the 1990s as part of the US labor movement (Just Transition Centre 2017), has broadened considerably to reflect the overarching goal of distributing the benefits and costs of the energy transition so as not to disproportionately burden certain segments of society (Carley and Konisky 2020).

Existing research provides strong evidence that today's energy system is far from just. Researchers have examined the distributional effects of environmental policies across many dimensions, often finding that these policies disproportionately benefit wealthier households (Borenstein and Davis 2016; Deryugina et al. 2019; Lamb et al. 2020). One growing area of Just Transition research relates to the notion of "energy justice," which builds on the environmental justice framework (Mohai et al. 2009; Banzhaf et al. 2019) and finds that communities of color often face disproportionately high energy costs due in part to a legacy of discriminatory housing policy (Reames 2016; Lyubich 2020; Chen et al. 2020).

Our analysis fits most neatly into the stream of research focused on the implications of the energy transition for communities that rely heavily on coal, oil, or natural gas systems as a driver of local economic activity. This work also spans a range of disciplines, including ethnographic work that seeks to understand how coal extraction shapes community and individual identity (Bell 2009; Bell and York 2010), survey-based research that assesses support for Just Transition policies in fossil fuel–producing communities (Mayer 2018; Cha et al. 2019), and interview-based research that examines perceptions of the energy transition among residents of coal communities (Carley et al. 2018).

The Just Transition topic that receives perhaps the most attention from policymakers and the media can be summed up in one word: jobs. Advocates of a rapid shift away from fossil fuels highlight the potential for job growth in emerging sectors (American Clean Power 2021); opponents highlight the risks for coal, oil, and natural gas workers (American Petroleum Institute 2017). Although numerous engineering studies have estimated that a rapid transition to clean energy would lead to a net increase in energy sector employment (Wei et al. 2010; Lehr et al. 2012; Larson et al. 2020; Pai et al. 2021), they do not address the distributional challenges for communities where those jobs are concentrated. In a recent article, Weber (2020) addresses the challenges faced by coal communities, finding that that each lost coal mining job reduced county-level income by $100,000 annually, that many who lost their jobs did not relocate and remained unemployed, and that these job losses exacerbated income disparities across counties.

Although it has received much less attention from policymakers, the fiscal effects of the energy transition may be of similar, or even greater, significance as job gains and losses. For decades, scholars have understood the importance of fiscal policies as a tool to combat the potential "resource curse" associated with extractive industries globally (Sachs and Warner 2001; Humphreys et al. 2007; Ross 2015), and resource revenues have enabled the growth of sovereign wealth funds in Norway, Saudi Arabia, and other nations (van den Bremer et al. 2016).

One principle that has emerged in the US context is that governments may be able to improve long-term economic outcomes by capturing resource rents and investing them in savings funds and the promotion of new economic sectors (Gunton 2003; Ryser et al. 2018), thereby diversifying local economies and tax bases. Although the concept is well understood among researchers, few US governments have taken steps to invest resource wealth in permanent funds that can support future government spending (notable exceptions include Alaska, New Mexico, Wyoming, and the Southern Ute Indian Tribe) or economic diversification. Yet even for those governments that have invested in permanent funds, a rapid energy transition poses considerable fiscal risk.

What is the scale of this fiscal risk? No previous work has sought to answer this question at a national scale, but several recent analyses can help orient us. Newell and Raimi (2018a) estimate that in 2013, oil and gas production generated $28 billion for state and local governments, with most revenues being spent rather than saved. Morris et al. (2021) take a case study approach, describing several counties where coal contributes one-third or more to local budgets, and highlight the fiscal risk not just for local governments but also for holders of municipal debt. Marchand and Weber (2020) demonstrate that oil and gas production growth in Texas tripled local tax bases and increased school revenue (although teacher retention and student achievement declined). And Smith et al. (2021) quantify how $2 billion in annual revenues from fossil fuel extraction on federal lands flows to states and local governments.

Numerous case studies examine economic, fiscal, and planning challenges for coal-fired power plant communities in the rural West (J.H. Haggerty et al. 2018; K. Roemer et al. 2021; K. Roemer and Haggerty 2021), Appalachian Ohio (Jolley et al. 2019), and West Virginia (Morris et al. 2021). This work has pointed out the lack of planning for an energy transition and highlighted fiscal risk as a concern, particularly for rural regions.

But how might current or future policy affect revenues for governments dependent on fossil fuels? Just three recent studies (none of which has yet been published in peer-reviewed journals) have estimated these effects at a large scale. Considine (2020) estimates that restrictions on federal lands leasing in eight western states would reduce state and local revenues by $1.6 billion to $2 billion annually, with effects growing over time. However, these estimates are calculated against a baseline that includes very optimistic assumptions about future production on federal lands, notably in northern Alaska.

