Confidential Draft

Commentary on the Modeling and Analysis of the Energy Permitting Reform Act of 2024
November 2024

Summary

The Manchin-Barrasso Energy Permitting Reform Act of 2024 (EPRA) includes several provisions that seek to promote electricity transmission, liquefied natural gas (LNG) exports, and oil and gas leasing. It is expected to increase deployment of both fossil fuel and clean energy infrastructure, yielding a combination of beneficial and harmful impacts on greenhouse gas (GHG) emissions, health, environmental justice, and ecosystems. This raises a complex and immensely consequential question with respect to the climate crisis: would this tradeoff take us in the right direction?

Several energy modeling and analytic efforts have been applied to EPRA to explore its climate impacts, including analyses by Third Way, Resources for the Future (RFF), RMI, Princeton ZERO Lab, and most recently, the Department of Energy (DOE). These analytical efforts have been very influential and heavily cited in conversations around the legislation.[1] While energy system analysis is an important tool, current capabilities are not well suited to assess legislation like EPRA. No analysis to date has modeled the impact of the bill comprehensively, and many provisions remain unmodeled. **However, given the existing data and levels of uncertainty, we find that the net effect of EPRA on climate will be mixed from moderately beneficial to moderately harmful. Effects on environmental health are also mixed and have largely not been modeled.**

Based on our assessment of the modeling efforts performed to date and the impacts that lie beyond what modeling can assess, we provide the following conclusions:

1) **The modeling and other analytic results have high levels of uncertainty.** The modeling efforts estimate the bill's impacts with an enormous range of uncertainty, from modestly positive to modestly negative in terms of GHG emissions reductions. The model outputs are largely based on designed scenarios and educated guesses, which are insufficient to project confidence in the bill's climate impacts.

2) **The modeling does not capture all impacts.** While much of the discussion around this bill has focused on its impact on GHG emissions, the bill would also have significant impacts related to other health-harming emissions, frontline communities, and ecosystems. Measuring the net health effects of these provisions has not been attempted

[1] https://www.eenews.net/articles/permitting-talks-create-tension-between-democrats-greens/.

and would not substitute for a proper environmental justice analysis of the effects of the bill that considered the cumulative impacts of fossil fuel pollution on fenceline communities. Addressing these impacts is essential to crafting truly effective and equitable climate solutions and lasting change.

3) **EPRA is not a "slam dunk" for climate**. The bill includes several provisions to accelerate the transmission development that is needed to support a clean energy transition, but they are obtained in exchange for a range of harmful provisions that promote fossil fuel industries. Thus, while some provisions are expected to reduce emissions, others are expected to increase them. Debating whether the bill is moderately beneficial, neutral, or harmful relative to today's status quo overlooks a critical point: We urgently need to reduce emissions, and we're behind the curve on the levels required. Every tradeoff today gives us greater challenges to overcome tomorrow. The climate crisis requires greater ambition.

We consider each of these points in greater detail below.

Analysis

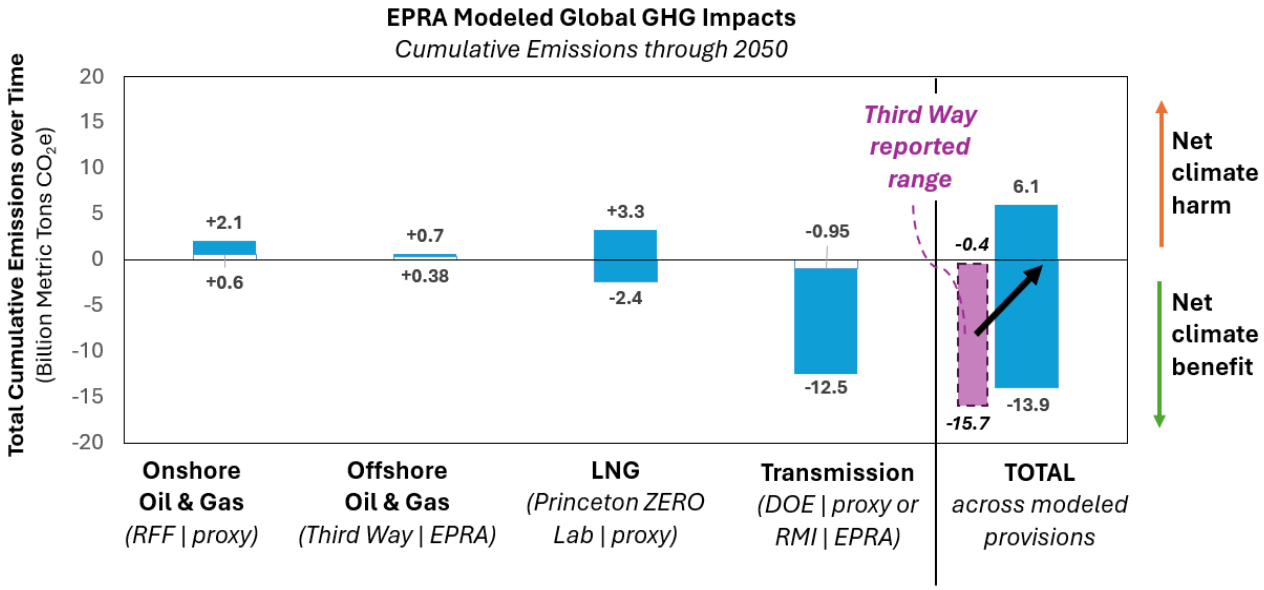
1. The modeling and other analytic results have high levels of uncertainty.

