Potential impacts of the Bipartisan American Affordability and Jobs Act on United States energy systems

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This version: November 6, 2026. *Update: Added sensitivity studies.*
Latest version: kevinjkircher.com/BAAJA

Abstract

The United States Senate will likely vote on the Bipartisan American Affordability and Jobs Act (BAAJA) in early November. BAAJA would reshape, in profound and uncertain ways, the federal laws and procedures that regulate energy infrastructure. Here, I use probabilistic modeling to assess BAAJA's potential impacts on the United States energy system, comparing a '2025 as it was' baseline to a '2025 with BAAJA in full effect' alternate history. With at least 75% probability in this modeling framework, BAAJA increases all of the following: Revenues and jobs in both clean electricity and fossil fuel industries, with larger increases for fossil fuels; domestic energy-related greenhouse gas emissions; domestic mortality attributable to air pollution from fossil fuels; and fossil fuel exports. The increased climate and mortality impacts come from increased domestic fossil fuel use. Viewed as an exchange between the economic benefits of growing the clean electricity industry versus the environmental costs of expanding the fossil fuel industry, BAAJA performs poorly on two metrics. The first metric, the greenhouse gas intensity implied by adding clean electricity generation at the cost of adding domestic greenhouse gas emissions from fossil fuels, is 1.7 kg of new greenhouse gas emissions per kWh of new clean electricity generation. This is 70% worse than the 1 kg/kWh greenhouse gas intensity of electricity from a typical coal-fired power plant. The second metric, the value of a statistical life implied by adding clean electricity revenue at the cost of adding mortality attributable to air pollution from fossil fuels, is $2.1 million per lost life. This is 82% worse than the $11.8 million value of a statistical life that the Environmental Protection Agency recommends using in benefit-cost analysis of environmental policy.

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1 Introduction

On September 30, 2026, two Republican Senators and two Democratic Senators introduced draft text of the Bipartisan American Affordability and Jobs Act (BAAJA), a 417-page, highly technical bill that modifies or interfaces with large bodies of existing law, including the National Environmental Policy Act, the Clean Water Act, the National Historic Preservation Act, the Endangered Species Act, and the Federal Power Act. BAAJA would profoundly reshape federal governance of many types of infrastructure, especially energy infrastructure. The nature and extent of BAAJA's potential impacts are highly uncertain, as they depend on how future executive branches would interpret and implement BAAJA provisions and how federal courts—possibly including the Supreme Court—would rule on legal challenges. The Senate is expected to vote on BAAJA on November 9, just 40 days after publication of the draft text. As BAAJA would overhaul many federal regulations, passing it would require a filibuster-proof 60-vote supermajority in the Senate, likely including the 53 Republican Senators and at least seven Democrats or Independents. Future efforts to amend or repeal BAAJA would likely also require Senate supermajorities.

Because BAAJA is new, large, and complex, its potential benefits and risks have not been fully characterized. On September 30, the Center for Climate and Energy Solutions (a nonprofit think tank) and Greenline Insights (a for-profit research firm) released a policy brief summarizing modeling of how changes to interconnection and transmission policy might affect the electricity sector. They estimated 16% and 23% increases in wind and solar generation, respectively, a 9% decrease in electricity-sector greenhouse gas emissions, and residential electricity bill savings on the order of $17 per household per year[1]. In late October, Robin Millican and coauthors from the Center on Global Energy Policy at Columbia University published a broader, more qualitative white paper that discussed BAAJA's potential impacts on the electricity, fossil fuel, and mining industries, as well as energy security and residential energy affordability. They argued that 'BAAJA is not climate legislation' and that affordability gains are 'plausible but conditional,' estimating electricity cost savings on the order of $19 per household per year[2]. On October 29, Kevin Rennert and Aaron Bergman from Resources for the Future, a nonprofit think tank, published a detailed modeling study of BAAJA's potential impacts on the electricity sector. They reported large increases in transmission capacity, about a 3.5% increase in clean electricity generation[3], a 6% decrease in electricity-sector greenhouse gas emissions, and electricity cost savings on the order of $39 per household per year[4].

