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Removing U.S. Fossil Fuel Subsidies: Priorities for Action and Data Needs

Doug Koplow, Earth Track, Inc.

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1. Subsidy reform is a necessary element of any strategy to reduce greenhouse gases

Reducing greenhouse gas (ghg) emissions in the United States to meet the country's commitments under the Paris Accords is a formidable challenge. Eliminating subsidies to fossil fuels is an important component of this effort: it makes little sense to be subsidizing emissions at the same time we are trying to reduce them. The Biden Administration's commitment to identify and remove fossil fuel subsidies (Section 209[a] in the January 27, 2021 *Executive Order on Tackling the Climate Crisis at Home and Abroad*) offers a great deal of promise.[1]

Subsidy reform can provide broader benefits to the country than just climate. Fiscal savings are often also generated, and these can be redeployed to other sectors of the economy, accelerating important structural changes that will benefit the country for decades to come.

The climate benefits, however, could be substantial. A few years ago, Earth Track teamed up with the Stockholm Environment Institute to model the impact of removing key federal and state subsidies on the investment returns of new production in the United States.[2] Published in the journal *Nature Energy*, we found that at then-prevailing oil prices of US$50 per barrel, tax preferences and other subsidies pushed nearly half of new, yet-to-be-developed oil investments into profitability, potentially increasing US oil production by 17 billion barrels over the next few decades. This oil, equivalent to 6 billion tonnes of CO2, could make up as much as 20% of US oil production through 2050 under a carbon budget aimed at limiting warming to 2 °C. We found that removal of tax incentives and other fossil fuel support policies could help us to fulfill G20 commitments and yield climate benefits.

Reductions in baseline corporate tax rates in 2017 will mute this effect somewhat; concurrent removal of fossil fuel subsidies by our trading partners (many of whom have already committed to phase-outs through their participation in the G20 or APEC) would amplify the climate benefits.

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[a]Section 209 reads: "Fossil Fuel Subsidies. The heads of agencies shall identify for the Director of the Office of Management and Budget and the National Climate Advisor any fossil fuel subsidies provided by their respective agencies, and then take steps to ensure that, to the extent consistent with applicable law, Federal funding is not directly subsidizing fossil fuels. The Director of the Office of Management and Budget shall seek, in coordination with the heads of agencies and the National Climate Advisor, to eliminate fossil fuel subsidies from the budget request for Fiscal Year 2022 and thereafter."

2. Achieving better price signals on fossil fuels required evaluating all mechanisms of subsidization

Realizing the potential environmental gains implied by Section 209 will not be easy. This paper provides an overview of the different mechanisms the government uses to transfer value to coal, oil, and natural gas fuel cycles, and why looking just at direct spending will miss critical subsidies. Using this framework, the paper then highlights policy areas where subsidy reform, redirection, and transparency can leverage national efforts to transition the economy to a lower-carbon baseline. Links to relevant source material are provided.

Subsidies to energy producers and consumers are provided in many different forms. These include direct spending; credit subsidies such as loan guarantees and direct loans; liability transfers such as subsidized insurance or artificial caps on private liability exposure; purchase mandates that require markets to consume particular forms or quantities of energy even at above-market prices; and direct state ownership of particular supply chain functions. Because some forms of energy have larger environmental impacts during extraction or consumption, regulatory exemptions can allow damages (negative externalities) to go unchecked, creating a competitive hurdle for cleaner alternatives and an unjustified market advantage for the more polluting fuels.

A summary of the common ways governments intervene in energy markets is shown in Table 1 below. While definitions of what counts as a subsidy are not identical around the world, incorporating a broad range of policy instruments is the norm by the major international agencies working in this area: the Organisation for Economic Cooperation and Development (OECD), International Energy Agency (IEA), World Bank, and the International Monetary Fund (IMF).

The most important subsidy mechanisms will vary by energy resource, and all relevant mechanisms of subsidy to fossil fuels should be evaluated. Focusing only on direct budgetary outlays will understate both the total support[3] federal programs provide to fossil fuels and the share[4] of total support flowing to oil, coal, and natural gas relative to other forms of energy or demand-side strategies.

Table 2 uses this general framework to identify high priority areas for attention in the current budget and over the coming year. It is not intended to be a comprehensive listing.

Table 1. Governments transfer value to the energy sector in many different ways

Intervention category	Description
Direct transfer of funds	
Direct spending	Direct budgetary outlays for an energy-related purpose
Research and development	Partial or full government funding for energy-related research and development
Tax revenue foregone	
Tax*	Special tax levies or exemptions for energy-related activities, including production or consumption; includes acceleration of tax deductions relative to standard treatment
Other government revenue foregone	
Access*	Policies governing the terms of access to domestic onshore and offshore resources (e.g., leasing auctions, royalties, production sharing arrangements)
Information	Provision of market-related information that would otherwise have to be purchased by private market participants
Transfer of risk to government	
Lending and credit	Below-market provision of loans or loan guarantees for energy-related activities
Government ownership*	Government ownership of all or a significant part of an energy enterprise or a supporting service organization; often includes high risk or expensive portions of fuel cycle (nuclear waste, oil security, or stockpiling)
Risk	Government-provided insurance or indemnification against accident or operating risks, at below-market prices
Induced transfers	
Cross-subsidy*	Policies that reduce costs to particular types of customers or regions by increasing charges to other customers or regions
Import or export restrictions*	Restrictions on the free market flow of energy products and services between countries
Price controls*	Direct regulation of wholesale or retail energy prices
Purchase requirements*	Required purchase of particular energy commodities, such as domestic coal or biofuels, regardless of whether other choices are more economically attractive
Regulation*	Government regulatory efforts that substantially alter the rights and responsibilities of various parties in energy markets or that exempt certain parties from those changes. Distortions can arise from weak regulations, weak enforcement of strong regulations, or over-regulation (i.e., the costs of compliance greatly exceed the social benefits)
Costs of externalities	Costs of negative externalities associated with energy production or consumption that are not accounted for in prices; examples include greenhouse gas emissions and pollutant and heat discharges to water systems
* Can act either as a subsidy or as a tax depending on program specifics and one's position in the marketplace.	