A more detailed modeling effort from Prest (2021) includes onshore and offshore oil and gas development and accounts for the potential for drilling activity to spill over from federal to state or private lands. He estimates that a federal leasing ban would reduce federal, state, and local revenues by around $5 billion annually.

The most similar analysis to this paper comes from Barro et al. (2021), which estimates the changes in K-12 school funding in the state of Texas through 2050 under different oil and natural gas price scenarios. They find average annual revenue shortfalls of $2.5 billion across these scenarios, reaching $5.8 billion annually under the lowest price scenario, but note that these gaps are a small percentage of total K-12 funding in the state. They also highlight revenue replacement options, including taxes on general sales, marijuana, and gaming.

In the following section, we develop the first nationwide estimate of the contribution from fossil fuels to public finances in the United States over roughly the past five years.

3. Historical US Fossil Fuel Revenues

We begin by estimating annual average public revenues between 2015 and 2020 from coal, oil, and natural gas production for the federal government, tribes, and state and local governments in 21 states: Alaska, Alabama, Arkansas, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Texas, Utah, West Virginia, and Wyoming. In 2019, these states, along with federal and tribal lands and waters, accounted for 99.8, 99.5, and 97.3 percent of US oil, natural gas, and coal production, respectively. We include revenues from severance taxes, lease revenues from public lands and waters, property taxes on fossil energy production property, income taxes from individuals and businesses in relevant sectors, and sales taxes applied to mining sector purchases.

Revenues from other fossil fuel sources, such as petroleum product taxes and property taxes applied to oil and gas pipelines, oil refineries, and fossil fuel–fired power plants, are collected in all states, not just the 21 states identified above. For that reason, we estimate these revenues for all 50 states and the federal government. Publicly available revenue data from tribes are very limited, although we were able to gather data from the Navajo Nation, the largest tribe in the United States by land area and membership (Associated Press 2021). Table 1 provides an overview of the revenue sources included here, with details in the Appendix.

Table 1. Major Coal, Oil, and Gas Revenue Sources

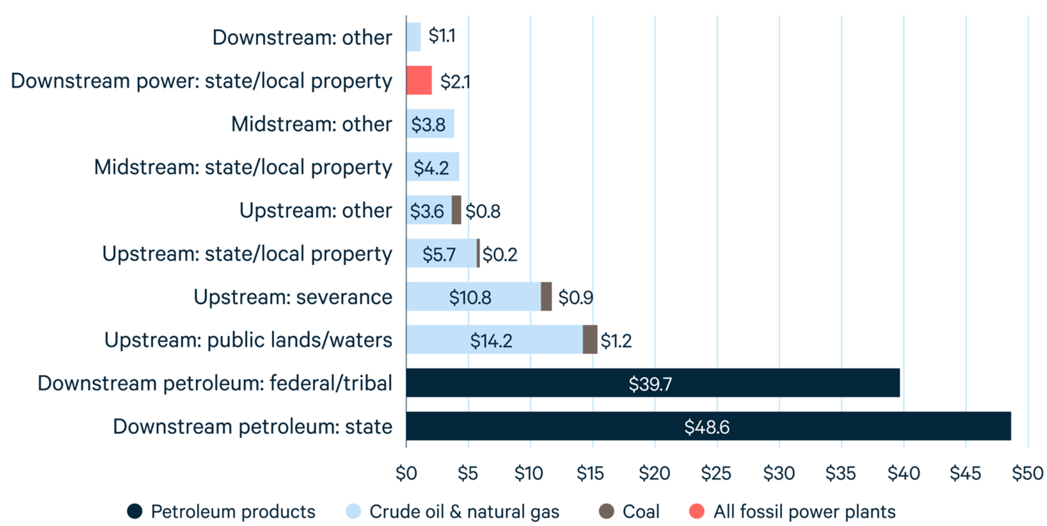
Revenue source	Coal	Oil	Gas	Primary recipient(s)
Severance taxes	✓	✓	✓	States, some tribes
Production on public lands	✓	✓	✓	Federal, tribes, states
Property taxes				Local, some tribes
Production property	✓	✓	✓	
Pipelines		✓	✓	
Refineries		✓		
Power plants	✓		✓	
Petroleum product taxes		✓		States, federal, some tribes
Sales taxes	✓	✓	✓	Local, states, some tribes
Income taxes (corporate and personal)	✓	✓	✓	States, federal

Note: Tribal tax policies are complex and vary widely. In general, tribes do not levy income taxes, though some impose severance taxes (or share revenue with states), sales taxes, and petroleum product taxes; the Navajo Nation's possessory interest tax functions similarly to a property tax. Revenue from production on tribal lands is generally collected by the federal government and distributed to tribes and tribal members.