Five main factors differentiate this white paper from the studies mentioned above: 1) Quantitative modeling of the electricity and fossil fuel industries, covering 95%[5] of United States primary energy, 2) accounting for BAAJA potentially increasing electricity or fossil fuel demand, 3) modeling mortality impacts attributable to fossil fuel air pollution, 4) accounting for methane (CH_4, a potent greenhouse gas) emissions from fossil fuel infrastructure, and 5) disclosing the modeling details, data, and code.

Relative to a '2025 as it was' baseline, I estimate the following impacts in 2025 under an alternate history where BAAJA had been implemented years previously and taken full effect by 2025.

- **Revenues and jobs very likely[6] increase in clean electricity and fossil fuel industries, with larger increases for fossil fuels.** Clean electricity industries add a mean of $3.1 (95% confidence interval: −$1.4 to $7.5) billion per year in revenue, a relative increase of 3.5% (−1.5% to 8.5%), and 22,100 (−9,800 to 54,000) jobs. Fossil fuel industries add $30.6 ($17.2 to $43.9) billion per year in revenue, a relative increase of 4.4% (2.5% to 6.4%), and 46,800 (26,500 to 67,200) jobs. On average, fossil fuel industries add 10 times more revenue and 2.1 times more jobs than clean electricity industries.

- **Greenhouse gas emissions likely increase.** Excluding exports, domestic energy-related greenhouse gas emissions increase by 136 (−113 to 385) Mt of carbon dioxide equivalent (CO_{2e}) per year, a relative increase of 2.3% (−1.9% to 6.5%). On average, each kWh of additional clean electricity generation enabled by BAAJA is associated with 1.7 kg of additional domestic CO_{2e} emissions. For context, the CO_{2e} intensity of electricity from a typical coal-fired power plant is 1 kg/kWh[7].

- **Mortality attributable to air pollution likely increases.** Domestic mortality attributable to air pollution from fossil fuels increases by 1.8% (−3.4% to 6.9%). The mean mortality increase is

1,500 additional American deaths per year. On average, each $2.1 million of additional revenue from clean electricity generation enabled by BAAJA is associated with one additional American death. For context, the Environmental Protection Agency (EPA) recommends using $11.8 million as a value of a statistical life[8] for policy benefit-cost analysis.

- **Fossil fuel exports very likely increase.** Fossil fuel exports increase by 3.3 (-1.3 to 7.8) exajoules (EJ, a unit equal to 0.95 quadrillion British thermal units) per year, a relative increase of 30% (−12% to 71%). The greenhouse gas emission and mortality estimates reported above do not include exports.

These results are from a binary comparison wherein the only alternative to BAAJA is business as usual. Future work could compare BAAJA to other policy approaches to accelerating buildout of electricity infrastructure that do not require a filibuster-proof Senate supermajority. Example policies include expanding the federal Permitting Council's Fast-41 program, expanding the Department of Energy's Coordinated Interagency Transmission Authorizations and Permits program, funding the transmission sections of the Inflation Reduction Act of 2022 (Sections 50151–50153, from which the One Big Beautiful Bill Act of 2025 rescinded unobligated funds), creating a transmission investment tax credit, or increasing funding and staffing for the agencies that review applications for relevant permits. Future work could also characterize BAAJA's potential impacts in scenarios where the United States energy system diverges significantly from today's, such as deep decarbonization or rapid fossil fuel expansion.

Disclosures: Due to the short time between publication of the draft bill text and the likely Senate vote, this white paper has not undergone peer review. However, I provide the full modeling details in Section 5 and make all data and code freely available at github.com/kevinjkircher/BAAJA. I did not receive funding for this work. I do not work for or invest in any fossil fuel or clean electricity companies. I do not speak for Purdue University or any other organization or individual.

2 Methodology summary

To analyze BAAJA's potential benefits and risks, I model two scenarios: A '2025 as it was' baseline and an alternate-history version of 2025 wherein BAAJA had been implemented long enough ago that it had taken full effect by 2025. I use '2025 as it was' as a baseline, rather than looking ahead over the coming decades, for two main reasons. First, defining a forward-looking baseline requires making subjective modeling choices about future energy and capacity prices, future demand for electricity and fossil fuels, future constraints on energy supply and movement, discount rates, and other uncertain parameters. Using a retrospective baseline reduces uncertainty and subjectivity by removing dependence on these modeling choices. Second, in the field of sequential decision-making under uncertainty, where much of my research focuses, understanding realistic near-term consequences is generally more important than exploring far-future possibilities. This suggests that to support good decision-making today, it is more important to characterize BAAJA's potential impacts this decade, when United States energy systems are unlikely to diverge substantially from their 2025 state, than to speculate about energy systems in 2040.