Modeling is one of many tools in the policy analysis toolkit, and it can provide meaningful insights, but models cannot address all queries equally, and their results should be used with an understanding of their limitations. EPRA provides a particularly challenging case for analysis because many of its provisions are process-related (e.g., directing FERC to issue an interregional transmission planning rule) and cannot be incorporated directly into models. This is in contrast to the Inflation Reduction Act (IRA), which included provisions that could be directly modeled (e.g., the Investment Tax Credit as a reduction in the capital cost or the Production Tax Credit as a reduction in variable operating costs).

We explored the analytic efforts included in Third Way's synthesis report and its component parts (performed by RFF, ZeroLAB, and RMI), as well as DOE's recent transmission study, which provided a critical secondary approach to the transmission section addressed by RMI. We reviewed the extent to which the modeling was able to directly model the effects of the legislation, leverage defensible assumptions based on data and historical precedent, and present a synthesis conclusion with certainty. We considered both model-induced uncertainties, and the real uncertainties inherent to dynamic systems.

We find that these EPRA analyses have significant uncertainty. Overall, the analyses suggest a range of 0.38 GtCO2e to 2.1 GTCO2eq of increased emissions for the oil and gas leasing

provisions; 0.95 GtCO2e to 12.5 GtCO2e of decreased emissions for the transmission provisions; and between 2.4 GtCO2eq emissions *reduction* to 3.3 GtCO2eq emissions *increase* for the LNG provisions, on a cumulative basis through 2050.



The significant uncertainty is driven by two main points. First, most analyses have not modeled the bill impacts directly, but rather designed best-guess scenarios as proxies to estimate how the legislation would stimulate investments. These scenarios were then analyzed and sensitivity analyses were used to bound uncertainties. Overall, this may be the only viable approach to assess many of these provisions, but it puts the work on a foundation of extensive assumption both in the quantity and level of conjecture required in high-sensitivity variables. The modelers themselves addressed this transparently in presenting their work in most cases.[2]

Second, the modeling did not include all provisions in the bill, such as Title V (Electric Reliability) or provisions related to coal leasing, offshore wind, and onshore renewable leasing. Furthermore, the models did not consider several other important impacts of the bill on energy systems, the environment, and people, leading to an incomplete picture of the bill's potential effects.

To better understand the levels of uncertainty identified in the modeling, we consider the analytical ranges encountered for each modeling effort. RFF estimated the bill's onshore oil and gas leasing provisions would increase emissions by 0.6 to 2.1 GtCO2e (central estimate of 1.2 Gt) between 2024 and 2050, and Third Way estimated offshore oil and gas leasing provisions

[2] RFF: "This analysis specifically does not estimate the emissions effects of onshore oil and gas provisions in the recently introduced Energy Permitting Reform Act of 2024 (EPRA). The onshore oil and gas provisions in EPRA are likely to have a more modest effect on emissions than the high leasing scenario analyzed here;" RMI: "Together, the EPRA and FERC Order 1920 would accelerate transmission expansion by 2–4x over today's rate."

would do so by 0.38 to 0.69 GtCO2e. This is the most tightly bounded estimate of all the modeling considered.

The LNG exports modeled by ZeroLAB estimated a net increase in global GHG emissions of 543 MMT CO2eq over twenty years (central estimate). In part because global gas and oil prices and international market dynamics are inherently difficult to forecast, this result was banded by enormous uncertainty. A critical variable was how LNG would be used in international markets. ZeroLAB considered sensitivities where 100% of the LNG displaced coal in international markets, versus a case where 100% of LNG increased emissions through competition with renewable energy or increased consumption. This resulted in vastly different outcomes, ranging from a 2.4 GtCO2eq emissions *reduction* to 3.3 GtCO2eq *increase* in global emissions over twenty years.

Two different studies have analyzed the impacts of greater transmission, using very different modeling strategies and arriving at different estimates. RMI takes an empirical strategy, constructing scenarios by estimating EPRA's impacts based on historical examples (e.g., the regional transmission planning would result in 50% of the transmission buildout rate of MISO), and addressing uncertainties through an extensive sensitivity analysis. This approach is not clearly bound or quantitively determined. They also addressed the combined impacts of FERC Order 1920 and EPRA, with the modelers somewhat arbitrarily estimating that 30% of the regional transmission buildout would be credited to EPRA (and 100% of interregional transmission). The link between transmission buildout and renewable energy development is also simplified, such as the assumption that increased transmission linearly results in renewable energy deployment (100% clean-enabling) and that each mega-watt hour (MWh) from these lines displaces 0.6 tons of CO2e per MWh in all years. In reality, the relationship between transmission buildout and the stimulation of clean energy development is nonlinear, depending on regional interconnection queues, renewable resources, supply chains, and other state- and local-level barriers such as local siting and permitting constraints and distribution infrastructure bottlenecks. RMI's final estimate is that EPRA's provisions could reduce emissions by a central case of 6.5 GtCO2e (with a sensitivity range from 4.0 to 12.5 GtCO2e) cumulatively by 2050.

