Hearing on

Modernizing Energy Development Laws for the Benefit of Taxpayers, Communities, and the Environment

Written Testimony of Dr. Brian Prest
Fellow, Resources for the Future

Prepared for the US House Committee on Natural Resources,
Subcommittee on Energy and Mineral Resources

March 9, 2021

Introduction

Chair Lowenthal, Ranking Member Stauber, and distinguished members of the Subcommittee:

Thank you for the opportunity to appear before you today.

My name is Brian Prest, and I am an economist and fellow at Resources for the Future (RFF), an independent, nonpartisan, nonprofit research institution in Washington, DC. RFF's mission is to improve environmental, energy, and natural resource decisions through impartial economic research and policy engagement. The institution, which will mark its 70th anniversary next year, is committed to being the most widely trusted source of research insights and policy solutions leading to a healthy environment and a thriving economy.

While RFF researchers are encouraged to offer their expertise to inform policy decisions, the views expressed here are my own and may differ from those of other RFF experts, its officers, or its directors. RFF does not take positions on specific legislative proposals.

Background and Analysis

I was invited to testify today regarding policy options for reforms to the federal oil and gas leasing program. A major component of the bills under consideration is the intention to raise royalty rates charged on onshore federal oil and gas leases from their current minimum level of 12.5% to 18.75% (H.R. 1503 and H.R. 1517). This 18.75% rate matches the rates currently charged for deepwater wells in the Gulf of Mexico.

In a recently released working paper, I modeled the implications of various reforms to the oil and gas leasing program, including, but not limited to, the royalty rate increase from 12.5% to 18.75% under consideration today. Designing federal leasing policy brings to the fore a critical lesson from economics: achieving efficient outcomes nearly always requires tradeoffs. The development of energy resources has many often-competing implications for societal outcomes, including economic development, environmental conservation (in the context of BLM's multiple-use mandate), and effects on greenhouse gas (GHG) emissions linked to climate change.

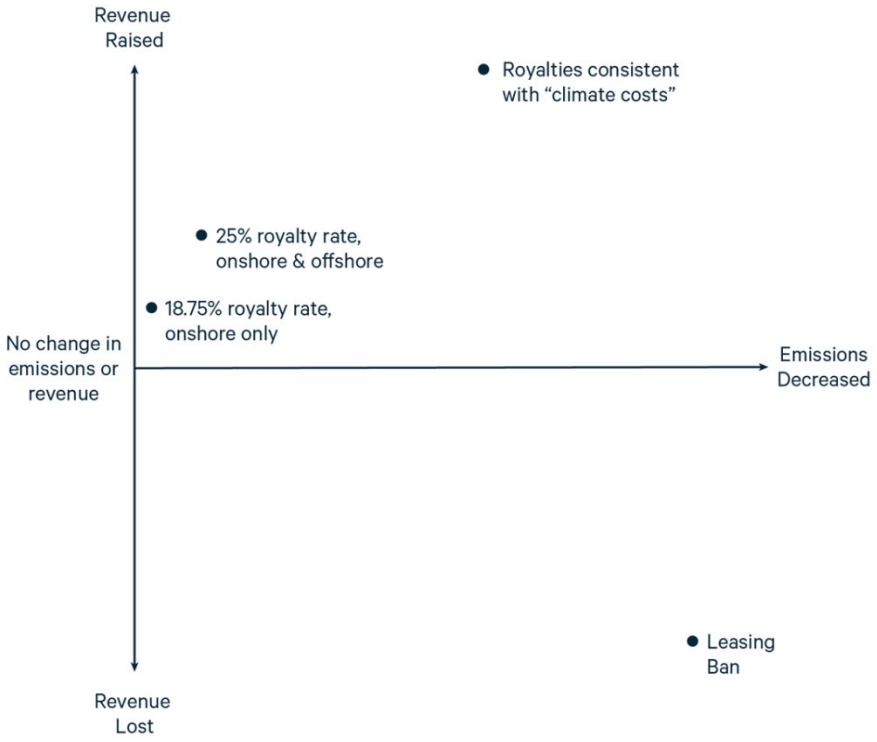
Given these tradeoffs, policies that only focus on a single outcome—to the detriment of the others—are unlikely to be economically efficient. In contrast, economically efficient policy design requires accounting for and balancing competing objectives.