The model has six energy components: Fossil fuel production, clean electricity generation, fossil fuel electricity generation, domestic fossil fuel direct use, domestic electricity use, and fossil fuel net export. I model revenues, jobs, greenhouse gas emissions, and mortality impacts as directly proportional to energy inputs to or outputs from these components. Carbon dioxide (CO_2) emissions come from fossil fuel electricity generation and fossil fuel direct use. CH_4 emissions come from fossil fuel production (modeled here as including extraction, gathering, processing, transmission, storage, and distribution). Domestic mortality impacts attributable to air pollution[9] come from fossil fuel electricity generation and fossil fuel direct use.

I do not model BAAJA's potential impacts on residential electricity bills, as the studies reviewed in Section 1 suggest that electricity bill savings are likely small. Further, based on their limited descriptions of modeling details, I surmise that these studies assumed electricity demand under BAAJA equals electricity demand in their baseline scenarios. Under this assumption, BAAJA should indeed reduce electricity prices,

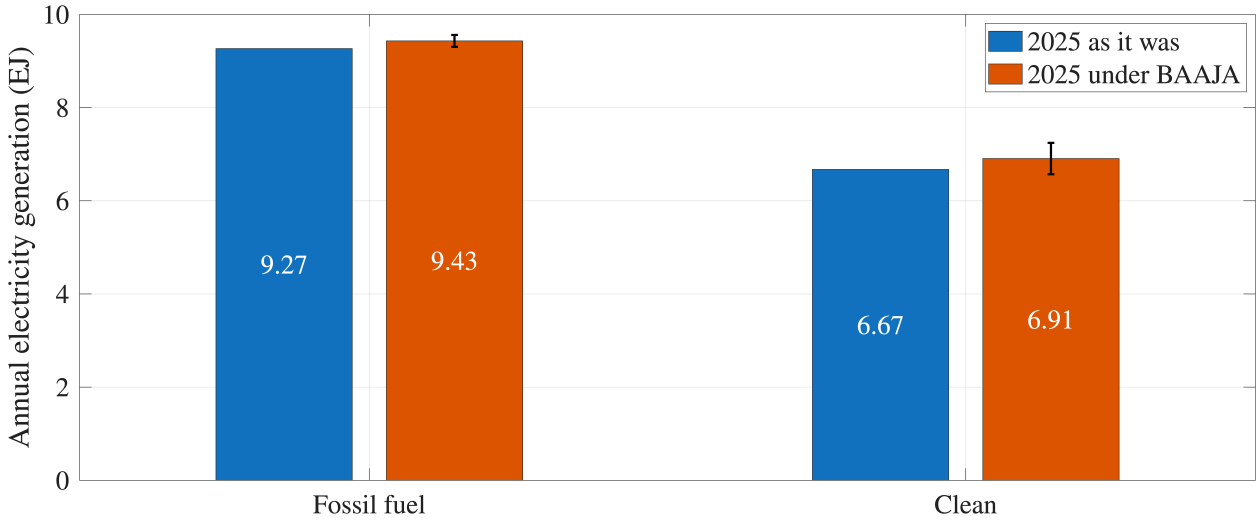


Figure 1: Annual electricity generation in 2025 as it was (blue) and if BAAJA had been in full effect (orange). Bar heights are means; error bars span 2.5th to 97.5th percentiles. On average, BAAJA increases total, fossil fuel, and clean electricity generation by 2.5%, 1.8%, and 3.5%, respectively.

as it would increase supply relative to the assumed baseline, while demand remained constant. However, if BAAJA potentially increases both electricity demand and supply—a possibility I consider here—then price reductions may be smaller or nonexistent.

This white paper's job estimation scope includes only the energy sector. I do not model BAAJA's potential impacts on other jobs, such as supporting compliance with the environmental protection and historic preservation laws that BAAJA would weaken. Jeopardized jobs include biological surveyors, archaeologists and field technicians, architectural historians, contractors who work in historic construction and rehabilitation, hospitality workers in regions with significant historical tourism, and others.