Links to Policies Covered

Direct transfer of funds
- Direct spending
- Research and development

Tax revenue foregone
- Expensing of intangible drilling costs and accelerated amortization of geological and geophysical expenses
- Percentage depletion allowance
- Eliminate the tax advantages of Master Limited Partnerships (MLPs)
- Eliminate the use of LIFO accounting
- Constrain tax-favored "opportunity zones" for climate-damaging investment
- Better targeting 45Q tax credits; control revenue-loss risks

Access to minerals
- Increase federal royalty rates to more closely match levels in private leases and on state lands
- Ensure competitive lease auctions
- End royalty-free leases in Gulf of Mexico
- Increase bonding rates and publish improved data on sureties
- Establish federal excise tax on oil and gas to backstop states and properly close abandoned wells
- End royalty-free fuels on federal leases

Transfer of risk to government

Lending and credit
- Redirect credit support from Export-Import Bank, OPIC/Development Finance Corporation, US contributions to World Bank and other multi-lateral development institutions
- Improve transparency and targeting of Private Activity Bonds
- Improve transparency and targeting of Rural Utility Service (RUS) lending and guarantees for electric power
- Improve transparency and targeting of tax-exempt municipal debt for energy
- Eliminate New Funding for Advanced Fossil Energy Projects under the Title 17 Innovative Technology Loan Program

Government ownership
- Improve Strategic Petroleum Reserve financial reporting and identify alternative funding mechanism
- Subsidies to fossil-intensive transportation infrastructure
- Full user funding of construction and maintenance of Inland Waterway System
- Full user funding of Interstate Highway system
- Redirect fuel tax exemptions on cross-border trips to pooled carbon reduction funds

Risk
- Improve funding of, and liability protection from, the Oil Spill Liability Trust Fund
- Eliminate oil spill liability caps for offshore spills
- Internalize railcar accident liability for shipments of oil or LNG by rail
- Internalize liability associated with underground injection of captured CO2

Regulation

Costs of externalities

Table 2: Review of Existing Fossil Fuel Subsidies and Proposed Policy Actions

Intervention Category	Description
Direct transfer of funds	
Direct spending. Direct budgetary outlays for an energy-related purpose	• This is the main category of support captured by the current wording of Section 209 in President Biden's Executive Order (EO). The standard budget processes should capture most of the direct spending line items; the main risk will be agency-level decisions to exclude line items based on internal assessments of the specific wording of the EO. For example, agency staff may argue that programs that support fossil fuels do so in a way that is not "direct," is not subsidizing them, or can't be modified while being "consistent with applicable law." • The initial objective in evaluating reforms should be to build as comprehensive a list of programs providing potential support to fossil fuels, and then conduct further review to prioritize the most important subsidies to redirect or eliminate first. Equally important will be to identify areas where additional data collection and disclosure now would improve options to eliminate or better target the subsidies a year from now. • There is a natural tendency for program managers to want to avoid reductions in spending, even where it is beneficial from a climate perspective to do so. Subsidy information provided by each program should comprise and important part of any review, though also be supplemented with data from other sources.
Research and development. Partial or full government funding for energy-related research and development	• A useful goal on energy R&D would be to reprogram federal research on fossil energy towards accelerating the low-carbon technologies that are needed to replace coal, oil and natural gas. R&D related to monitoring production and emissions from fossil fuel activities; or on health or environmental effects from these fuel cycles both seem useful to retain. Continued research into improving or expanding fossil energy should not be funded. • Carbon Capture and Sequestration (CCS) research should be carefully vetted by the objective of the program. A strong federal role in the basic science of efficient capture and secure sequestration is in the public interest. Federal research that has the effect of subsidizing the cost of fossil energy to deal with its emissions should be discouraged. Those costs should be paid by the industry itself, and will be of diminishing value as economic functions (e.g., power generation, transport) switch away from fossil fuels. It will be more useful to focus on carbon capture technologies such as direct-air capture that will be of long-term value to society.

Intervention Category	Description
Tax revenue foregone	
Tax. Special exemptions for energy-related activities, including production or consumption; includes acceleration of tax deductions relative to standard treatment and corporate structures that reduce, delay, or avoid standard tax burdens.	The tax breaks listed below are *not intended to be a full list*, [b] but rather to reflect my views on high impact areas and emerging issues that have yet to be well characterized. Additional resources for a larger list include analysis by other environmental and fiscal watchdog NGOs such as Taxpayers for Common Sense[5], Greenpeace, and Friends of the Earth; and the provisions included in the End Polluter Welfare Act[6] that was introduced last summer. **Expensing of intangible drilling costs and accelerated amortization of geological and geophysical expenses** *Proposed action*: Elimination. *Rationale:* Industry argues that since these expenses have no salvage value should an operation be discontinued, they should be able to write them off immediately. This violates standard accounting rules to capitalize all costs incurred to bring a production unit online and then to depreciate them over the asset's useful life. Many industries have intangible costs with no resale value should the enterprise be shut down: engineering and architectural work on construction projects; development costs for firm-specific software tools; etc. And even once the provision is gone, the industry would still be able to write off investments that cease to be used and useful, also true in all economic sectors. **Percentage depletion allowance** *Proposed action:* Elimination.

[b] Known subsidies to fossil fuels not covered in this memo include: accelerated depreciation for natural gas distribution lines and pollution control facilities (mostly coal); tax credits for enhanced oil recovery, producing oil and gas from marginal wells, or from non-conventional sources; special rules for mining reclamation reserves (coal), passive losses (oil and gas); capital gains treatment for coal royalties; tax credits for refined coal and coal produced from Indian lands; favorable tax treatment of refining, transport, and distribution income from foreign oil and gas subsidiaries; enhanced ability to monetize net operating losses; deductibility of 20% of qualified business income for partnerships and other pass-through entities; and the defense of critical oil supply routes.