As a policy tool, the adjustment of royalty rates can simultaneously address multiple objectives. It can raise revenues, conserve public land, and reduce GHG emissions, while also allowing continued oil and gas development on federal lands.

This is a particularly interesting discussion to be having in the context of the Biden administration's recent pause on all federal leasing in Section 208 of Executive Order 14008 signed on January 27th. Section 208 also directed the Secretary of the Interior to consider offering new leases under new terms for royalties, specifically considering "whether to adjust royalties associated with coal, oil, and gas resources extracted from public lands and offshore waters, or take other appropriate action, to account for corresponding climate costs." This language implicitly suggests the current pause on leasing is temporary in nature and provides for a review to determine whether current royalty rates accurately reflect the climate impacts of federally produced oil and gas. This review presents an opportunity to consider the relevant tradeoffs.

As depicted qualitatively in Figure 1, different policies have contrasting implications for outcomes such as revenues and greenhouse gas emissions (GHG). At one extreme, a permanent leasing ban will reduce royalty revenues dramatically but achieve substantial emissions reductions. At the other extreme, raising royalty rates will generate additional revenue and achieve some reductions in emissions, but these effects are modest in comparison. Policymakers can also consider policies in between that allow continued oil and gas leasing but under alternative contractual terms to account for "climate costs," or as economists call them, "negative externalities." These alternative terms could include higher royalty rates or charges based on GHG emissions to reflect those negative externalities, commonly measured using the social cost of carbon.

Figure 1. Qualitative Depiction of the Effects of Leasing Policy Options on Royalty Revenue and GHG Emissions



Emissions, Externalities, and Policy

In a 2018 US Geological Survey report, researchers estimated that the total volume of GHG emissions associated with federally produced fossil fuels was equivalent to about one quarter of total US emissions annually. Historically, the bulk of these emissions have been associated with coal production on federal lands, but given the shale boom, oil and gas are now a larger contributor than coal to emissions associated with fossil fuel production on federal lands.

In the context of fossil fuel production, GHG emissions are a negative externality; this occurs when a polluter does not bear the full costs of their activities (including the societal cost to remove the pollution produced). This market failure leads to economically inefficient levels of pollution. Economists overwhelmingly favor incentive-based or market-based policies like carbon pricing to address this market failure and reduce emissions.[1] Standard economic models demonstrate that economy-wide Pigouvian taxes[2] that put a price on the environmental externality (including those resulting from fossil fuels) are economically efficient remedies.

A royalty rate adjustment, potentially accounting for the effects of carbon emissions, would fall far short of economy-wide carbon pricing but is nonetheless a step towards more economically efficient policy. Indeed, basic economic theory demonstrates that economically efficient policy requires charges to account for environmental damages.[3]

Four Key Areas of Impact

My recent analysis of oil and gas leasing policy focuses on four potential areas of effects: the levels and sources of production, GHG emissions, royalty revenues , and oil and gas prices. I will discuss each of these in turn.

Production

I estimate that a permanent cessation of future leasing will reduce federal oil and gas production gradually over time. While a royalty rate increase would also reduce production somewhat, the effect is modest, amounting to only one-twentieth of the effect of a leasing ban. Because existing leases last 10 years or more and are not affected by a change in new leasing practices, this reduction occurs gradually over the course of more than a decade, as the industry stockpile of leases is gradually exhausted. This reduction in federal production is accompanied by increases in production on state and private land, as well as by increases in supply from other countries, in response to reduced federal supply. Economists call this offsetting increase in

---

[1] https://www.econstatement.org/, https://www.igmchicago.org/surveys/climate-change-policies/, https://www.igmchicago.org/surveys/carbon-taxes-ii/, https://www.igmchicago.org/surveys/carbon-tax/

[2] A Pigouvian tax is a tax on a negative externality set equal to the marginal external cost of that externality. The Pigouvian tax is a canonical example of a government policy that remedies a market failure and improves overall societal well-being.

[3] See, e.g., Pigou, Arthur Cecil. *The Economics of Welfare*. Palgrave Macmillan, 1920, Holland, Stephen P. "Emissions taxes versus intensity standards: Second-best environmental policies with incomplete regulation." *Journal of Environmental Economics and Management* 63, no. 3 (2012): 375-387, and Sandmo, Agnar. "Optimal taxation in the presence of externalities." *The Swedish Journal of Economics* (1975): 86-98

production elsewhere "leakage," as reductions in supply from regions covered by the policy (e.g., federal lands) "leak" in the form of supply increases in uncovered regions (e.g., state and private land).