The Department of Energy utilized a capacity expansion model, the Regional Energy Deployment System (ReEDS), to assess the impacts of different transmission scenarios on the U.S. power system. The report included four scenarios, which could be seen as proxies for business-as-usual (Restrictive), FERC Order 1920 alone (scenario EST1), FERC Order 1920 with additional EPRA-like provisions (EST2), and lastly a case representative of FERC Order 1920, EPRA-like provisions, and a 30% investment tax credit for all new regional and

interregional transmission (EST3).[3] This power sector modeling-based approach finds that the combined effects of FERC Order 1920 and EPRA (EST2) are estimated to reduce emissions by 3.4 GtCO2e cumulatively from 2024-2050. If one assumes that EPRA's independent contribution to emissions reductions could be estimated by the difference between ETS1 and ETS2, it would indicate that EPRA is estimated to reduce emissions by 0.95 GtCO2e, sixfold-less than RMI's central estimate.[4] The combined ranges of these studies suggest an overall uncertainty range of 0.95 GtCO2e to 12.5 GtCO2e by 2050.

We note greater issues with Third Way's synthesis report, which concludes that "EPRA results in net emissions reductions, in both low and high-range scenarios." First, the report overlooks the uncertainties inherent in the modeling process. While RMI, RFF, and ZeroLAB noted the distinction between direct bill impacts and their models, Third Way bypasses this nuance. Additionally, in the transmission section, they incorporated RMI conclusions while adjusting RMI's assumptions in a way that asymmetrically amplified the positive estimates of emissions reductions. Had they incorporated the RMI analysis in its original form, the cumulative emission impacts would range from a 2.1 GtCO2e emissions *increase* to 13.9 GtCO2e emissions *decrease* through 2050 instead of their reported range of 0.4 to 15.7 GtCO2e emissions decreases, countering their conclusion that all scenarios unambiguously support climate net benefit.

2. The modeling does not capture all impacts.

In addition to the real and modeled uncertainties of the bill analysis, EPRA would have distributional impacts that have not yet been analyzed and have been left out of many conversations. These impacts come with their own complexities and should be part of the discussion. For example, the oil and gas leasing provisions will increase fossil fuel development and associated harms experienced by communities that live near fossil fuel infrastructure. The same applies to the LNG provisions. (CEQ's CEJST screen tool identifies that the majority of proposed and under-review LNG export facilities are located in environmental justice communities). These more local, environmental and health impacts were not included in most of the analytical efforts, which renders them largely invisible to the discussion of the bill's impacts. The recent DOE Transmission study was an important exception—it did consider health impacts of transmission, specifically from the perspective of reduced peaking resources. They found that a combination of EPRA-like and FERC regulatory actions would improve transmission enough to reduce the need for peakers by approximately 70 GW in 2041 relative to the Restricted Transmission Scenario. This is a significant result—reducing peaker plant pollution is critical

[3] It is important to note that DOE does not associate any of their scenarios with specific policy proposals. However, our groups assess that the assumptions included in EST1 do appear to be a plausible representation of FERC Order 1920, and for EST2, Order 1920 combined with EPRA.

[4] DOE does not present the independent impacts of EPRA, and the assumption that the difference between EST2 and EST1 scenarios could identify the "EPRA-only" impact is imperfect, given the potential interactions between both policies.

and it illustrates how it is essential to account for the non-GHG impacts of all provisions of the bill.

3. EPRA is not a slam-dunk for climate.

Uncertainties matter in policies with tradeoffs, and EPRA presents a mixed picture for climate policy. The transmission infrastructure section of the bill includes a number of beneficial provisions that address barriers to the transmission build-out, such as the interregional planning provision and cost allocation and expanded federal permitting authority, as well as legislative direction that supports FERC's authorities regarding interregional transmission planning. However, the bill's tradeoffs with the fossil fuel provisions make its overall impact a complex package. An understanding of its ultimate impacts is compounded by the high degree of uncertainty in the analytical efforts and real impacts, as well as the many variables that are not accounted for in the analysis. Even within the existing analyses, the overall range of possible outcomes is not consistently positive, as summarized in the chart above.

While the oil and gas leasing provisions are estimated to have more narrow emissions impacts relative to the bill provisions, they move us in the wrong direction and risk locking in more fossil fuel drilling. They also risk hindering access to develop renewable resources on federal lands and waters, which could increase emissions and undermine efforts to transition away from carbon-intensive energy sources. The section on accelerated LNG exports has the highest potential for causing substantial environmental harm, and a significant band of uncertainty. The transmission section is likely to provide the greatest benefit, but its uncertainty range is the greatest of all. While transmission expansion is essential to support the levels of clean energy deployment needed to decarbonize our energy systems, EPRA does not itself guarantee that clean energy will be built. There are other barriers to clean energy deployment, including siting and interconnection issues that may still prevent the level of clean energy deployment we need even with transmission expansion. The large range in the modeling reflects the high degree of uncertainty as to the magnitude of emission reductions that can be attributed solely to these transmission provisions.

Additionally, some subtleties may result in large impacts that have not been studied, such as the provision on Electric Reliability, which has the potential to undermine or chill agency regulations.

APPENDIX: Assessment of EPRA Modeling & Analysis

We find the results of the analysis to have significant uncertainty. Many provisions in the bill are inherently challenging to translate into the impacts we will see on the ground in terms of energy infrastructure deployments and associated climate impacts. As a result, these modeling efforts make extensive assumptions— both in the quantity and level of conjecture required in high-sensitivity variables (e.g., the LNG provisions increase LNG exports by an assumed X%, with these exports displacing an assumed Y% coal, Z% renewables, and incrementally increasing global gas consumption by an assumed A%). Thus, the modeling provides an illustration of potential outcomes based on the modelers' best guess of a provision's impact but are not a function of the text of the bill itself.