Intervention Category	Description
	Rationale: There is no reason percentage depletion should remain in our tax code at all – not for fossil fuels, and not for non-fuel minerals either. Capital assets can be written off over their service life across all sectors of the economy, but this is based on the funds invested, not the market value of the product. Indeed, the structure of percentage depletion is particularly inefficient: subsidies increase as market prices rise, which is the time government subsidies are needed least. Percentage depletion should be removed for all minerals. Further, though not a fuel mineral, eliminating the ability to claim tax write-offs on the depletion of groundwater would be another beneficial reform to fix an antiquated policy that has long made no sense.[7] That change that would help to protect critical water resources in the Ogallala Aquifer. At the very least, a study to evaluate whether water in the arid southwest used for fracking is also benefitting from depletion write-offs would be important. **Eliminate the tax advantages of Master Limited Partnerships (MLPs)** *Proposed action:* Preferably eliminate all remaining allowable uses for the publicly-traded partnership so that all MLPs must formally convert to standard corporate forms within two years. An alternative would be to alter the taxation of these entities to be equivalent to a standard C-corporation. The best strategy would depend on the complexity of making the change versus ensuring the post-reform treatment is highly resistant from being reversed in the future. *Rationale:* Fossil fuel subsidies are a massive challenge in many developing countries, mostly through below-market prices to consumers. In these situations, the common guidance on subsidy reform is that periods of low fuel prices are an ideal time to implement subsidy reforms because subsidy removal will have little or no effect on the prices consumers see. As a result, economic and social dislocations will be minimized, and the political environment much more accepting. Here's an article by the International Energy Agency making this point.[8] This is relevant to eliminating MLPs because, following the massive drop in the top corporate rates under the Tax Cuts and Jobs Act of 2017, the tax differential between standard corporations and MLPs is at a historic low. The

Intervention Category	Description
	differential is small enough that many MLPs decided on their own to convert back to standard C-corporations over the past couple of years, or have spun off C-corporation shares that now trade in parallel to the MLP. They decided that the much smaller remaining tax savings weren't worth the added complexity in accounting and restrictions the partnership structure placed on some of their target investors. But many fossil fuel-related MLPs remain, as do a handful of publicly-traded private equity and infrastructure funds (e.g., Brookfield Infrastructure Partners, ticker BIP) that also hold substantial oil and gas assets. A current list of remaining MLPs is here.[9] The ability to avoid corporate income taxes entirely through the use of publicly-traded partnerships (PTPs) was eliminated for the vast majority of US industries in 1986. The action was viewed as critical: the structure was growing so fast across many economic sectors that that government feared the PTPs would undermine corporate tax collections.[10] Natural resource industries slipped by the dramatic tightening of PTP eligibility, which is why the vast majority of MLPs have been in the oil and gas sectors (with a smattering of activity in coal, fertilizer, and other resources). For those industries still eligible, companies used the tax courts and IRS private letter rulings through much of the 2000s to expand eligibility further (see Figure 3 here), arguing that this or that activity met the statutory language and should be eligible to form an MLP and avoid corporate-level income taxes.[11] This should end. In 2006 Canada eliminated Income Trusts, an analogous corporate structure to MLPs, as a surge in corporate conversions put their corporate tax revenue at risk.[12] As in the US, oil and gas were the biggest beneficiaries of the old system. Canada's reform was quick and comprehensive, and can be studied to evaluate options for the US. Recent shifts away from MLPs do not mean that action now is unneeded. If firms can continue to create MLPs, as soon as corporate income tax rates begin to rise again, assets parked in MLP structures will similarly increase. The rules need to be changed permanently now. **Eliminate the use of LIFO accounting** *Proposed action:* Elimination. *Rationale:* Last-in-first-out accounting has been heavily used by the oil industry for many decades to increase the size of near-term tax deductions. The deferrals have reduced the taxes owed on a present value basis. In addition to

Intervention Category	Description
	reducing subsidies to large oil companies (see, for example, Li and Sun, 2017),[13] repealing LIFO would move the US closer to being able to adopt the International Financial Reporting Standards. Convergence would simplify reporting for international companies and enhance market transparency for investment and corporate oversight. An interesting history of the origin of LIFO and its problems can be found here.[14] **Constrain tax-favored "opportunity zones" for climate-damaging investment** *Proposed action:* Collect and publish data on how this subsidy is being used; eliminate eligibility for areas conflicting with the policy goals of the original statute, including investments in oil and gas infrastructure. *Rationale:* Created by the Tax Cuts and Jobs Act of 2017, investors in "Qualified Opportunity Zones" or QOZs (areas deemed distressed by the Treasury) can defer capital gains on asset proceeds parked in opportunity zones, and often eliminate capital gains tax liability entirely for appreciation associated with the opportunity zone investment itself. While most of the attention on QOZs has focused on buildings, it appears as though oil and gas companies are able to partake in this subsidy as well.[15] There are a number of private equity funds advertising that they are focused on this niche of oil and gas opportunity zone investments, though the degree to which capital has been committed is unclear.[16] There are many concerns with the Opportunity Zone program that go well beyond its potential to subsidize new construction of long-lived, greenhouse-gas intensive infrastructure. Those include how eligible parcels are selected and whether it accelerates gentrification rather than enhancing opportunities for low-income people through housing and jobs. The Administration should establish a public database that includes line item detail on the amount, location, and use of proceeds for QOZ-subsidized investments. This data would demonstrate whether the fast-growing subsidized program is achieving its original stated intent, or if it is exacerbating climate change risks by funding oil and gas activities or real estate located in areas that will be heavily affected by sea level rise, increased hurricanes, or other similar risks.

Intervention Category	Description
	Better targeting 45Q tax credits; control revenue-loss risks *Proposed action:* The Administration should immediately review the likely use of this provision under the final rules published by the IRS in January. This review should estimate (a) revenue loss; (b) mix of likely claimants in three categories: enhanced oil recovery; injection or reuse by large incumbent ghg emissions sources; and innovative technologies for direct air capture or conversion of carbon oxides into a solid; (c) distribution of losses among parties from failed sequestration; (d) options to cap taxpayer exposure to revenue losses; and (e) ways to direct credits towards innovative solutions that will provide societal flexibility even as fossil fuel use declines (rather than mostly subsidizing enhanced oil recovery). The Administration should also ensure that tax credit claims are accessible in a public database, showing claimant, amount claimed, source and sink of the carbon oxides, key vendors, and any failures over time. *Rationale:* One-for-one federal tax credits for carbon capture and sequestration, including reinjection into oil and gas wells to boost oil production, and no longer with any cap on how many tons can be claimed, is a program at great risk for very large revenue losses for quite limited public benefits. Earlier versions of the law had a national cap of 75 million tons of subsidized sequestration. There is no cap on tonnage that can claim a credit under the rule changes implemented as part of a budget agreement bill in 2018.[17] Taxpayer exposure could be huge, and with little visibility on who is making claims and for how much. If Congress has inadequate advance warning of the scale of the credits claimed, or who is claiming them, options to constrain the program if signs of abuse or too rapid scaling arise will be quite limited. Even with a national cap, there have been significant indications of fraudulent claims and insufficient oversight.[18] This problem could get much worse now. Further, the sequestration the taxpayers are buying with these tax credits doesn't exactly come with a performance guarantee. While eligible projects require a binding contract for sequestration to claim a credit, this is binding per state law. Thus, if the project is in one of the states that has agreed to take on the longer-term liability for projects from developers, many claimants would seem to be relieved of responsibility to ensure their sequestration services actually work over the long-term as they have promised (and been compensated for).