On average from 2015 through 2020, we estimate that coal, oil, and natural gas generated $138 billion annually for localities, states, tribes, and the federal government. The largest sources were petroleum product excise taxes, which generated $48 billion for states and $40 billion for the federal government annually. Upstream oil and gas development generated $34 billion annually, led by $14 billion from production on federal, tribal, and state lands and waters; $11 billion from state severance taxes; and $6 billion from local property taxes. For the remainder of this analysis, we use the terms “upstream” to refer to extraction and initial processing, “midstream” for long-distance transportation and refining, and “downstream” for marketing and consumption, including at power plants.

We estimate that the midstream oil and gas segment generated $8 billion annually, with roughly $4 billion from property taxes on refineries and pipelines, and $4 billion from state and federal income taxes. Upstream coal generated roughly $3 billion annually, led by public lands leasing ($1.2 billion) and state severance taxes ($0.9 billion). Finally, we estimate that fossil fuel–fired power plants and natural gas distribution pipelines generated $2 billion and $1 billion annually in local property taxes, respectively. Although these figures may appear small relative to larger sources, they can play a major role for local tax bases, particularly in rural communities (J.H. Haggerty et al. 2018).

Figure 1. Annual Average Fossil Fuel Government Revenue, 2015-2019 ($2019 billions)



Source: Authors. “Other” includes corporate income, personal income, and sales taxes, along with the federal coal excise tax and local property taxes on natural gas distribution. Tribal petroleum product fees are for the Navajo Nation only and average $14 million annually.

Among the 21 states where coal, oil, and natural gas production is concentrated, dependence on fossil fuel revenue varies widely. In absolute terms, the states with the highest levels are Texas, California, and Pennsylvania, with petroleum product taxes dominating in California and Pennsylvania. However, Wyoming, North Dakota, Alaska, and New Mexico are the most dependent on fossil fuel revenues by a variety of measures. In Wyoming, government revenues from fossil fuels average more than $7,000 annually for each resident and account for more than half of all state and local own-source revenue.

North Dakota, which has experienced a major boom in oil and natural gas production over roughly the past decade, is the second most dependent state by these measures, with fossil fuels generating nearly $4,000 in government revenue per capita. These revenues have been accompanied by considerable fiscal challenges for localities experiencing rapid population growth and the need for enhanced public services, leading rural counties and small cities to take on hundreds of millions of dollars in new debt (Newell and Raimi 2018b).

In Alaska, fossil fuel revenue has been extremely volatile, driven by oil prices and exacerbated by state tax policies. These policies, which include tax credits to incentivize new investment, have resulted in oil severance tax revenues ranging from roughly $7 billion in 2012 to a loss of $50 million in 2016 (all figures in 2019 dollars). On average from 2015 through 2019, oil severance tax revenues in the state averaged roughly $400 million.

New Mexico, the third most dependent state by our measures, has also experienced considerable volatility, with strong growth in oil and natural gas revenues over the past five years. The state contributes revenue from oil and natural gas production on state lands to a permanent fund worth more than $20 billion to support future government services, leading some to refer to the state as implementing "model fiscal policy" (M. Haggerty 2021).

West Virginia, the fifth most dependent state, differs from the previous four in that it does not invest any fossil fuel revenue into permanent funds. The state's coal severance tax revenue has fallen from more than $600 million in 2011 to less than $200 million in 2020. Revenues from oil and natural gas production have been volatile, rising from less than $100 million in 2010 to nearly $250 million in 2015, then falling to roughly $125 million in 2020.

The other states with high dependence on fossil fuel revenues include Montana, Oklahoma, Louisiana, Texas, and Colorado. Within these states, there is wide variation in local government dependence on fossil fuel revenue. For example, although Texas has diversified its economy considerably over the past several decades (Slijik and Phillips 2021), dozens of counties in parts of South and West Texas remain heavily dependent on oil and natural gas production to support local services (Newell and Raimi 2015).

For the above-mentioned states, Table 2 reports total fossil fuel revenue, revenue per capita, and revenue as a share of state and local own-source revenue.

Table 2. State and Local Fossil Fuel Revenues, by State, 2015-2019 Average ($2019)