I convert CH_4 emissions to units of CO_{2e} using the 100-year global warming potential (GWP) of 29.8[10], consistent with typical United States greenhouse gas accounting practices. This modeling choice entails the implicit assumption that climate impacts should be evaluated over the 100-year horizon from 2025 to 2125. As CH_4 is a fast-acting greenhouse gas, choosing a shorter horizon makes CH_4 more influential in overall greenhouse gas emission estimates. For example, a reader who prefers to evaluate climate impacts from 2025 to 2045 would use the 20-year GWP of 82.5. This choice would increase the reported CO_{2e} estimates associated with CH_4 from fossil fuel production by a factor of $82.5/29.8 = 2.77$.

The domestic greenhouse gas emission estimates reported here do not include CO_2 emissions associated with fossil fuel exports. While this aligns with typical United States greenhouse gas accounting practices, not everyone agrees with this accounting choice. I therefore separately estimate CO_2 emissions associated with fossil fuel exports and let readers choose how to account for them.

To characterize the mortality intensity attributable to air pollution from fossil fuel use, I draw upon two recent peer-reviewed studies. I use numbers from the study that estimates lower mortality impacts. The mortality estimates I report here include only domestic mortality. They do not include domestic non-fatal illnesses or any illness or mortality associated with fossil fuel exports.

This white paper does not consider any impacts on non-human species.

I model BAAJA as having two influences on energy supply and two influences on energy demand. The first supply influence is increasing (or, with low but nonzero probability, decreasing) the combined clean electricity generation from nuclear (17.7% of total electricity generation in 2025[11]), wind (10.5%), solar (6.7%), hydropower (5.6%), biomass (1.0%), and geothermal (0.4%) power plants. This influence could

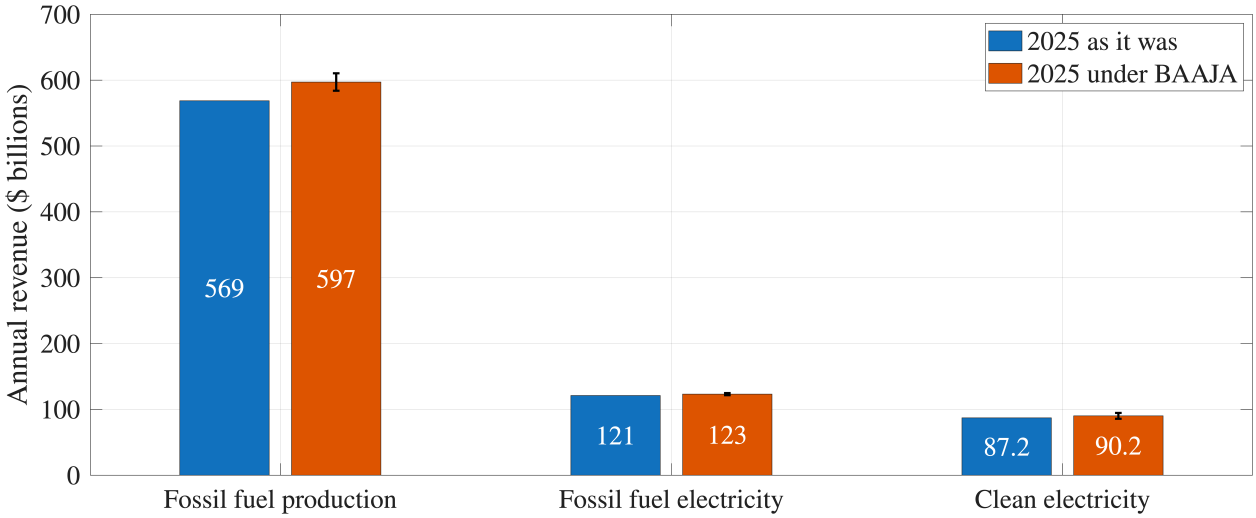


Figure 2: Annual revenue in 2025 as it was (blue) and if BAAJA had been in full effect (orange). Bar heights are means; error bars span 2.5th to 97.5th percentiles. On average, BAAJA increases revenues from fossil fuel production, fossil fuel electricity, and clean electricity by 5%, 1.8%, and 3.5%, respectively.

model, for example, accelerating siting or interconnection of new clean power plants, or reducing curtailment of existing clean generation by expanding buildout of power lines or batteries. The low-probability decrease in clean electricity generation could model, for example, an executive branch using BAAJA provisions to deny permits to renewable power plants in new ways[12]. The second supply influence is increasing fossil fuel production, for example, by accelerating siting or interconnection of infrastructure for fossil fuel extraction, gathering, processing, transmission, storage, distribution, or export.