Intervention Category	Description
	Companies appear to be shifting liability in two other ways as well. First, damage caps as low as just above 5% of the contract price seem allowable under liquidated damage provisions. This would seem to leave the potential for liability shedding on to the public – as we've seen frequently with oil and gas well closures and coal mine reclamation that also effectively cap operator exposure for damages via insufficient bonding levels. Second, even the tax credits paid out by Treasury offer taxpayers little protection that we actually get what we "paid" for. While CCS is touted as a long-term solution, the final rule released on January 6, 2021 limits the period during which tax credits must be repaid if the sequestration fails (the recapture period) to only 3 years. After that point, the taxpayer keeps the tax credit even if the CO2 leaks back to the atmosphere.
Other government revenue foregone	
Access. Policies governing the terms of access to domestic onshore and offshore resources (e.g., leasing auctions, royalties, production sharing arrangements)	The federal government remains a large owner, lessor, and manager of fossil fuel minerals. Federal payments (through rents, royalties, and bonus payments) also affect Tribal and State coffers through delegated management and shared cash flows from leases. Decisions on the timing, scale, and location of lease sales have significant environmental and regional fiscal impacts. A 2018 analysis by the US Geological Service estimated that fossil fuels from federal lands comprised 23.7% of national CO2 estimates and 7.3% of national methane emissions.[19] Current practice provides subsidies to fossil fuel extraction that need to be addressed. Further, some federal leases put at risk pristine natural environments or other key regional industries such as fishing. For these areas, leasing bans or moratoria may be the optimal approach. The modifications below would apply to areas where lease sales continue. **Increase federal royalty rates to more closely match levels in private leases and on state lands** *Proposed action:* Increase federal onshore royalty rates of 12.5% by roughly 50% (to match private and state levels) or 100% (to match Texas) depending on the quality of the reserves. Adjust minimum rentals for inflation to bring original rates to the same real value in today's dollars; and don't waive minimums on auctions going forward. *Rationale:* Federal royalty and rental rates have been politically set and rarely adjusted for inflation or changes in

Intervention Category	Description
	prevailing market practice. This goes against the expectation that BLM (and the US Forest Service) will also protect the interests of taxpayers. Rates should be raised to more closely match those prevailing on State and private leases. An analysis of 1.8 million private oil and gas leases done some years back found average royalty rates of 17.8%.[20] Though an updated data set would be helpful, this detailed review underscores of the inadequacy of federal onshore royalty rates. GAO published some comparative data on federal and state royalty rates in 2019 here (page 11), also demonstrating that the current federal rates are inappropriately low.[21] **Ensure competitive lease auctions** *Proposed action:* Any sale tract with fewer than three competitive bidders should be cancelled, and the oversight agencies should develop software algorithms and bidder information collection systems that enhance the government's ability to identify patterns of potentially collusive bidding. The Administration should direct BLM, BOEM, and the Forest Service to compile and publish integrated and granular data on their historical and current leasing of all minerals on public land. *Rationale:* Industry sometimes claims that royalty rates don't matter because when they bid on federal leases they pay full market value through the combination of royalty rates and up-front bonus payments. This claim is faulty in two respects. First, royalties are more volatile payment streams, but better allocate market and development risk between the resource owner (the federal government) and the lessee than an upfront payment alone. Indeed, upfront bonus bids are depressed for that uncertainty. There are few resource owners better able to handle the volatility of cash flows in order to achieve a higher overall return than the federal government, so a policy that provides artificially low royalties on federal leases does not make economic sense for taxpayers. Second, a large number of federal leases for all fossil fuels have only one bidder. Many more have only two or three. In order for bonus payments to have a prayer of boosting low royalty rates to a market-rate payment overall, lease auctions need to be competitive. In far too many cases they are not. In the Powder River Basin, there have been 28 individual lease sales between 1992 and 2017 from which 7.3 billion tons of federal coal were sold.[22] Of these, 22 had only a single bidder (all of whom were already mining an adjacent parcel); five attracted two bidders. A 2018 review of twenty years of offshore lease awards by the Project on Government Oversight determined that more than

Intervention Category	Description
	three-quarters of those in the Gulf of Mexico had only a single bidder.[23] GAO (page 10) found that only 17 percent of onshore leases had competitive bids and what they considered a high bonus payment (more than $100 per acre).[24] Aside from adjusting federal royalty rates upwards, a critical improvement the Biden administration should implement is to make all historical and current leasing data publicly-available, and accessible in a much more granular way. For each tract bid, did the government or the developer propose the bid; how many parties bid; who were they; who won and with what bid rates and terms; who are the principals within the winning firm; did that lessee make all payments completely and on time; did they properly clean up the site and close the well; was the lease sold or transferred to another party? All of this data will allow powerful external evaluations of the degree to which leasing programs have earned adequate returns for the federal government (and by extension tribes and state governments), and whether particular individuals or firms have failed in their responsibilities to properly manage the federal lands on which they operated. Even if the Administration moves forward with leasing moratoria or bans, granular data on the past lease auctions and performance of winning bidders should be compiled into a permanent, publicly-available data set. Legacy problems exist on a substantial number of federal acres, and the data would help assign responsibility. Further, should a different administration or Congress reverse these bans, the data tracking implemented now would establish improved norms of disclosure and help to reduce the risk of egregious abuses of land stewardship and auction oversight in the future. The data should also support more complicated assessments of potentially collusive behavior in public resource auctions over time. **End royalty-free leases in Gulf of Mexico** *Proposed action:* Ideally, end royalty-free production from the Gulf of Mexico from legacy royalty-free leases. In addition, do a formal review of the cause of what appears to be a very strange oversight in the original enabling legislation, and whether corruption was involved.