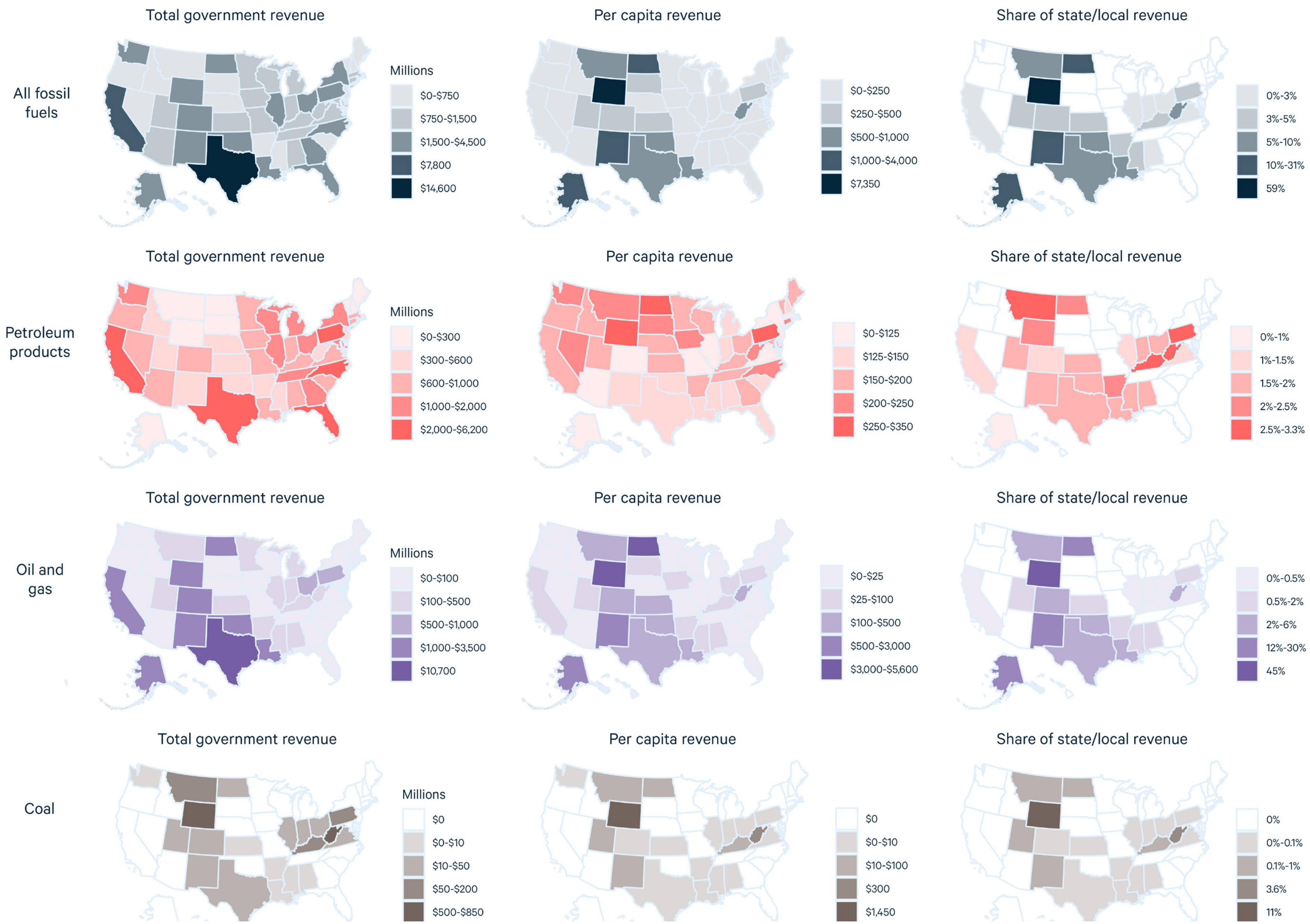
Total government fossil revenue (millions)[1]		Per capita government fossil revenue[2]		Government fossil revenue as share of state and local own-source revenue (%)[3]	
Texas	$14,591	Wyoming	$7,339	Wyoming	59
California	$7,823	North Dakota	$3,854	North Dakota	31
Pennsylvania	$4,422	Alaska	$2,713	Alaska	21
Wyoming	$4,264	New Mexico	$1,303	New Mexico	15
North Dakota	$2,917	West Virginia	$698	West Virginia	9.4
New Mexico	$2,726	Montana	$613	Montana	7.9
Ohio	$2,563	Oklahoma	$550	Oklahoma	7.7
Louisiana	$2,518	Louisiana	$540	Louisiana	7.2
Oklahoma	$2,163	Texas	$516	Texas	7.0
Alaska and Colorado	$2,000	Colorado	$356	Colorado	4.1

Notes:
1. Includes petroleum product taxes.
2. Fossil fuel revenues divided by state population from the 2017 US Census.
3. Fossil fuel revenues divided by total state and local own-source revenues (US Census Bureau 2020), which consist of all local and state internal revenue (i.e., excludes intergovernmental transfers) averaged from 2015 to 2019.

Fossil fuels contribute to state and local government revenues even in states without significant coal, oil, or natural gas production. Consider Hawaii, a state with no fossil fuel production. There, petroleum product taxes contribute more than $80 million annually, and we estimate that natural gas distribution pipelines and fossil fuel–fired power plants contribute an additional $35 million per year.