Importantly, the modeling to date has also not assessed all provisions of the bill, such as Title V (Electric Reliability) or provisions related to coal leasing, offshore wind, and onshore renewable leasing. Furthermore, the models also did not consider several other important impacts of the bill on energy systems, the environment, and people, leading to an incomplete picture of the bill's potential effects.

The Challenges of Modeling EPRA

EPRA provides a classic example of a challenging modeling query: unlike the Inflation Reduction Act (IRA), which included extensive provisions that could be directly modeled (e.g., the Investment Tax Credit as a reduction in the capital cost or the Production Tax Credit as a reduction in variable operating costs), several of EPRA bill provisions, such as directing FERC to issue an interregional transmission planning rule and changing the offshore leasing five-year plan, cannot be modeled directly. Modelers of EPRA were required to rely heavily on assumptions and constructed scenarios for the critical step of translating bill provisions into deployments for oil and gas production or new transmission lines. This approach was transparently referenced in many of the analyses released to date, with the modeling organizations stating clearly that they were not actually modeling the EPRA, and/or that the modeled impact cannot be fully attributed to the EPRA.[5] A detailed summary of the modeling assumptions and approaches and our interpretation is presented in Table 1.

We summarize our detailed commentary on the analysis in Table 1.

Model Conclusions	Approach/Assumptions Commentary
RMI estimates the impact from the transmission provisions of EPRA and FERC Order 1920 in	Does not directly model any provisions in EPRA.

[5] RFF: "This analysis specifically does not estimate the emissions effects of onshore oil and gas provisions in the recently introduced Energy Permitting Reform Act of 2024 (EPRA). The onshore oil and gas provisions in EPRA are likely to have a more modest effect on emissions than the high leasing scenario analyzed here"; RMI: "Together, the EPRA and FERC Order 1920 would accelerate transmission expansion by 2–4x over today's rate".

combination, and assumes these two actions could increase the pace of transmission expansion by 2 to 4 times. **They also estimate that EPRA would facilitate additional clean energy deployment worth -6.5 GtCO2e cumulatively through 2050 (central estimate; range of sensitivities tested is -4.0 Gt to -12.5 Gt).**	Used a designed scenario as a proxy for legislative and administrative provisions in combination. To better characterize uncertainties, performed sensitivities on key variables, resulting in a very broad range of potential outcomes (-4.0 Gt to -12.5 GtCO2e). While the overall result is significant (2-4x increase in transmission expansion), it combines the impacts of EPRA and FERC Order 1920, and includes scenario assumptions that appear to be based on educated guesswork, e.g., • Greater planning will bring US national transmission buildout to 50% of the buildout achieved by MISO • EPRA is responsible for 30% of the future regional transmission buildout and 100% of interregional transmission. • Planning increases interregional transfer capacity in proportion to regional peak loads, i.e., such that grid planning regions can import/export 20% of their peak load. • Transmission directly incentivizes the build-out of renewables on a per-mile basis. In reality, several other barriers also exist and can be significant and are not captured by this approach (renewable resources, supply chain, interconnection delays, local policy, distribution infrastructure, etc.)
DOE estimated that enhanced transmission could decrease domestic GHG emissions by –0.95 to –3.4 GtCO2e through 2050, depending on the independent effect of FERC Order 1920.	Does not directly model any provisions in EPRA. The DOE study modeled future transmission scenarios in ReEDS, a capacity expansion model. The DOE study explored three "enhanced transmission" scenarios (ETS), which do not reflect any specific policy. Based on the scenario assumptions, we see ETS1 as a proxy for a world without EPRA, but with FERC Order 1920, and ETS2 as a proxy for a world with both EPRA and Order 1920. While we believe this is a reasonable proxy, DOE did not directly model EPRA nor is the proxy perfect. For example, ETS1 (our proxy for Order 1920) does not allow interregional transmission between the 11 FERC Order 1000 planning regions until 2038. However, even without EPRA, we expect that some interregional transmission lines will be built before 2038.

	Like all capacity expansion models, ReEDS simplifies the transmission network and cannot fully depict the transmission planning process, including modeling transmission expansion based on the existing network and ties.
Princeton University's ZERO Lab estimated that the LNG provisions of the bill could raise or lower cumulative global emissions by –2.4 GtCO2e to +3.3 GtCO2e between 2030 – 2050, with a central estimate of +0.54 GtCO2e.	Does not directly model any provisions in EPRA, but instead assesses the impact of all U.S. LNG export terminals currently pending permitting approval (12.8 billion cubic feet per day). Wide range is reflective of large uncertainties around international market dynamics (e.g., how much coal or zero-emissions energy U.S. LNG displaces in global markets) and the impacts on carbon intensity in US electricity systems. Methane leakage estimates include uncertainty in leakage rates and future regulation. The low emissions scenario uses a methane leakage rate of 0.5%, which reflects the U.S. region with the lowest current estimated leakage rates. However, the most recent estimate of a weighted average across producing regions in the US is 2.95%, and the highest observed value was nearly 10%, according to a recent article from Stanford. While accounting for feedback effects on US gas supply and prices attributed to the operation of these pending LNG terminals, as ZERO Lab was not modeling the bill directly, the modeling does not account for the impact of EPRA's onshore and offshore gas leasing provisions. The impacts from these other provisions could offset some of the domestic gas price increases that resulted in reductions in domestic gas consumption and emissions in the study.
Resources for the Future (RFF) estimated that increases in onshore federal fossil fuel leasing could increase global emissions from oil and gas production cumulatively by 1.2 GtCO2e from 2024-2050. Considering multiple uncertainties, sensitivities, and different scenarios, they provide an estimate that the	Does not directly model any provisions in EPRA. RFF's modeling classifies itself as exploring "boundary conditions," and sets high and low bounds with fairly high confidence. It represents high onshore leasing levels at levels equivalent to leasing levels seen under the Trump administration, compared with a base case representing the average between the Trump and Biden