Intervention Category	Description
	Rationale: The federal costs of royalty-free leases issued to a subset of lease holders in the Gulf of Mexico have been estimated at $18 billion in lost royalty revenue through 2018.[25] Although the initial errors date back to 1995, even in 2018, roughly 22% of the production from federal leases in the region was royalty-free.[26] Efforts to stem future losses from this error via excise taxes[27] or similar tools have been proposed, and should again be considered by the Administration. Separate from that, however, there should be a more detailed evaluation of how this error occurred in the first place, and whether there were elements of political meddling or corruption that led to the resource giveaway. **Increase bonding rates and publish improved data on sureties** *Proposed action:* Eliminate blanket bonding in favor of well-specific financial assurance; increase required bonding levels to 90th percentile of expected closure costs; establish public reporting of bonding and surety information for every well. *Rationale:* Natural resource extraction involves substantial expenditures at the end of operations to properly close the well or mine, clean up the site, reclaim the landscape, and fund any required ongoing monitoring. These costs hit while revenues from the minerals themselves have dropped, resulting in a higher chance the firm will have insufficient funds, or choose not to deploy them, to properly close the site. Historically, larger firms have sold off wells to smaller firms as production levels declined. Such sales have also historically shifted closure responsibility to a smaller, often poorly capitalized new owner. Surety bonds have been used to address this problem, but have been inadequate to meet the challenge. Legacy costs to properly plug and clean up well sites and ancillary fuel cycle infrastructure are a huge, though poorly characterized, problem. In pending work, Earth Track and the Stockholm Environment Institute estimate the scale of this unfunded legacy cost in the hundreds of billions of dollars across the US. In an effort to better understand the scale and scope of this problem, Carbon Tracker recently launched a web portal to compile relevant data.[28] Detailed disclosures at the well level of lease bonding levels and the associated surety can help government and

Intervention Category	Description
	other interested parties to better understand the problem on BLM and Forest Service lands by identifying firms, related firms, and individuals who repeatedly create management or cleanup issues on current or past onshore leases. Offshore activity is also a growing concern: abandoned and improperly plugged offshore wells appear to be a much bigger problem than previously anticipated.[29] This suggests a parallel system for BOEM is needed – though one that is integrated with onshore activity so actors in both sectors can be easily tracked. The Administration should also increase bonding levels to ensure coverage is provided not at average expected closure costs, but rather those of the 90th percentile costs. This should not be a big ask: Carbon Tracker's data on Colorado (see the 26 minute mark here) indicated annual premiums for existing bonding was less than $1/per well.[30] Auto policies, mandated in most US states, don't require coverage only up to the average cost of an accident. If they did, large numbers of drivers would be under-insured. Federal data on leases should list the Surety, the coverage amount, the Surety quality (e.g., AM Best ranking), and any situations in which the Surety would have the right to cancel coverage once it was put in place but before the site was properly and entirely closed. All of these factors would highlight potential gaps in coverage before they result in taxpayer liability. **Establish federal excise tax on oil and gas to backstop states and properly close abandoned wells** *Proposed action:* Implement a new federal excise fund on oil and gas production to supplement inadequate collections nationwide in state abandoned well funds. The new fund would be similar in purpose to the Abandoned Mine Land fund for coal, though with a different allocation method in order to bolster state engagement and improved site mapping. It is important to start these collections now, while the industry remains healthy and before production drops as a result of a transition to a lower-carbon economy. *Rationale:* There are millions of legacy oil and gas well sites around the country. Hundreds of thousands of them have been improperly closed, or have very old plugs that have failed and are leaking. Others have been parked as "idled" for many years, allowing the owner to avoid spending money to fully close them. Bankruptcies and industry consolidation often result in liabilities being dumped on to taxpayers. While all producing states do have plugging and abandonment funds, collections are well below the level needed to address the scale of their legacy well problem.

Intervention Category	Description
	As noted, this mirrors the situation the federal government faced with abandoned coal mine lands, and that led to the creation of the Abandoned Mine Land trust fund in 1978. Federal excise fees on new coal extraction have greatly helped address this problem; a similar approach should be adopted for oil and gas wells. **End royalty-free fuels on federal leases** *Proposed action.* End current royalty exclusions for on-site consumption, venting, or flaring of oil and gas on federal leases. Any fuels severed from the mineral estate should pay royalties. *Rationale.* Current practice allows fuels that are extracted from federal leases but that are used to fuel production-related activities, or that are flared, vented, or reinjected to be excluded from royalty payments due. Because reinjection does not remove the fuel from the federal mineral estate, this exclusion makes sense. None of the other ones do; indeed, allowing vented or flared natural gas to avoid royalties reduces the incentive to properly manage these production streams. To the extent that government practice drives private lease terms on these royalty-free streams, correcting this problem at the federal level could improve resource management on private leases as well.
Transfer of risk to government. Markets are largely about assessing and allocating risks and rewards. When governments absorb or limit risks for one industry and not another, the less-risky way to provide the same good or service is penalized.	
Lending and credit. Below-market provision of loans or loan guarantees for energy-related activities	Federal subsidization of oil and gas through credit markets can arise via tax-favored bonds issued by the Treasury or Federal agencies; US provision of low cost credit to international multilateral lending or export credit agencies; bonds issued by state or municipal governments on which interest is federally tax-exempt; or federal loan guarantees to fossil-fuel related activities. In all of these situations, credit subsidies expand or extend the reach and duration of long-lived fossil fuel infrastructure.