Figure 2 illustrates our estimates for all US states (tribal nations are not shown because of data limitations) and groups revenues by energy type, aggregated across upstream, midstream, and downstream phases. As noted above, Texas and California collect the largest amounts of fossil fuel revenues, but some unexpected states, such as Florida, New York, North Carolina, and Washington State also collect substantial revenues driven by petroleum product taxes.

Figure 2. Annual Average Fossil Fuel Government Revenue, 2015-2019 ($2019 billions)



Some local governments in states with little or no production depend heavily on large facilities that process or consume fossil fuels. For example, oil refineries are major sources of property tax revenue for some local governments in Michigan, Minnesota, and New Jersey. Coal- and natural gas–fired power plants are important local revenue sources in dozens of communities across the nation, and hundreds of counties and municipalities receive revenue from oil and natural gas transmission and distribution networks. At a statewide level, these sources may be small on a per capita basis, but at the local level, they can represent a sizable share of the tax base. For example, one oil refinery in Will County, Illinois (adjacent to Chicago), represented more than $1 billion in market value and paid more than $26 million in property taxes in 2020 (Will County Supervisor of Assessments Office 2021).

In summary, we find that fossil fuels are a large contributor to public finances across the United States. Revenues are concentrated in certain states but are important across the nation. Our figures represent the most comprehensive estimates of US fossil fuel revenues to date, but they are not complete. As we describe in the Appendix, we were unable to gather or credibly estimate revenues from several sources, particularly state and local income and sales taxes. We also have very limited data on tribal revenues. The Navajo Nation was the only fossil fuel–producing tribe we identified that publishes relatively detailed revenue data. Future research could improve on our estimates by incorporating additional data, although some data limitations will likely persist.

Next, we generate estimates for how fossil fuel revenues change under three stylized scenarios through 2050.

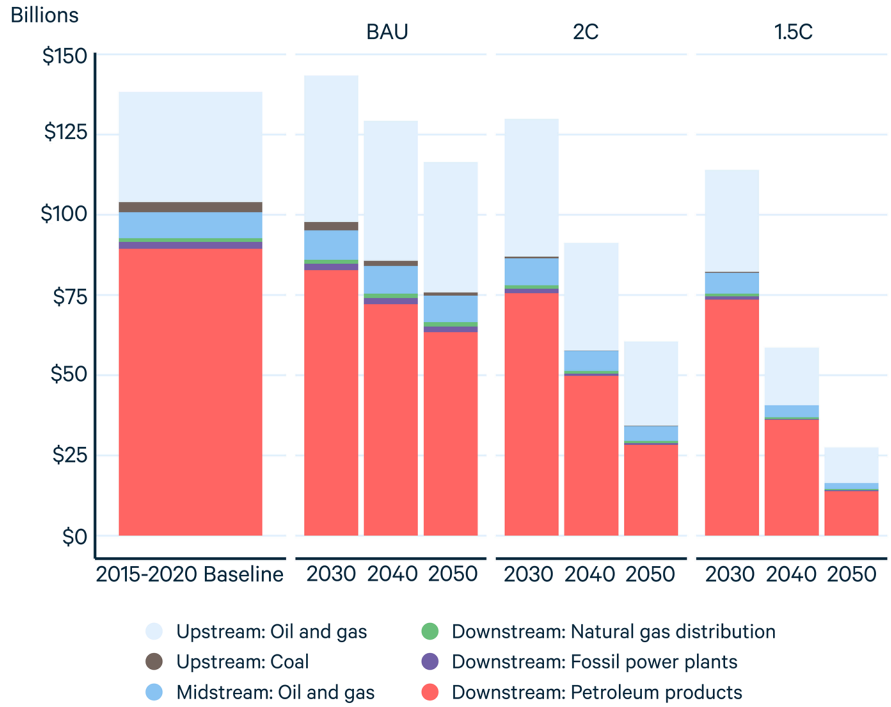
4. Projected Fossil Fuel Revenues under Three Scenarios

To estimate future changes in fossil fuel revenue, we rely primarily on three scenarios developed by bp (2020): business as usual (BAU), 2°C (2C), and 1.5°C (1.5C). BAU represents bp's view on the energy future, given current policy frameworks, and the 2C and 1.5C scenarios are designed to reduce emissions consistent with long-term global temperature rises of 2°C and 1.5°C, respectively. We choose these scenarios because (1) they provide a plausible yet wide range of futures, including deep decarbonization; (2) detailed scenario results are publicly available; and (3) they include projections for the United States. Projections from the US Energy Information Administration (EIA 2021) were excluded because they do not include a deep decarbonization scenario, and those of other organizations, such as the International Energy Agency (2020), cover North America only in aggregate.