I model each of BAAJA's two demand influences as positively correlated with a supply influence. The first demand influence is increasing electricity demand, for example, by accelerating buildout of data centers or other large loads. I assume that in scenarios where BAAJA is more effective at accelerating siting and interconnection for clean electricity, it is also more effective at accelerating siting and interconnection of load (either to bulk power grids, or to natural gas pipeline networks that enable on-site power generation), although to a lesser degree. The second demand influence is increasing domestic fossil fuel direct use, for example, by accelerating buildout of natural gas pipelines to supply-constrained regions, such as the Northeast, or through price effects. I model this demand influence by linearly regressing domestic fossil fuel direct use on fossil fuel production. The regression uses data from 2015 through 2025, when each 3% increase in fossil fuel production corresponded to about a 1% increase in domestic fossil fuel direct use. I embed the regression results and associated uncertainty information in probabilistic simulations.

I analyze BAAJA's potential impacts in 10 million probabilistic scenarios, each corresponding to a different set of samples drawn from probability distributions over uncertain model parameters. I also run deterministic simulations to show how two tradeoff metrics scale with uncertain model parameters. The first metric is the CO_{2e} intensity implied by trading new clean electricity generation for new greenhouse gas emissions from fossil fuel expansion. The second metric is the value of a statistical life implied by trading new clean electricity revenue for new mortality risks attributable to air pollution from fossil fuels.

3 Economic and environmental impacts

Electricity generation and load very likely increase, with larger increases in clean generation than fossil fuel generation. Figure 1 shows annual fossil fuel (left two bars) and clean (right two bars)

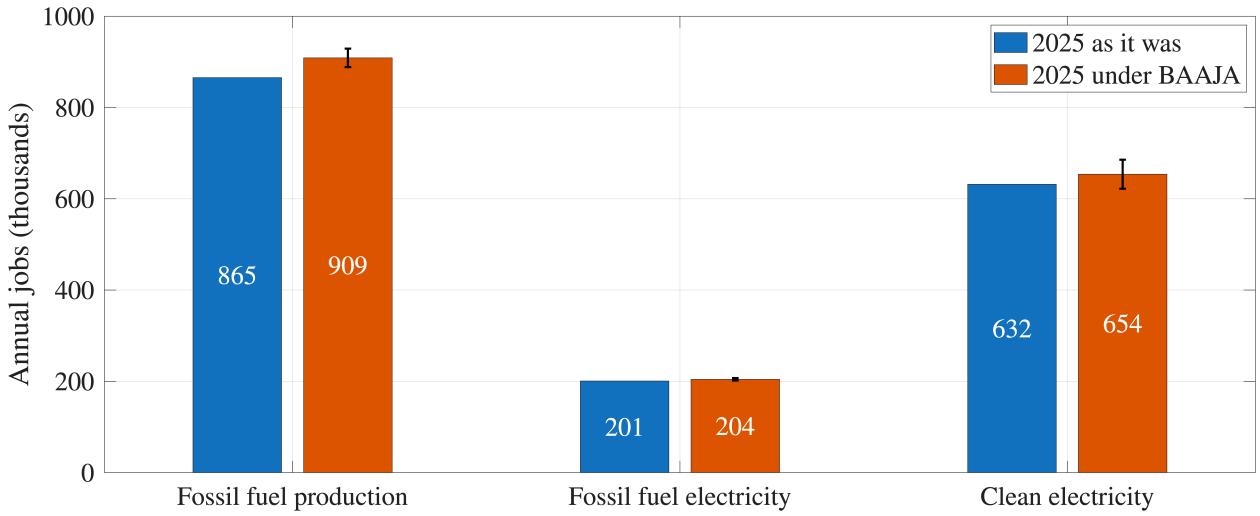


Figure 3: Annual jobs in 2025 as it was (blue) and if BAAJA had been in full effect (orange). Bar heights are means; error bars span 2.5th to 97.5th percentiles. On average, BAAJA increases jobs in fossil fuel production, fossil fuel electricity, and clean electricity by 5%, 1.8%, and 3.5%, respectively.