Intervention Category	Description
	Redirect credit support from Export-Import Bank, OPIC/Development Finance Corporation, US contributions to World Bank and other multi-lateral development institutions *Policy recommendation:* Lending and credit support provided by these institutions no longer be directed towards fossil fuel infrastructure. Lending commitments via all institutions should be compiled in a publicly-available database, including information on below-market terms and defaults. *Rationale:* The US has long funded oil and gas projects through Exim Bank. A detailed review of loan and guarantee commitments during the 1980s found that fossil fuels captured 77% of direct loans to energy and nearly 70% of loan guarantees during that period (starting on page B4-144, from this study).[31] The mix has improved in recent years, and the Administration seems poised to remove support to oil and gas projects entirely.[32] However, support for fossil fuels has also been common in these other institutions. A recent review by Friends of the Earth details billions in support to the sector from OPIC/DFC; large commitments in 2020 are discussed in this DFC press release.[33] Fossil fuels have captured the largest share of energy lending support by multilateral development banks and export credit agencies, averaging $72 billion annually in recent years.[34] The social needs these institutions meet are real and growing; however, there are ample opportunities for funds to be redeployed in a manner much more closely aligned with commitments of the US and recipient countries under the Paris Agreement. **Improve transparency and targeting of Private Activity Bonds** *Policy recommendation:* Public, real-time database of all tax-exempt bond issuance including borrower, use of proceeds, amount, and other relevant terms. *Rationale:* Private activity bonds allow the issuance of federally tax-exempt debt for private activities deemed also to have a public benefit. Because the interest is not treated as taxable income, the bonds reduce tax revenues to the federal treasury, and also reduce borrowing costs to issuers. Some allowable use of proceeds categories flow to energy. These include local electric energy or gas furnishing

Intervention Category	Description
	facilities, local district heating and cooling facilities, and docks and wharves (relevant for bulk fuel trade). All have a sizeable fossil energy component. In addition, opportunity zone bonds are more generally targeted but can sometimes be heavily captured by one sector. Gulf Opportunity Zone bonds, authorized to help rebuild areas hard hit by Hurricane Katrina, are no longer being issued. However, they provide a useful example of how general bonds can be relevant to track from the perspective of fossil fuel subsidies. In this case, fossil-fuel facilities (including basic chemical production reliant on fossil-fuel feedstocks) captured 57% of the nearly $8 billion of tax-favored GO Zone bonds issued by the state of Louisiana, which in turn was the largest state issuer of these bonds.[35] Including bonds that jointly funded a fossil-fuel use of proceeds plus something else boosts the capture rate to nearly two-thirds. Private activity bonds often support important public policy goals. However, the ability to issue tax-exempt bonds is a privilege and one that saves the issuer significant money through reduced interest costs. Additional transparency on how these bonds are being used is needed, and can be provided by the Biden administration by creating a public database of every bond issuance and the use of proceeds. This database should include historical issues as well as new ones, and include the issuing agency, the authorizing program, the beneficiary, the terms, and the use of proceeds category. **Improve transparency and targeting of Rural Utility Service (RUS) lending and guarantees for electric power** *Policy recommendation*: A public, real-time database of all RUS-issued electric power loans and loan guarantees, including borrower, use of proceeds, amount, performance, and other relevant terms should be easily accessible online. Accelerated targeting of non-fossil infrastructure, as well as improved grid-flexibility so rural cooperatives are better able to integrate distributed low carbon energy as their existing capital wears out, should be prioritized. *Rationale:* The RUS has approximately $46 billion in outstanding lending to rural electric utilities, nearly all of which is in the form of direct loans rather than guarantees.[36] While renewables penetration in rural areas is growing, recent data indicate these facilities remain fossil-intensive, with approximately 1/3 of capacity coal-fired (often older plants) and 1/3 natural gas.[37] Accelerating the rate at which federal support and subsidies to rural energy supports improved efficiency and cleaner power should be a priority. More visibility on which facilities within the loan portfolio are most problematic in terms of carbon emissions and air pollution should also be established quickly.

Intervention Category	Description
	Improve transparency and targeting of tax-exempt municipal debt for energy *Policy recommendation:* As with the other categories of subsidized lending, government support in this area has continued to primarily support legacy energy systems, which are predominantly fossil-based. Improved transparency is needed to evaluate these patterns, and also to pressure an increased share of lending capacity flowing to lower-carbon generation, demand-side programs, and improved grid management. Reporting of natural gas leakage rates along these distribution systems should be quickly increased and disclosure made a condition of lending. New lending should be shifting towards non-fossil infrastructure. *Rationale:* Tax-exempt debt provides substantial support to public power. Electric infrastructure comprises about $100 billion in outstanding debt as of early 2021.[38] As compared with total power markets in the United States, the publicly-owned generators are a bit more coal-intensive (25.2% versus 22%), more oil-intensive (4.6% versus 3.1%), and slightly lower in terms of natural gas (43.5% versus 45.3%). Fossil fuel-based generation continues to dominate its supply base. Support for municipal natural gas processing and distribution systems for heating and cooking is also large, though could not be quantified. **Eliminate New Funding for Advanced Fossil Energy Projects under the Title 17 Innovative Technology Loan Program** *Policy recommendation:* Fossil energy projects are at best a short-term patch for a broader need to migrate to non-fossil alternatives. Eligibility for these projects under Title 17 should be ended. *Rationale:* The open solicitation for Title 17 presently includes $8.5 billion in lending capacity for "advanced fossil energy."[39] The objective of this program is to jump-start solutions to problems too risky for private funders to take on, but that can scale quickly and broadly to have a meaningful impact on societal transitions to low carbon. Most of these advanced fossil energy project categories fail these criteria: even if they work, the capital lifetimes will exceed the Paris agreement deadlines to sharply ramp down carbon, and the world at that stage will have little space even for lower-emission fossil energy systems. The benefits of targeting advanced fossil further decline once one