It is important to note that the shift is not one for one, and there are indeed net reductions in global emissions due to a permanent leasing ban. Roughly speaking, each barrel (or barrel of oil equivalent for gas) of production reduced on federal lands is offset by between 0.5 and 0.75 barrels of increased production from other sources, including state and private land as well as foreign producers. Consequently, there remains a net reduction in oil and gas production and emissions, but it is much smaller than one would surmise by simply focusing on the effect on federal supply alone.

Emissions

In my research, I estimate that a permanent end to leasing would reduce global GHG emissions by around 100 million metric tons of CO_2 equivalent ($MMTCO_2e$) per year on average over the coming three decades, even after accounting for leakage. This is equivalent to roughly 2% of total US energy-related emissions.[4]

The effects of adjusting royalty rates are much smaller. I estimate that an increase in royalty rate of 6.25 percentage points, from 12.5% to 18.75%, (equivalent to the deepwater offshore royalty rate) would reduce emissions by only about 4–7 $MMTCO_2e$/year, or approximately 0.1% of US emissions.

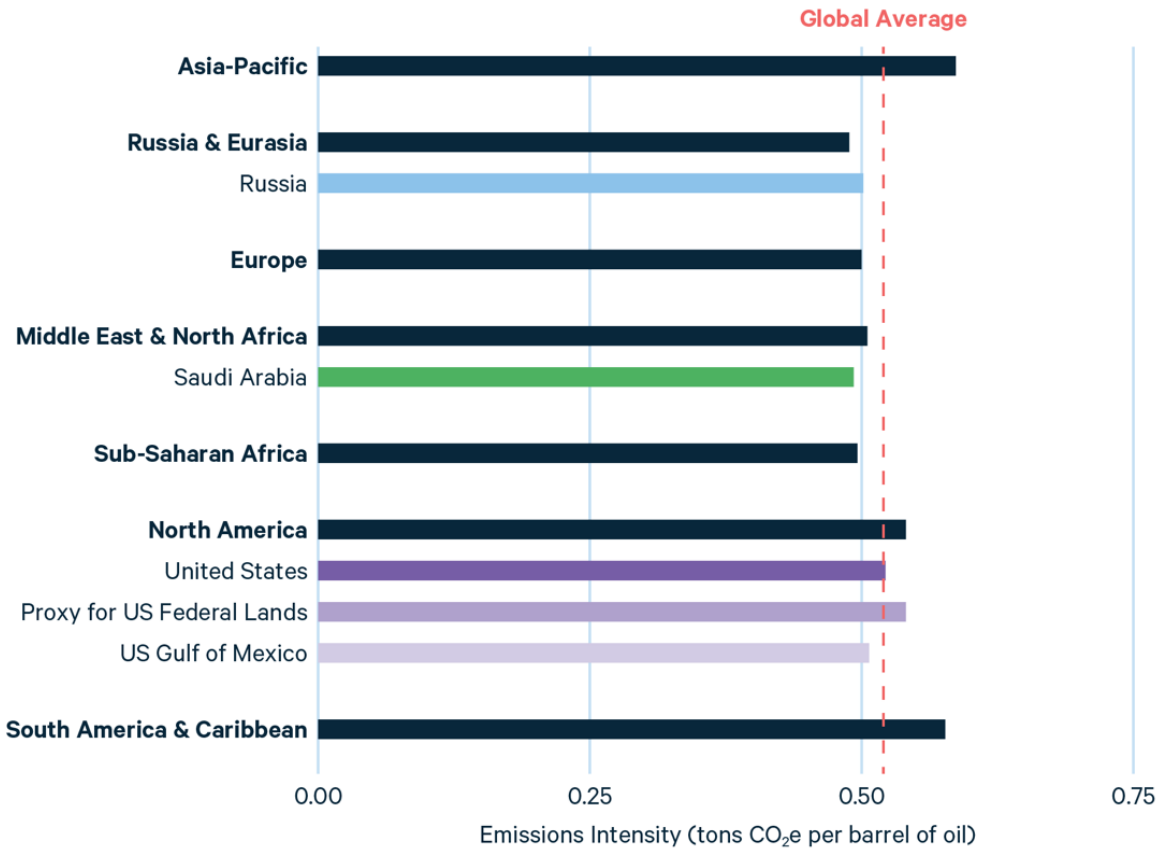
A note about leakage and emissions intensity