Because state- and local-level projections are not available, we assume that all public revenues associated with fossil energy systems change proportionately to the changes in production, processing, and consumption of each fuel. This is a limitation because it does not incorporate the distribution of changing fossil fuel production, processing, and use, nor does it account for the changes in energy commodity prices under alternative scenarios. Future work could incorporate these details, which is beyond our current scope (details in Appendix).

Our headline result is that by 2050, fossil fuel revenues decline across all scenarios, even absent new climate policies. Total revenues in the BAU scenario increase above the baseline by 4 percent ($5 billion) in 2030 but fall 16 percent ($22 billion) by 2050. In the 2C scenario, total revenues fall 6 percent ($8 billion) by 2030 and 56 percent ($78 billion) by 2050. In the 1.5C scenario, total revenues fall 18 percent ($24 billion) by 2030 and 80 percent ($111 billion) by 2050 (Figure 3).

Figure 3. Baseline and Projected Fossil Fuel Government Revenues under Three Scenarios



Under BAU, petroleum product taxes fall roughly 30 percent ($26 billion) by 2050. Under the 2C and 1.5C scenarios, rapid deployment of electric vehicles and enhanced energy efficiency reduce these revenues by 69 percent ($60 billion) and 85 percent ($75 billion), respectively, relative to the average in recent years.

Upstream oil and gas revenue is more resilient, although these estimates are subject to large uncertainty due to volatile prices and production levels. Under BAU, revenues are 37 percent ($11 billion) higher than the baseline in 2030 and 22 percent ($6 billion) higher in 2050. In the 2C scenario, revenues in 2030 are 28 percent ($9 billion) higher, then decline to 21 percent ($8 billion) below the baseline by 2050. Under the 1.5C scenario, revenues decline 8 percent ($3 billion) by 2030, then fall rapidly to 68 percent ($23 billion) below the baseline by 2050. Production does not fall to zero because in these scenarios, hydrocarbons continue to be a feedstock for petrochemicals production and—often coupled with carbon capture and storage—other applications.

The resilience of upstream oil and gas largely reflects the choice of baseline period and the nature of the scenarios. US oil and gas production grew 28 percent from 2015 through 2019 and declined modestly in 2020. Because future production in the scenarios is based on the most recent (2020) levels, it remains high relative to the average over the baseline period. In addition, the 2C and 1.5C scenarios envision a relatively high level of future natural gas demand and a relatively low level of future coal demand, compared with other scenarios with similar emissions trajectories (Newell et al. 2021). We discuss these issues in more detail and provide the relevant data in the Appendix.

Upstream coal revenues tell a different story, declining sharply under all scenarios. Under BAU, they fall 22 percent ($0.5 billion) by 2030 and 70 percent ($2.1 billion) by 2050. In the 2C and 1.5C scenarios, upstream coal revenues fall 85 and 90 percent ($2.6 billion and $2.8 billion), respectively, by 2030, and approach zero by 2040.

The midstream oil and gas sector follows a similar trajectory to upstream oil and gas. By 2050, total revenues increase 2 percent ($0.2 billion) under BAU but decline 42 percent ($3.4 billion) and 78 percent ($6.3 billion) under 2C and 1.5C, respectively. Intuitively, higher levels of production and consumption under BAU lead to higher levels of pipeline and refinery throughput, which translates into higher levels of public revenues.

Fossil power plant revenues fall under all scenarios and by 2050 are 15 percent ($0.3 billion), 77 percent ($1.6 billion), and 90 percent ($1.9 billion) lower under BAU, 2C, and 1.5C, respectively. Because of data limitations, we are unable to independently estimate the distribution of revenue losses among coal, natural gas, and the small number of petroleum-fueled power plants. However, revenue losses will be experienced most rapidly for coal power plant communities. Under BAU, coal-fired power generation falls more than 75 percent by 2050 and approaches zero under 2C and 1.5C. Natural gas–fired generation grows 34 percent under BAU, displacing coal but slowing renewables, and declines 60 and 83 percent under 2C and 1.5C, respectively. These scenarios from bp are consistent with a variety of other modeling efforts, which find that coal-fired power is likely to decline regardless of future climate policy, whereas natural gas-fired power is more sensitive to policy decisions (Murray et al. 2018; IEA 2020; EIA 2021).

Because the bp scenarios do not provide state-level estimates on energy production, processing, or consumption, they are not well suited to estimate future changes in state-level revenue. For upstream revenues, it is likely that regions with the lowest production costs, lowest emissions footprints, and best access to markets will be the most competitive as policies and markets incentivize lower emissions across each fuel's life cycle. Other factors and technologies, including the scale of deployment of carbon capture, use, and storage, will also help determine the future of fossil fuel production and use across the United States, with consequent implications for public revenues.

Despite the uncertainty about how revenue reductions will be distributed, governments will need to identify new sources of revenue as fossil fuels decline. We now consider what options are available and identify issues to consider when weighing alternatives.