production is very likely to be within a range of 0.6 to 2.1 (the "high upper bound") GtCO2e.	administrations (1.1 million acres over two years). The scenario lacks a low-leasing comparison. The effort also performed sensitivity analyses to consider the sensitivity of the model to the EIA oil and gas production baseline estimates, methane leakage, and the effect of gas displacement of other fuels, and comments that EPRA provisions are unlikely to drive the same degree of emissions increases envisioned by the higher leasing scenarios.
Third Way estimated that the offshore federal fossil fuel leasing provisions of the bill could increase emissions by 0.38 to 0.69 Gt CO2e cumulatively through 2050.	Third Way's offshore modeling relies on assumptions about the amount and timing of production on leased land, production-per-well rates, leakage, and demand elasticity. However, none of these assumptions have been made public, making it difficult to robustly evaluate their results.
Third Way reviewed these four studies and totaled their findings to assert that emissions reductions would range from 0.4 to 15.7 GtCO2e cumulatively through 2050.	Our groups identified a few substantive concerns with Third Way's analysis approach, namely: 1) Third Way's effort synthesized modeling efforts performed with different levels of uncertainty and different approaches, then states that "EPRA results in net emissions reductions." This is analytically inaccurate, as it draws this conclusion based on modeling that did not model the bill directly, and for which not all bill provisions were modeled. Third Way adapted RMI's analysis and conclusions but made analytical choices that enhance EPRA's predicted impact. This includes: 2) Third Way changed the percent of the regional transmission emission reductions that was attributed to EPRA (as opposed to FERC Order 1920). In RMI's analysis, they assume that 30% of these regional transmission reductions are attributable to EPRA. Third Way instead assumed 100% of these reductions were attributable to EPRA.

Detailed Review of Modeling Efforts

1. Transmission Provisions

Provisions Summary.

According to RMI's assessment of transmission impacts, the following four provisions have the greatest relevance to transmission buildout:

- Interregional transmission planning and cost allocation: Requires the Federal Energy Regulatory Commission (FERC) to issue an interregional planning rule that requires neighboring regions (excluding Texas) to establish processes for creating an interregional transmission plan, updated every four years, and subject to FERC approval, and further enables FERC to arbitrate disputes related to interregional transmission planning and to develop a plan of its own if any regions fail to do so (Section 402(a)).
- FERC permitting and cost allocation: Modifies the transmission backstop siting process such that it no longer only applies to transmission lines within a Department of Energy (DOE) designated National Interest Electric Transmission Corridor, but instead applies to any line that FERC determines to be in the national interest. This remains a backstop process, available only after a project has applied at the state/local level and not received approval within a year, and does not directly mandate more transmission buildout (Section 401(b)).

Analytical Approach

RMI modeling Assessment of transmission provisions, utilizing custom formula with sensitivity analysis

- Regional Transmission:
    - The effort assumed that the EPRA's new siting and cost allocation provisions, combined with FERC Order 1920, will result in half of MISO's rate (taken as an example ISO with extensive regional planning, at 600 GW-miles/year), scaled for peak load.
    - Assumes U.S. peak load grows linearly to double in 2050, taking into account data centers and manufacturing additions as well as other electrified loads.
    - Assumes new transmission enables grid operators to add 32 GWh per year of wind and solar energy per GW-mile, based on estimates for generation additions from planned transmission lines.
    - Assumes clean energy displaces emissions at a constant rate of 0.6 tons/MWh, the approximate life-cycle emissions rate of gas generators, in all years out to 2050.
    - EPRA and regional planning accelerate the buildout of ~16 TW-miles of transmission projects that are already planned, and therefore have an earlier start date of 2029.
    - Assumes EPRA is responsible for 30% of regional transmission buildout (the rest attributable to FERC Order 1920).
- Interregional Transmission:
    - The bill's provision requiring that FERC issue an interregional planning rule increases interregional transfer capacity in proportion to regional peak loads, i.e., such that grid planning regions can import/export 20% of their peak load.
    - Same assumptions as regional transmission on load growth.

- Assumes that EPRA and regional planning processes accelerate the buildout of the ~7 TW-miles of already-planned interregional transmission that energizes in 2030.
- Assumes EPRA is responsible for 100% of interregional transmission.

- *Analysis of analytical approach and insights:*
  - **The modeling is not directly applied to the bill provisions.** RMI's model establishes a scenario to translate FERC and EPRA provisions into transmission buildout. For example, the assumption that regional planning will enable transmission buildout at 50% the rate of MISO may be a plausible scenario, but it also appears to be a conjecture that is not explained in the report, underscoring the uncertainty of the exercise.
  - **Transmission's link to clean energy deployment is simplified.** The RMI analysis uses a transparent assumption that emissions benefits are a linear result of transmission buildout. This approach assumes that transmission bottlenecks are the only barrier preventing renewable energy deployment. In practice, the amount of induced renewable energy from transmission expansion is sensitive to several variables, including the share of renewable energy within the generation mix, the specific state-level policies, and geography of the power system.
  - **Analysis is uncertain on EPRA's role in stimulating change.** The role that EPRA itself plays in delivering renewable energy buildout is also the product of assumptions. RMI's assumption that 30% of all future regional transmission expansion and 100% of interregional transmission is attributable to EPRA is plausible, but there is no obvious mechanism to calculate these percentages with precision, and minor percentage shifts would significantly alter the outcomes of the analysis. The assumption that interregional planning leads to a 20% minimum transfer capacity is also a significant assumption – while estimates of optimal capacity have ranged from 20%-30%, the actual transfer capacities across transmission regions varies dramatically, with very low transfer capacities currently available in the Mountain States, Great Plains, Southeast and Northeast.[6]