electricity generation in the baseline (blue) and alternative (orange) scenarios. Total electricity generation increases by 0.40 (0.06 to 0.73) EJ or 2.5% (0.4% to 4.6%). Clean electricity generation increases by 0.23 (−0.10 to 0.57) EJ or 3.5% (−1.5% to 8.5%). Fossil fuel electricity generation increases by 0.17 (0.04 to 0.29) EJ or 1.8% (0.4% to 3.1%). The probability that generation increases are larger for clean electricity than fossil fuel electricity is 62.7%.

These results show the influence of BAAJA's potential to increase electricity load, which previous electricity-sector studies did not model. While, on average, BAAJA decreases the fossil share of electricity generation from 58.1% to 57.7%, BAAJA increases fossil generation and electricity-sector emissions because it also increases electricity load. If the model neglected load-growth effects, it would suggest a small decrease in fossil generation and electricity-sector emissions, consistent with previous electricity-sector studies.

Revenues and jobs very likely increase in fossil fuel and electricity industries, with the largest increases for fossil fuel production. Figure 2 shows annual revenues from fossil fuel production (left two bars), fossil fuel electricity generation (middle two bars), and clean electricity generation (right two bars) in the baseline (blue) and alternative (orange) scenarios. Fossil fuel production revenue increases by $28.4 ($15.2 to $41.7) billion or 5% (2.7% to 7.3%). Fossil fuel electricity generation revenue increases by $2.2 ($0.5 to $3.8) billion or 1.8% (0.4% to 3.1%). Clean electricity generation revenue increases by $3.1 (−$1.4 to $7.5) billion or 3.5% (−1.5% to 8.5%). Mean revenue growth for fossil fuel industries exceeds mean revenue growth for clean electricity by a factor of 10.

Figure 3 shows similar trends for jobs, although the clean electricity share of total job growth is 32%, on average, compared to a 10% share of total revenue growth. This is because clean electricity industries are comparatively job-intensive. Despite this effect, the probability that job growth in fossil fuel industries exceeds job growth in clean electricity industries is 88.4%.

Domestic energy-related greenhouse gas emissions very likely increase. Figure 4 shows annual CO_2 emissions from domestic fossil fuel direct use (left two bars), domestic electricity generation (center-left two bars), domestic CH_4 emissions from fossil fuel production (center-right two bars), and CO_2 emissions associated with fossil fuel exports (right two bars) in the baseline (blue) and alternative (orange) scenarios.