The effect of leakage is a topic of much discussion, in part because different sources of crude oil have different carbon intensities. In particular, one-for-one production leakage from one source of supply to another could increase or decrease emissions, depending on the sources' relative carbon intensity. While it is conceptually possible these differences could reduce or even negate the emissions reductions from federal lands, I find this does not happen in practice for two major reasons. First, production leakage is far from one-for-one, and reduced supply reduces overall oil and gas consumption. Second, the variation in emissions intensity among major producers is nowhere near large enough to negate the overall reductions in consumption.

For example, a recent study by a team at the Carnegie Endowment estimated field-specific lifecycle emissions of crude oil and compared crude oil from different regions, including the US Gulf, Russia, and Saudi Arabia. A selection of these estimates is shown in Figure 3. The differences among these major producers are small. Crude oil from the US Gulf features an emissions intensity around 0.51 tons CO_2e per barrel. Russian and Saudi oil ranges from 0.49 to 0.51 tons per barrel, either very slightly cleaner (2%) or essentially the same. Light oil in the Permian Basin is very slightly cleaner at about 0.48 tons per barrel, but that difference is nowhere near large enough to overwhelm the reductions from reduced overall production and consumption. To negate the emissions reductions from any of the policies I modeled, I estimate other marginal suppliers must have implausibly high carbon intensities. Furthermore, a recent paper published in the peer-reviewed journal *Science* found that, with regards to upstream "well-to-refinery" emissions (i.e., excluding combustion emissions), US crude oil is slightly dirtier than average.

[4] https://www.eia.gov/environment/emissions/carbon/

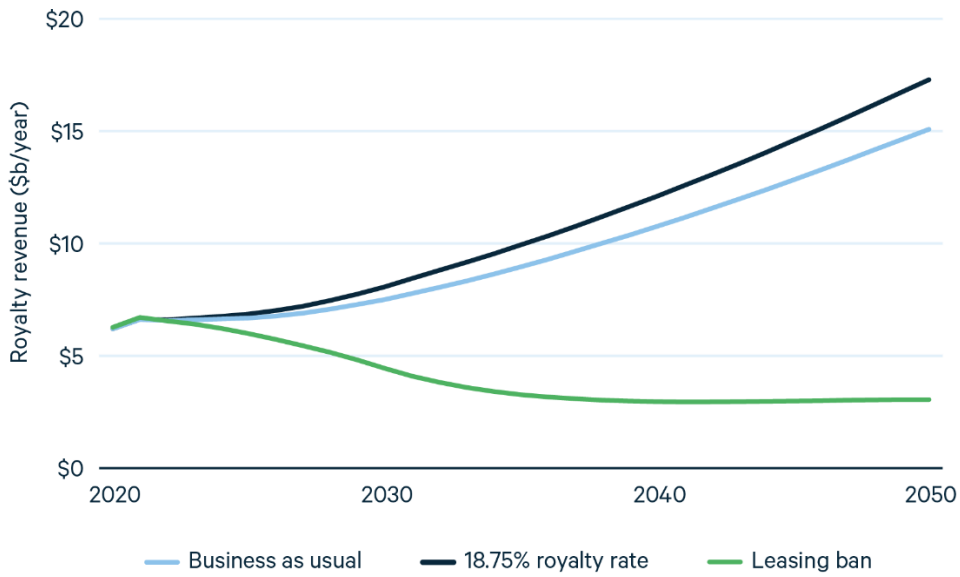
Figure 2. Lifecycle Carbon Intensity of Crude Oil Production by Supply Region (Source: Carnegie Endowment Oil-Climate Index)



Royalty Revenues

I also estimate that a permanent end to new leasing will reduce oil and gas royalty revenue by $5–6 billion per year, on average, over the coming decades. However, the lost revenue is modest over the first decade because existing leases continue to be developed and generate royalties. See Figure 3, which shows that the reduction in royalties is less than $0.5 billion per year in the first five years of the policy but reaches $3 billion per year by 2030. In contrast, continued leasing at higher royalty rates would naturally bring in greater revenue. If the increased royalty rates as proposed in the bills under consideration are passed, an onshore rate of 18.75% is estimated to generate about $1 billion per year in additional revenue over the same 2020-2050 period, but again the near-term effects are modest because the increased rates would only apply to new leases that take years to develop (less than $200 million per year in additional revenue in the first five years but exceeding $500 million per year by 2030). Compared to the status quo, higher royalty rates would generate even more revenue while also resulting in more meaningful emissions reductions. Policymakers may elect to adjust royalty rates to balance these goals with other ones, including land conservation and economic development.