<u>DOE modeling</u>

Modeling of different transmission scenarios, utilizing the capacity expansion model, ReEDS (Regional Energy Deployment System)

[6] Interregional power transfer capability ranges from 1% to 92% across North America: NERC. Utility Dive, August 28, 2024. https://www.utilitydive.com/news/interregional-transfer-capability-north-america-NERC-ITCS-FERC-report/725454/.

- DOE modeled four difference scenarios: one a restrictive case representing a world where major bottlenecks to both regional and interregional transmission expansion remain, and three "enhanced transmission" cases where those restrictions are gradually loosened.
    - Enhanced Transmission Scenario 1: Allows regional transmission lines to be completed starting in 2032 are allowed to be completed in 2032, Interregional lines that do not cross interconnections are allowed to be completed starting in 2038 (with cost adders), when limits of resource adequacy sharing is also removed within the three interconnections. (*our* proxy for FERC Order 1920).
    - Enhanced Transmission Scenario 2: Both regional and interregional lines can both be built starting in 2032, including interregional lines that cross the three interconnections. In this case, the limit to resource adequacy sharing is removed in 2032 and sharing is allowed across interconnections.
    - Enhanced Transmission Scenario 3: Same as ETS 2 but with a 30% investment tax credit to new regional and interregional lines.

- *Analysis of analytical approach and insights:*
    - **The modeling is not directly applied to the bill provisions.** DOE is explicit that these scenarios represent generic actions to facilitate new transmission infrastructure and are not representative of any specific legislation. Based on the scenario assumptions, we see ETS1 as a proxy for a world without EPRA, but with FERC Order 1920, and ETS2 as a proxy for a world with both EPRA and Order 1920. While we believe this is a reasonable proxy, DOE did not directly model EPRA nor is the proxy perfect. For example, ETS1 (our proxy for Order 1920) does not allow interregional transmission between the 11 FERC Order 1000 planning regions until 2038. However, even without EPRA, we expect that some interregional transmission lines will be built before 2038.

- *Administrative Interaction*: Unlocking transmission buildout and leveraging it to drive renewable energy deployments requires coordinated, multi-part policy interventions. EPRA seeks to enhance transmission buildout and is presented as an important counterpart to FERC's Administration actions. RMI's estimates suggest that EPRA is only responsible for roughly one-half as much effect as the FERC proposals (i.e., Order 1920). If this is indeed the case, it would suggest that the most significant aspect of this legislation may be in its protecting FERC's administrative actions from statutory reinterpretations. This is of value; however, it is worth noting that in the future, FERC may change its priorities and decline to enact these administrative actions even if the legislation is passed. Put simply, some of EPRA's provisions are important enablers but require Administrative action to build out transmission.

Improvements

Transmission infrastructure is necessary for climate progress. EPRA does advance some important transmission provisions, however, the direct impact of this bill is uncertain, and even considering RMI's most optimistic case scenarios, likely insufficient to the needs of the U.S. energy system.

There are many additional transmission reforms that are needed and would render greater climate benefits. These include:

- Minimum transfer requirements, which would ensure that interregional transmission capacity is built;
- Proactive community engagement and community benefits, which would improve community participation and outcomes;
- Full federal siting authority for certain projects, which would reduce unnecessary state veto points;
- Further interconnection queue reforms (beyond Order 2023), which would eliminate wasteful and confusing planning requirements on the marginal system-wide capacity improvements required by individual projects;
- A transmission ITC paired with more funding to the Grid Deployment Office's transmission facilitation program, which would ensure sufficient investment capital no matter what happens in the private markets; and
- Incentives for new load sources to be demand responsive and for building utility-scale energy storage, which would supplement transmission expansion.

2. LNG Export Provisions

Provisions Summary.

- EPRA limits DOE's review and approval process for LNG exports by imposing a 90-day decision deadline under various scenarios:
  - (i) 90 days from the bill's enactment for pending applications where FERC has completed its environmental analysis of the relevant export terminal;
  - (ii) 90 days from FERC's issuance of a final environmental review for any new export terminal application;
  - (iii) 90 days from the issuance of a draft environmental review for any new applications to re-export through Canada or Mexico; and
  - (iv) 90 days from the date of the application for any requests to extend the life of an existing export authorization.
- If the DOE fails to act within 90 days as described above, the bill's language would automatically approve export applications.
- DOE is required to rely on existing LNG Export studies unless and until a supplemental review is finalized and implemented.

Analytical Approach: ZERO Lab Analysis

- The Zero Lab study finds a range of estimated impacts on global GHG emissions spanning a reduction of about 120 million metric tons of CO2-equivalent per year (MMT CO2e/y) to an increase of about 170 MMT CO2e/y circa 2035-2040.
- The study finds that this would likely increase domestic gas prices, which would reduce domestic consumption, and be replaced with renewables or coal. It estimates that it would drive US gas consumption down by 3.5 to 4.3 Bcf/d.
- Abroad, this action would drive an increase in international gas consumption by 3.5-4.1 Bcf/d.
- Zero Lab's analysis uses a range of methane leakage rates from 4% (worst-case scenario, reflecting current rates from Permian basin) to 0.5% (best-case scenario, with stringent regulation from the EPA). The leakage rates do not account for LNG that is re-exported through Mexico.
- It also assumes that 100% of pending capacity would 1) be approved, 2) be built, and 3) be purely additional to what already exists. Zero Lab notes that these three assumptions are unlikely to be true, and the effects found here are larger than what would likely occur.