Intervention Category	Description
	recognizes that Title 17 funds proof-of-concept projects; achieving impacts at scale (i.e., with many more units) will take decades that we simply don't have. Given the need to have shifted from fossil-fuel based power and transport systems entirely over the next couple of decades, and that all of these systems will continue to have a larger carbon intensity than rapidly-growing alternatives, public resources would be better spent elsewhere. The checks and balances of the DOE Loan Program have been problematic in general;[40] alternative structures to better share upside with taxpayers, more accurately price credit subsidy values, and create more long-term alignment of interests between funding gatekeepers and the performance of loan recipients are critical given the planned scale of this program under the Biden administration.
Government ownership. Government ownership of all or a significant part of an energy enterprise or a supporting service organization; often includes high risk or expensive portions of fuel cycle (nuclear waste, oil security, or stockpiling)	With the world's largest market system, it is easy to overlook that the United States does have substantial direct government involvement with the energy industry, including fossil fuels. A few important examples are below. **Improve Strategic Petroleum Reserve financial reporting and identify alternative funding mechanism** *Policy recommendation:* Improve accounting methods to treat SPR like a state-owned enterprise and properly reflect cost of capital, implicit federal insurance, and other cost elements in its financial accounting statements. Alter funding base away from taxpayers to more accurately reflect the cost of supply risk into market prices, studying funding approaches in other IEA countries as possible models. *Rationale:* Stockpiling a 90-day supply of oil as a buffer against supply interruptions is required as a part of the US membership in the International Energy Agency.[41] This requirement is an important one in terms of global stability, and recommendations to eliminate the public stockpile entirely should not be pursued.[42] However, subsidies to SPR should be corrected. The subsidy element arises through how the cost of the Reserve is calculated, and who pays that cost. In the United States, the stockpile is built and managed by the federal government, and entirely paid for by

Intervention Category	Description
	taxpayers. Two improvements are needed. The first is that the financial statements of SPR should reflect the enterprises' real costs of having capital tied up in infrastructure and oil inventory. This can happen immediately. Were a private firm to operate the entity, working capital would be a substantial component of its annual running costs; and ignoring this in federal accounting materially understates the cost to build and operate the reserve. An overview of this issue can be found in Section 4.3 here.[43] The second change, on funding, should be reviewed during the coming year so that an improved funding approach can be put forth in the next budget. Other IEA members use a variety of mechanisms to fund their stockpiling requirement, with a larger portion covered by the industry beneficiaries rather than taxpayers. The US stockpile benefits both commercial markets and military readiness, so funding from both civilian and military sources would likely make sense. The most recent detailed country-by-country review of stockpiling approaches by IEA seems to have been published way back in 2007.[44] However, it is likely that if requested to do so by the US government, IEA staff could relatively quickly update the data on stockpiling approaches and funding methods across member countries. **Subsidies to fossil-intensive transportation infrastructure** Funding of infrastructure via fees on users is an approach frequently implemented in the United States. This includes interstate highways, inland waterways, airports, ports, and harbors. Fees on fuels consumed by vehicles using these systems, or charges on vehicles or freight carried, are the most common funding bases. Where funds are inadequate to cover the costs of these systems, a subsidy accrues to users. If particular groups use the infrastructure much more intensively than others; or use it in a way that creates disproportionate construction or maintenance costs, the user subsidy favors particular industries or user sub-groups (e.g., heavy trucks) and harms substitute goods and services. **Full user funding of construction and maintenance of Inland Waterway System** *Policy recommendation:* Increase user fees so they can cover full system costs. Importantly, this would remove subsidies from the largest volume users of the system, which include bulk coal, petroleum, and petroleum products.

Intervention Category	Description
	Rationale: Fees on users cover only between 35 and 50 percent of system costs.[45] And bulk coal, petroleum and petroleum products have long comprised 50% or more of tonnage shipped (see, for example, national summaries in this Army Corp publication).[46] Among available transport modes (e.g., truck, train, air), water is by far the least expensive for those commodities able to use it. Thus, fee adjustments are not expected to result in material disruptions to trade. **Full user funding of Interstate Highway system** *Policy recommendation:* Increase federal motor fuels excise tax to cover the all or nearly all of the cost to build and maintain highways. *Rationale:* Users should pay a much higher portion of the costs to build and maintain federal highways; their share has had to be supplemented by general tax revenues for decades. Increasing federal motor fuel taxes can make up for this short-fall. In the near term, with the majority of vehicles using the roads still fueled by petroleum, this can accelerate the transition to more efficient and cleaner vehicles. As non-petrol vehicles reach a larger proportion of vehicle miles traveled on highways, a supplemental or replacement tax base will be needed to ensure funding adequacy and equity among road users. **Redirect fuel tax exemptions on cross-border trips to pooled carbon reduction funds** *Policy recommendation:* Study scale of existing problem within US, and options to address with aim of statutory reforms and policy specifics in the next Biden budget. *Rationale:* As noted, state and federal fuel taxes are frequently deployed to construct and repair related infrastructure (roads, rails, ports, harbors, airports, inland waterways). However, vehicles crossing state or federal political boundaries are exempt. This exclusion derives from the interstate commerce clause of the US Constitution, and international agreements on travel and commerce between the US and other countries.

Intervention Category	Description
	Economically, the exemption makes no sense. The vehicles create identical wear and capacity requirements on the associated infrastructure whether they cross political boundary lines or not. Environmentally, the exemption reduces the incentive for operators to invest in more efficient vehicles, or to shift to more efficient modes of transport. Modes of transport that rarely enter national jurisdictions (e.g., oceanborne shipping reliant on heavily polluting bunker fuel) have significant emissions problems. The exemptions arise out of a fear that one jurisdiction will unfairly tax another, creating restraints to trade and tit-for-tat countervailing charges. However, there may be ways around this constraint by creating a pooled repository for the fuel taxes across all interstate or international users of the relevant infrastructure. This eliminates the conflicts of interest one state or country would have on trying to collect fees on cross-border transit. It would also create better price signals on fuel consumption. Further, collections could be used to improve infrastructure of joint benefit of the contributors, to support ghg-reducing vessel replacement, or some mix of both.
Risk. Government-provided insurance or indemnification against accident or operating risks, at below-market prices	All activities involve some risks, and well-functioning insurance markets help to protect workers and the public against uncompensated damages from accidents, spills, or other damages. Perhaps even more importantly, the requirement to buy third party insurance coverage introduces another oversight party (the insurer) and a price on poor risk management (encouraging firms to invest more in risk reduction). Where insurance is subsidized or provided directly by the government, or where liability caps below likely damages are embedded in statutes, subsidies to the affected industry can often result. **Improve funding of, and liability protection from, the Oil Spill Liability Trust Fund** *Policy recommendation:* Statutory changes so all users pay into the system; implement an industry pool insurance tier to internalize upper tail catastrophic risk for incidents that cause damages above the existing fund limits. *Rationale:* All users of the nation's pipeline system should pay into the Oil Spill Liability Trust Fund. At present, an excise tax on crude oil of 9 cents per barrel flows into a fund to be used in case of a spill. Oil derived from shale and tar sands was exempted from the charge based on an IRS interpretation of the original statute. The loophole should be closed, as this recent bill attempts to do.[47] A recent court ruling puts this oil spill funding at further