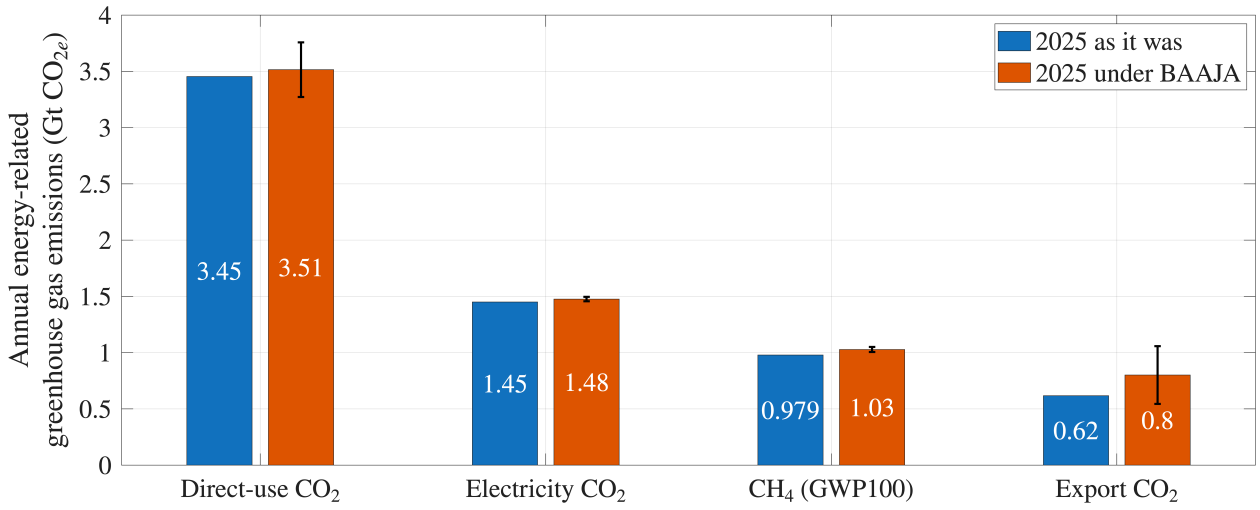


Figure 4: Annual energy-related greenhouse gas emissions in 2025 as it was (blue) and if BAAJA had been in full effect (orange). Bar heights are means; error bars span 2.5th to 97.5th percentiles. On average, BAAJA increases total domestic CO_{2e} emissions, domestic CO_2 emissions from fossil fuel direct use, domestic CO_2 emissions from fossil fuel electricity, domestic CH_4 emissions from fossil fuel production, and CO_2 emissions associated with exported fossil fuels by 2.3%, 1.8%, 1.8%, 5%, and 30%, respectively.

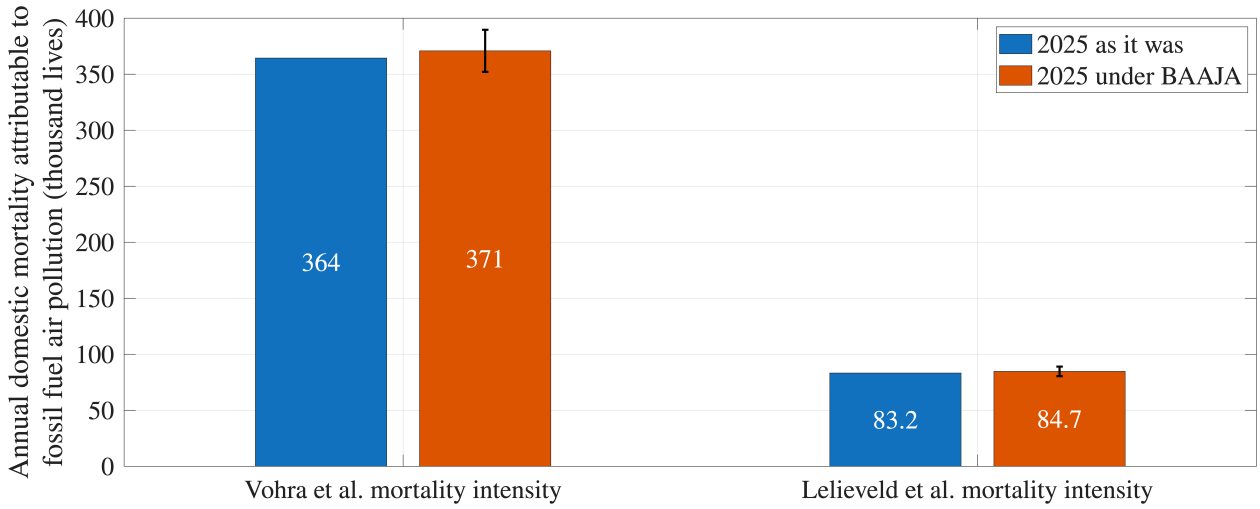


Figure 5: Annual domestic mortality associated with fossil fuel air pollution in 2025 as it was (blue) and if BAAJA had been in full effect (orange). Bar heights are means; error bars span 2.5th to 97.5th percentiles. On average, BAAJA increases mortality by 1.8%. The probability that mortality increases is 74.9%.