5. Options for Replacing Revenue

Before detailing revenue replacement options, it is worth emphasizing that the current and future damages from fossil fuel use easily outweigh the fiscal losses described here. For example, greenhouse gas emissions in the US energy sector averaged 5,117 million metric tons of CO2-equivalent from 2015 through 2019 (EPA 2021). Using the US Interagency Working Group's 2021 central estimate for the social cost of carbon (SCC) of $51 per metric ton, these emissions roughly translate to annual damages of $261 billion. These damages would be much higher under alternative SCC estimates in the recent climate economics literature (e.g., Daniel et al. 2019; Carleton et al. 2020; Bressler 2021; Rennert et al. 2021). And climate damages are far from the only externality associated with fossil fuels, which include air pollution that damages health and contributes to premature mortality (Jaramillo and Muller 2016; Vohra et al. 2021) and water pollution and site contamination (Herlihy et al. 1990; Jackson et al. 2014; Raimi et al. 2021), and more.[1]

That said, reductions in public revenues from fossil fuels will create fiscal challenges. For some states, particularly those with upstream oil and gas industries, our results suggest that the revenue may remain substantial for decades, providing a window for policymakers to invest energy revenues into savings funds, update fiscal policies, and seek to diversify regional economies. For states and communities reliant on coal, the implications are far starker.

Policymakers have numerous options to address these revenue shortfalls, many of which are technically straightforward and economically efficient but challenging to implement, primarily for political reasons (Rabe 2018). In the following two sections, we assess one set of options that are directly related to the energy system, followed by an economy-wide second set of options.

5.1. Energy-Related Fiscal Options

Clean energy has the potential to replace some of the revenues that will be lost from the decline of fossil energy. For example, personal and corporate income taxes from clean energy industries such as wind and solar may grow to rival those from coal, oil, and natural gas. As noted earlier, numerous recent studies have estimated that net employment would increase substantially in a rapid shift to clean energy (e.g., Larson et al. 2020; Pai et al. 2021). Importantly, however, renewable energy employment currently pays considerably less than most jobs in coal, oil, and natural gas (NASEO and EFI 2020).

Clean energy development on public lands will also contribute new revenues, although

1 This description is meant to be illustrative of the damages from fossil fuel use relative to the fiscal losses estimated in this paper. It is not a comprehensive benefit-cost analysis, which would incorporate many additional elements, such as emissions mitigation costs.

fossil fuels currently generate orders of magnitude more. In 2020, wind leases on federal lands generated just $5.5 million (Office of Natural Resource Revenue 2021), a number that will almost certainly grow substantially in the future. However, clean energy also receives large federal deployment subsidies, which may limit its capacity to be a major new source of revenue. The US Department of the Treasury (2021) estimates that federal clean energy tax credits are projected to cost $265 billion from fiscal year 2022 through 2031.

Petroleum product taxes, the largest fossil revenue source, could be replaced by a tax applied to vehicle miles traveled (VMT). A VMT tax could reflect the weight of the vehicle, type of road used, and other factors to account for multiple externalities (e.g., pollution, congestion, and accidents) and address the regressivity of current tax policies for electric vehicles (Davis and Sallee 2020; Shaffer et al. 2021). However, VMT taxes face political hurdles, including the challenges associated with raising any new taxes, along with concerns about privacy and distributional effects (Raschke et al. 2014).

As a tool to replace declining revenue, VMT taxes are quite appealing. The Congressional Budget Office (2019) estimates that a $0.05 per mile tax levied on commercial trucks would raise $12.8 billion annually, and a back-of-the envelope calculation suggests that a $0.01 per mile tax applied to each passenger vehicle would have raised $28.5 billion based on VMT in 2017 (FHWA 2019). On average, drivers would pay a similar level of tax per mile driven, and revenues would total $40 billion, roughly equal to current federal revenues this source (see Appendix for calculations). States could take a similar approach by piggybacking their own VMT tax atop a federal one, as they do today for petroleum products.

In the near term, governments could raise additional revenue by updating leasing terms such that producers of coal, oil, and natural gas on public lands pay higher royalty rates or other fees (e.g., “carbon adders”), raising additional revenue and potentially reducing emissions (Prest 2021). Most evidence suggests that higher severance tax rates have modest effects on oil and gas production (Yücel 1989; Chakravorty et al. 2011; Anderson et al. 2018; Rao 2018) and would typically increase government revenue even if they decrease production (Brown et al. 2020). However, two factors constrain this approach: first, it may not be possible to amend existing leases; and second, future fossil fuel production will need to decline to address climate change, reducing the tax base.