Intervention Category	Description
	risk, concluding that oil that flows through pipelines but ends up being exported can't be charged the oil spill liability trust fund fee.[48] Further, the fee collection authorization periodically sunsets; and collections are capped creating a risk that a major spill would not be fully covered by the fund. Four changes are needed: (1) Definitional changes to ensure all fuel flows pay into the trust fund as proposed legislation would do. (2) Substitution of alternative financial assurance mechanisms if exporters of oil can no longer be charged a per barrel fee. Creating a mutual insurance company with assets sufficient to cover large spills, and to which any shipper using the US system must belong, could be one solution. (3) Make the trust fund authorization permanent. (4) Add an upper-tier of coverage via an industry-wide insurance pool to ensure a large spill can be covered. **Eliminate oil spill liability caps for offshore spills** *Policy recommendation:* Remove cap on operator liability for offshore oil spills. Allow operators to add a pooled insurance layer to meet the upper tail risk exposure if this is more efficient for them, subject to coverage adequacy review. *Rationale:* Under the Oil Pollution Act, liability for offshore spills is capped at $134 million per incident.[49] This is far below what actual damages are likely to be from a large spill (BP estimated that the cost of the Deepwater Horizon spill was $65 billion).[50] While this data is somewhat old, as of 2010, other developed countries have successfully developed offshore oil production without capping operator liability for spills.[51] The US should do the same. **Internalize railcar accident liability for shipments of oil or LNG by rail** *Policy recommendation:* Greatly increase required liability coverage requirements for all rail shipments of oil or gas; require industry-wide catastrophic bonding by unrelated third party to provide supplemental insurance above operator-specific coverage requirements.

Intervention Category	Description
	Rationale: Oil shipments by rail have grown dramatically over the past decade. At the outset, rail car specifications were not well adapted to these shipments. The worst accident to date was in Canada in 2013, with 42 people killed and 5 missing and presumed dead.[52] However, there have been many less severe accidents in the US, and these continue.[53] The US adopted more stringent tank car standards in 2015, with a multi-year phase-in through 2025. However, even these improved vehicles incorporate fewer safety features than was recommended by the National Transportation Safety Board. Residual risks to the public from spills, accidents or explosion remain. Further, a rulemaking pushed through at the end of the Trump administration, if retained, will allow LNG shipments by rail even through densely populated areas.[54] **Internalize liability associated with underground injection of captured CO2** *Policy recommendation:* Review state and federal policies and policy proposals, including liability limitations incorporated into Section 45Q of the tax code. Ensure risks are adequately priced into the cost of sequestration, and that responsibility for performance remains with the parties central to the transaction rather than being shifted to the public sector or left uncovered, implicitly putting the financial burden on the surrounding population. *Rationale:* This is an emerging issue. There are potential liabilities associated with sequestration performance, such as injected CO2 slowly leaking back into the atmosphere despite compensation for longer or permanent storage. There is also a risk of catastrophic release, where large pools of injected CO2 rupture and migrate into populated areas in a rapid surge. This can cause property damage and loss of life. Industry is interested in transferring this liability to the government. While the US federal government does not yet seem to have adopted such a policy explicitly, it has been implemented by a number of other states and countries (see Table 1 here).[55] Liability shifting – even after an operational period – could reduce the pressure to find more inherently stable sequestration techniques (such as solids) and slow the transition away from technologies that have substantial generation of CO2 as an inherent part of their production process.

Intervention Category	Description
Regulation. Government regulatory efforts that substantially alter the rights and responsibilities of various parties in energy markets or that exempt certain parties from those changes. Distortions can arise from weak regulations, weak enforcement of strong regulations, or over-regulation (i.e., the costs of compliance greatly exceed the social benefits)	If an entire economy ignores health or environmental impacts, it is reasonable to classify this gap as a negative externality. It still distorts economic decisions absent a policy intervention, but the distortions are broad-based. In contrast, "[w]here a particular market participant or category of participant is granted an exception from otherwise applicable mechanisms intended to force the internalization of the environmental and human health costs of commercial activity, what was a negative externality becomes a discrete subsidy" (Simms, 2017:436).[56] Even before the surge in regulatory rollbacks and exemptions for oil and gas that the Trump administration worked to put in place, Kron (2015) documented the many special exemptions the industry benefitted from.[57] He wrote that "[o]ne of the perennial topics of discussion and study in the field of environmental law is the unusual amount of exemptions or exclusions the oil and gas industry has received from our nation's major environmental laws. For the most part, these laws are broadly applicable and aim at certain environmental impacts and considerations, no matter the source. Yet the oil and gas industry is unique in the amount of exemptions and exclusions it has received—and continues to receive—from these laws. The only other industry that seems to come close is agriculture." These exemptions reduce costs to oil and gas producers, shippers, refiners, and marketers. This grants them a competitive advantage relative to clean energy substitutes, slowing the transition to low carbon resources. The Biden administration should close these regulatory loopholes and put fossil fuels on an equal footing with its cleaner competition.
Costs of externalities. Costs of negative externalities associated with energy production or consumption that are not accounted for in prices	There are indications that the Biden Administration is evaluating options for implementing a price on carbon and integrating a social cost of carbon in forward-looking government investment decisions. Still, including this issue here serves as a useful reminder of two key principles. First, that the longer there is no price on carbon, the longer the pollution reduction benefits of low-carbon technologies will be disadvantaged in the marketplace. And second, that carbon taxes are a **supplement** to subsidy reform, not a substitute. Pricing of carbon will help the United States meet its obligations under the Paris Agreement, while also providing a broad-based price signal to all of our users of fossil energy to innovate consistently to boost efficiency and reduce emissions. That regulatory-induced, but continuous, technical improvement is critical in ensuring that our core industries remain globally-competitive over the long-term.

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