Analysis of modeling approach and insights.

- **The decisions of countries in Southeast Asia, Africa, and elsewhere are not fully characterized.** It is uncertain how these markets would react in terms of LNG dependence and infrastructure build-out in response to lower prices and a geopolitical preference for US products.
- **The analysis considers scenarios for LNG displacement of other resources, but does not make predictions.** For example, the analysis presents three scenarios exploring the potential impacts if LNG replaces 100% zero-emission sources (or leads to additive emissions increases), 100% of coal sources, or a 50/50 mix of zero-emission sources and coal sources overseas. While this suggests bounding conditions, it does not predict how much of the LNG exported would displace LNG from other sources, coal, or clean energy, or the likelihood of each scenario.

Other impacts that are not captured by modeling

Additionally, the bill's LNG provisions have significant consequences that cannot be captured by the limited scope of this kind of modeling. This includes global gas infrastructure lock-in, continuation and worsening of pollution in environmental justice communities, broader energy price dynamics, and the political influence of the U.S. gas industry. For example:

- **There are significant public health harms that are unjustly imposed on specific communities,** which cannot be represented in generalized global models but are still analytically tractable. The majority of proposed and under-review facilities are located in

environmental justice communities (as identified with CEQ's CEJST screening tool). An exclusive reliance on energy system modeling to assess bill impacts overlooks these impacts.

- **The expansion of LNG exports undermines the demand-side pressures that drive emissions reductions across multiple climate policies.** Currently, according to Rhodium's Taking Stock 2024 low-emissions scenario, the U.S. is on track to cut U.S. demand for petroleum by as much as 16 percent and for natural gas by 20 percent by 2035, which would (but for exports) lead to lower prices and lower production levels. At the time of IRA's passage, a significant portion of the advertised cost savings were due to the way it lowered gas demand and therefore gas prices.[7] However, an increasing export capacity allows the industry to maintain or increase current production levels (further enabled by the fossil fuel leasing provisions of this bill) even if domestic demand declines (cite taking stock 2024). These systemic impacts are not captured in the ZERO Lab's efforts but may significantly undermine the overall climate benefit of the bill.

- *Administrative Interaction.* In addition to the emissions impacts estimated for this bill, the LNG provisions limit the federal government's ability to meaningfully review LNG export applications and create an automatic approval mechanism (once a 90-day review clock runs) that insulates export approvals from judicial review. This opens the door to an Administration intentionally missing deadlines to trigger the automatic approval mechanism, which would deem the export to be in the public interest – a poor governance incentive. The bill's provisions would make it harder for DOE to achieve its mission to determine if projects are in the public interest based on rigorous analysis.

- Administrative action on methane leakage and precise leakage rates will also have a large impact on associated emissions, including implications for gas re-exported through Mexico.

Conclusions

The ZERO Lab's modeling of LNG export provisions addresses some of the key variables and uncertainties relating to LNG exports, but is unable to provide directional confidence in others, including the uncertainties in international market dynamics and methane leakage rates and variability. Additionally, the consequential environmental impacts of expediting LNG exports are not considered through energy system modeling, including environmental justice and transformational impacts to the energy system.

3. Fossil Fuel Leasing Provisions

Provisions Summary.

[7] Ben King, et. Al. "Pathways to Paris: Post-IRA Policy Action to Drive US Decarbonization," Rhodium Group, March 30, 2023, https://rhg.com/research/ira-us-climate-policy-2030/.

- Places new limits on the Bureau of Land Management's ("BLM's") discretion to shape the size and location of lease sales and limits environmental or other guardrails the agency may wish to include in the terms of leases sold.
- Lengthens the duration of an onshore drilling permit from 2 to 4 years and makes them non-renewable.
- Allows oil and gas companies to access "split estate" resources without the need for a federal drilling permit, with regulatory oversight solely at the discretion of the relevant state agency.
- Requires Interior to conduct at least one offshore oil and gas lease sale, and to offer at least 60 million acres for leasing, every year for the next five years (2025-2029) by August 31 of each year. Interior must offer the same terms and conditions as Lease Sale 261 (Gulf of Mexico, 2023).
- Interior is required to issue new leases within 90 days of a sale for any "acceptable bids."
- Amends the coal leasing provision of the Mineral Leasing Act to impose a strict, expedited deadline for BLM to begin review of an industry request for a new lease or a modification to an existing lease. (This provision has not been modeled as of date).

Analytical Approach

<u>Onshore oil and gas modeling (RFF)</u>

- **Modeling Approach:** RFF modeled future scenarios of high levels of onshore oil and gas leasing as compared to business-as-usual (BAU) leasing. The high scenario extended the levels of onshore leasing seen under the Trump administration into the future through 2050, while the BAU scenario extended alternating high and low levels into the future. This analysis is static, using fixed assumptions about substitution and leakage and other market factors, rather than modeling markets dynamically where they can actively respond to changing conditions. They represent wells drilled each year based on a historical relationship with acres leased, and oil and gas prices. Actual production is then modeled as a function of the age of the well based on historical production curves. They also include an uncertainty exploration by varying some of their key assumptions.
- **Key Findings:** RFF modeling found a range of 0.7-2.0 $GtCO_2e$ net impact (difference between the high and BAU scenarios) with a central estimate of 1.2 $GtCO_2e$. They explore uncertainty by varying oil price assumptions, amount of oil available, emissions factors, and substitution rates across.