Figure 3. Oil and Gas Royalty Revenues Over Time under Different Policies ($b/year)



The threat of lost revenue, while not necessarily immediate in all cases, has implications for communities reliant on oil and gas royalty revenue. If Congress deems a 12.5% onshore royalty rate to be inadequate, the question then becomes how much it should be increased.

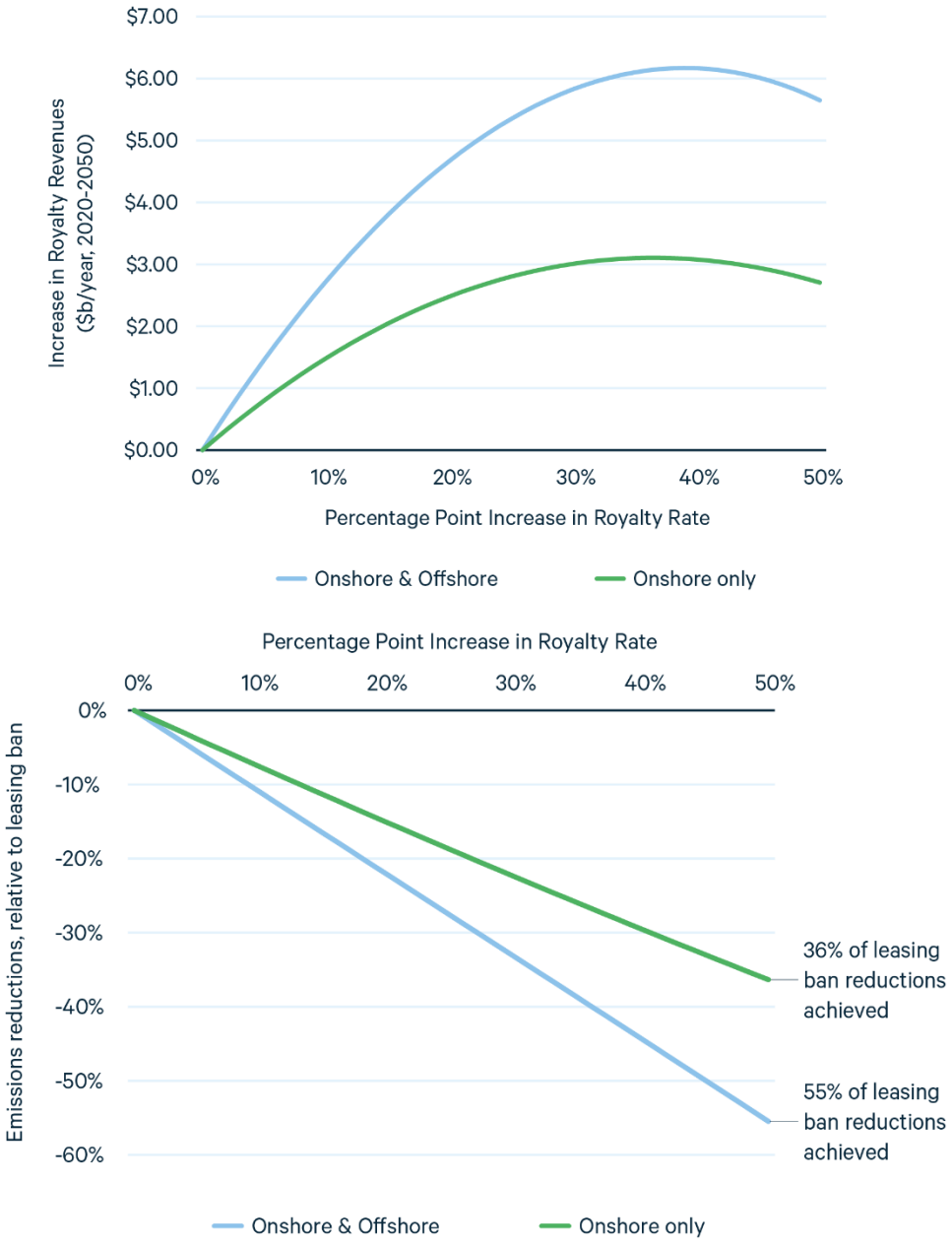
In my paper I considered only two royalty rates (18.75% or 25%). For the purpose of this testimony, I prepared an additional analysis that considers a broader range of rates. I ran the model more than one hundred times, each time varying the change in the royalty rate (starting from 12.5% onshore and 18.75% offshore), and whether the increase applied to all wells or just onshore wells. The results are reflected in the top panel of Figure 4 (below).