Another approach to raising revenue is to eliminate direct subsidies for fossil fuel producers (Metcalf 2017; Aldy 2021), which would raise an estimated $35 billion from 2022 through 2031 (US Department of the Treasury 2021). States could also eliminate tax preferences, such as Texas’s reduced severance tax rate for “high cost” natural gas wells (Texas Comptroller of Public Accounts 2021a). States may also consider new taxes on clean energy sources, though such efforts risk slowing the transition to clean energy.

As noted earlier, some US states have seeded permanent funds with fossil revenues, using interest earnings to support government operations. Expanding these funds could enhance fiscal stability. At their current level, however, the revenues generated by trust funds in Alaska, New Mexico, North Dakota, and Wyoming are unlikely to cover the losses associated with a rapid energy transition. In addition, the interest generated from permanent funds is already used to fund current services (or, in Alaska, annual payments to residents).

For local governments that rely heavily on property taxes applied to fossil fuels, clean energy technologies offer a new potential source. For example, commercial wind generation facilities paid $9.4 million in property taxes in 2019 to Montana local governments (Montana Department of Revenue 2021). However, localities are often limited in their ability to construct fiscal policy because states often adopt laws and rules that require uniform application across localities. For example, some states exempt renewable energy from local property taxes (California State Board of Equalization 2021; Texas Comptroller of Public Accounts 2021b), which may spur deployment but fail to raise revenue. In addition, the regions where fossil fuels provide the bulk of the local tax base are not necessarily the same regions where clean energy technologies will flourish.

5.2. Broader Fiscal Policy Options

At the federal level, policymakers have a variety of nonenergy tools to address shortfalls and could assist states through transfers. Important considerations include the economic efficiency of the tax, revenue stability, whether revenues move in tandem with the broader economy, the tax incidence, administrative requirements, and more. For a detailed discussion of these issues, see the Appendix.

From an economic efficiency perspective, perhaps the ideal approach is a price on greenhouse gas emissions, which would accelerate the energy transition while raising hundreds of billions in revenue to support multiple objectives, including bolstering public finances (Barron et al. 2018; Hafstead 2019, 2021). Another approach is a value-added tax (VAT), a form of consumption taxation that has long been favored by tax experts and is common in most of the world (Metcalf 1995; Graetz 2002).

If carbon pricing and VAT are not viable for political or other reasons, one alternative is raising income taxes, which account for more than half of total federal revenues. Recent proposals to increase taxes on corporations, capital gains, and other sources were projected to raise more than $200 billion in additional revenue per year (OMB 2021).

Compared with the federal government, states and localities have less policy flexibility because of balanced budget requirements (Clemens and Veuger 2020) and constraints on local property taxes (Preston and Ichniowski 1991). Because the federal government does not face these constraints, federal policies that have the effect of reducing fossil fuel revenues could be tied to financial transfers that help cover state and local shortfalls, as proposed in recent legislation (Barrasso 2021).

States may also consider broader fiscal policy reform. One way to assess the capacity for states to raise additional revenue is to evaluate their existing tax effort, which can generally be understood as the share of revenue that governments could raise relative to the revenue they do raise (Tannenwald 1999). On average, the 10 states with the highest dependence on fossil fuel revenues (see Table 2) have lower property tax effort, individual income tax effort, and corporate income tax effort than other US states (though, on average, they also have higher sales tax effort; see Appendix for details). This implies that some states could increase tax rates on property and income without substantially deterring economic growth.

Of course, such efforts would be politically challenging and could also run the risk of spurring out-migration for tax-averse individuals and businesses. In addition, downturns in fossil fuel activity in these states would likely reduce earnings for individuals and businesses, at least in the near term, which would reduce the tax base and further erode revenues. Taken together, these challenges suggest that transfers from the federal government to fiscally dependent states and communities will likely be necessary to sustain those communities during a transition away from fossil fuels.

6. Conclusion

A transition away from fossil fuels is needed to avert the worst consequences of climate change. This transition will provide broad benefits across society but also result in negative impacts for certain communities. Although most political rhetoric and scholarly attention have focused on the employment effects of this transition, the implications for public finance are also considerable. In this analysis, we estimate that fossil fuel production, transportation, processing, and consumption generate roughly $138 billion annually for all governments in the United States. Some states, led by Wyoming, North Dakota, Alaska, New Mexico, and West Virginia, are heavily dependent on these revenues to support public services. Using stylized scenarios of future energy use, we estimate that through 2050, nationwide revenues decline 16, 50, and 80 percent under business-as-usual, 2°C, and 1.5°C scenarios, respectively. Policymakers at the federal level have a wide variety of options to replace these revenues, such as carbon pricing, VMT taxes, and more, but each option faces considerable political hurdles in the immediate future. Tribes, states, and local governments that are heavily dependent on fossil fuel revenues are likely to face considerable fiscal challenges without federal support in the near to medium term and will need to diversify their tax base in the longer term.

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