<u>Offshore oil and gas modeling (Third Way)</u>

- **Modeling Approach:** Third Way developed three scenarios that project the future of offshore leasing, explorations, drilling, and production:
    1. A business-as-usual scenario in which auctioning of federal land for oil and gas development continues at the level required by the IRA;

2. An alternative business-as-usual scenario in which auctioning of federal land for oil and gas development is paused from 2025 to 2028, then resumed in 2029 at the level required by the IRA; and
3. A policy scenario reflecting EPRA's provisions in which additional permits for oil and gas development are auctioned from 2028 to 2032.

- Scenario 3 (EPRA) is compared to scenario 1 (BAU) to estimate the 'low' range, whereas scenario 3 (EPRA) is compared to scenario (2) to estimate the 'high' range.
- **Key Findings:** In both cases, offshore oil and gas production increases moderately. However, by spurring additional production in the near-term, the high range induces additional emissions increases. Third Way estimates that the offshore leasing provisions of EPRA could increase cumulative emissions by 0.38 to 0.69 Gt CO2e by 2050, with incremental annual emissions peaking in the 2040s.

Analysis of modeling approach and insights for both onshore (RFF) and offshore leasing provisions (Third Way).

- Due to the difficulty of directly modeling these provisions, RFF translated the oil and gas leasing provisions into models via a "high onshore leasing" scenario as a proxy for how the provisions may impact domestic production onshore.
- Third Way does characterize their offshore oil and gas analysis as directly modeling the legislative provisions, but there is little detail provided on their approach. Third Way states that their "assumptions for the amount of leased land that goes into production, production lag times, and production-per-well is based on historical data," and "industry standard leakage and demand elasticity rates are used" but does not provide any sourcing or reported values that would allow others to see or assess the values used in their assumptions.
- Additionally, as noted in the LNG section above, these bill provisions have significant consequences that cannot be captured by the limited scope of this kind of modeling, such as infrastructure lock-in, continuation and worsening of pollution in environmental justice communities, increased methane emissions, broader energy price dynamics, and the political influence of the U.S. oil and gas industry.

4. Net Emissions Calculation

- Analytical approach: Third Way presented a synthesis of the above analysis performed by other groups to determine the net climate impact of the bill across the transmission, oil and gas leasing, and LNG export provisions.

    - The numbers for onshore and offshore oil & gas leasing were taken directly from RFF and Third Way, respectively.
    - While Princeton ZERO Lab's work focused on the impact of the LNG provision in 2035, Third Way turned this figure into a cumulative number (multiplying the annual

impact by 20 to reflect the total impact between 2030 – 2050) to allow for an assessment of the net cumulative impact of the bill).
    - Third Way also adjusted RMI's cumulative results to represent "high attribution" of EPRA. RMI's analysis assumes that only 30% of regional transmission benefits are attributable to EPRA (with the rest to FERC Order 1920). In Third Way's aggregation, they adjusted RMI's transmission numbers to attribute 100% of regional transmission benefits to EPRA (and 0% to Order 1920).

- Given the multi-sector implications of EPRA, it is desirable to seek an assessment of the bill's overall impacts in total. Third Way's effort to present an apples-to-apples comparison includes some analytical choices with which we disagree. Our concerns include:
    - Third Way's effort synthesized modeling efforts performed with different levels of uncertainty and different approaches, without discussing the potential for interactions among the components. For example, ZERO lab's price effect-induced GHG reductions are not likely to happen if RMI's transmission-induced gas demand reductions occur.
    - Third Way changed the analysis in applying RMI's transmission modeling conclusions – where RMI had assumed that 30% of the transmission buildout was due to EPRA, Third Way utilized the same results but assumed EPRA was responsible for 100% of the buildout. Such a value would correspond to a world where, without EPRA, no regional transmission would be built. Third Way's synthesis found EPRA would result in a cumulative change in GHG emissions of -0.4 to -15.7 GtCO2e. However, if they had used RMI's methodology and stated range, Third Way's cumulative emission impacts would instead range from +2.1 to -13.9 GtCO2e through 2050, contradicting their reported conclusion that all scenarios unambiguously support climate net benefit.
    - Finally, Third Way claims their analysis "finds that EPRA results in net emissions reductions, in both low and high-range scenarios." Since most of the modeling performed did not directly model the bill, and a number of bill provisions were not covered by any of these analytical efforts, this claim raises concerns.

Other Points

Unmodeled Provisions

In addition to the unmodeled provisions noted above, the sum-total of the bill would present impacts in the following areas that are not viable for analysis through most energy system models. Such impacts require additional policy analysis to consider their impacts.

- Public land utilization for mining waste of all types would **expose water and soil to toxic pollution**.
- The potential for fossil fuel scale-up would have impacts in **local air and water pollution** in specific geographies, with serious implications for **environmental justice communities and ecosystem degradation**.
- The modeling to date has also focused on the GHG impact of these provisions, **but the non-GHG impacts have not been properly assessed**.
- Provisions that reinforce or expand fossil fuel leasing on the federal mineral estate could likely prevent the deployment of clean energy technologies on federal lands and waters.