Raising royalty rates increases revenue for low to modest values. Raising rates by about 6 percentage points onshore (12.5% to 18.5%) raises about $1 billion per year. Raising offshore rates by an additional 6 percentage points (from 18.75% to 24.75%) raises approximately $1 billion per year more, for a total of nearly $2 billion annually.

At very high royalty rates, the effect of further increases shrinks, and revenues eventually decline as high rates reduce oil and gas development due to prohibitive costs. At these higher royalty rates, the government would be collecting a growing share of a shrinking pie.

The bottom panel of Figure 5 shows the reductions in global emissions, relative to the emissions reductions that would be achieved by a permanent end to federal oil and gas leasing. Increasing the royalty rate by about 6 percentage points achieves about 5–10% of the reductions of a leasing ban, depending on whether the royalty increase is applied only to onshore leases, or to offshore leases as well. The effect is roughly linear: when royalties are increased for both onshore and offshore leases, each percentage point increase in the royalty rate reduces emissions by about 1% of the emissions that would be achieved by a full leasing ban (onshore and offshore). If applied only to onshore leases, the increase is slower, with each percentage point increase in royalty rate achieving about 0.7% of the emissions of a full leasing ban.

Figure 4. Effect of Royalty Rate Increases on Oil and Gas Royalty Revenues (top) and Global GHG Emissions (bottom), 2020-2050 Average



One last point on revenues should be noted. About half of oil and gas royalties collected onshore are directed back to the states where the oil and gas is produced. As such, any increase in royalty rates can offer an important source of direct economic support for states with communities that are historically dependent on oil and gas extraction, the same communities that are vulnerable to economic dislocation in an energy transition. We are seeing signs that an energy transition is underway, and the communities where energy has been historically produced are experiencing that change. That energy transition is likely to happen regardless

of federal oil and gas leasing policy, due to the broader technological, economic, and political trends favoring decarbonization. Changes to royalty rates will not prevent this, but the revenues they generate can help support communities in transition.

Oil and Gas Prices

All of these policies would have very small effects on oil and gas prices both because US federal production is a small share of the global market and because of the offsetting increases in supply from other sources. For example, in 2019, oil production from federal lands and waters amounted to less than 3% of global supply.[5] A complete cessation of new leasing would phase out a portion of that 3% very gradually over decades, creating small changes in long-run global oil supply well under 1%. This small change in global supply induces small changes in oil and gas prices, on the order of 2% under a leasing ban and less than 0.2% for the 18.75% onshore royalty rate.

Conclusion

Tradeoffs are a key component in any discussion of future modifications to energy development policy in the interest of achieving the maximum overall benefit for society, affected communities, the economy, and our natural environment. I have modeled the implications of various reforms to the oil and gas leasing program in the United States, including but not limited to the royalty rate increases under consideration today. I have also illustrated some of the important outcomes and tradeoffs that arise.

While some may argue that a leasing ban could be an effective and immediate solution to curbing carbon emissions, ignoring the relevant tradeoffs may not achieve all societal goals in an economically efficient way. Adjusting royalty rates to account for carbon's negative externalities may be more effective in the context of balancing environmental and economic concerns. Consideration should certainly be given to the effects of leakage and the carbon intensity of any replacement fuels, but those concerns do not eliminate the rationale for policy.

[5] US federal oil production amounted to 2.7 million barrels per day in 2019, (https://revenuedata.doi.gov/?tab=tab-production), relative to about 100 million barrels per day in global production and consumption (https://www.eia.gov/outlooks/steo/report/global_oil.php).