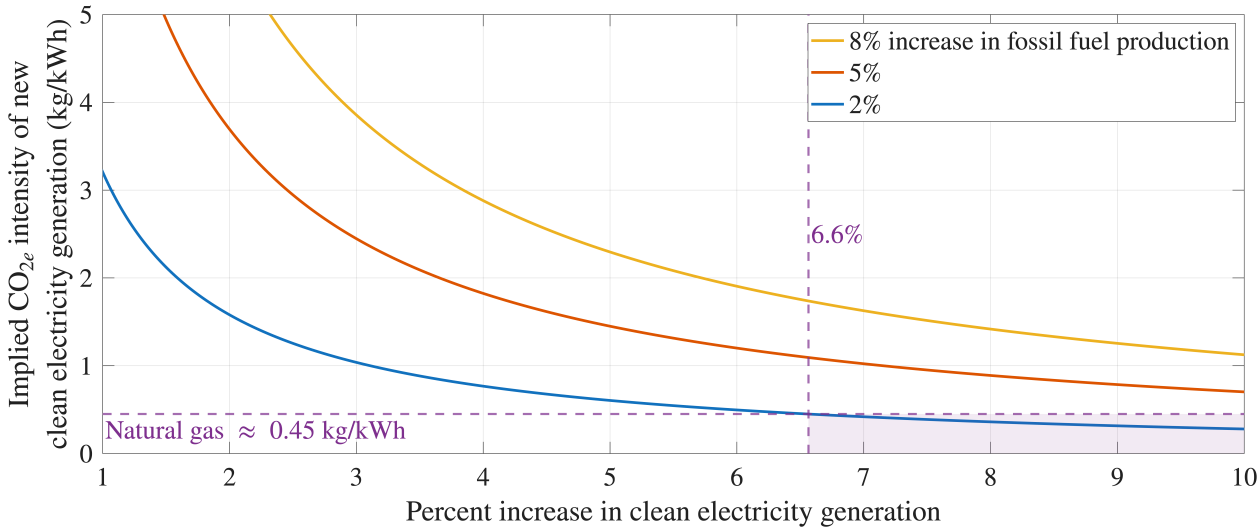


Figure 6: Scaling of the implied CO_{2e} intensity of new clean electricity generation enabled by BAAJA (vertical axis) with BAAJA's effectiveness in accelerating clean electricity generation (horizontal axis) and fossil fuel production (blue, orange, yellow curves). The implied CO_{2e} intensity is better (lower) than that of a typical natural gas power plant only if BAAJA is highly effective at accelerating clean electricity generation and highly ineffective at accelerating fossil fuel production (for example, in the shaded purple area).

Domestic CO_2 emissions from fossil fuel direct use increase by 61 (−182 to 304) Mt or 1.8% (−5.3% to 8.8%). Domestic CO_2 emissions from fossil fuel electricity increase by 26 (6 to 46) Mt or 1.8% (0.4% to 3.1%). Domestic CH_4 emissions increase by 49 (26 to 72) Mt of CO_{2e} (under the 100-year GWP) or 5% (2.7% to 7.3%). Total domestic CO_{2e} emissions increase by 136 (113 to 385) Mt or 2.3% (−1.9% to 6.5%). The probability that total domestic energy-related CO_{2e} emissions increase is 85.7%.

While exports do not enter into the emission estimates reported above, the CO_2 emissions associated with fossil fuel exports increase by 184 (−73 to 441) Mt or 30% (−12% to 71%).

Domestic mortality associated with fossil fuel air pollution likely increases. Figure 5 shows annual domestic mortality associated with fossil fuel air pollution based on mortality estimates from a 2021 *Environmental Research* study by Vohra et al. (left two bars) and a 2023 *British Medical Journal* study by Lelieveld et al. (right two bars) in the baseline (blue) and alternative (orange) scenarios. Vohra et al. estimated significantly higher United States mortality rates than Lelieveld et al. I base the mortality estimates reported everywhere else in this white paper on the lower mortality rates from the Lelieveld et al. study. Here, I report the mortality estimates basted on the Vohra et al. study for completeness and to illustrate the significant uncertainty involved in mortality estimation.

Mortality rates from the Vohra et al. study suggest a domestic mortality increase of 6,400 (−12,300 to 25,200) deaths per year. Mortality rates from the Lelieveld et al. study suggest a domestic mortality increase of 1,500 (−2,800 to 5,800) deaths per year. In either case, the relative mortality increase is 1.8% (−3.4% to 6.9%). The probability that mortality increases is 74.9%.

4 Tradeoffs between economic benefits and environmental harms

The results in Section 3 suggest that BAAJA would likely increase revenues, jobs, greenhouse gas emissions, and mortality attributable to air pollution from fossil fuels. In this section, I attempt to characterize the

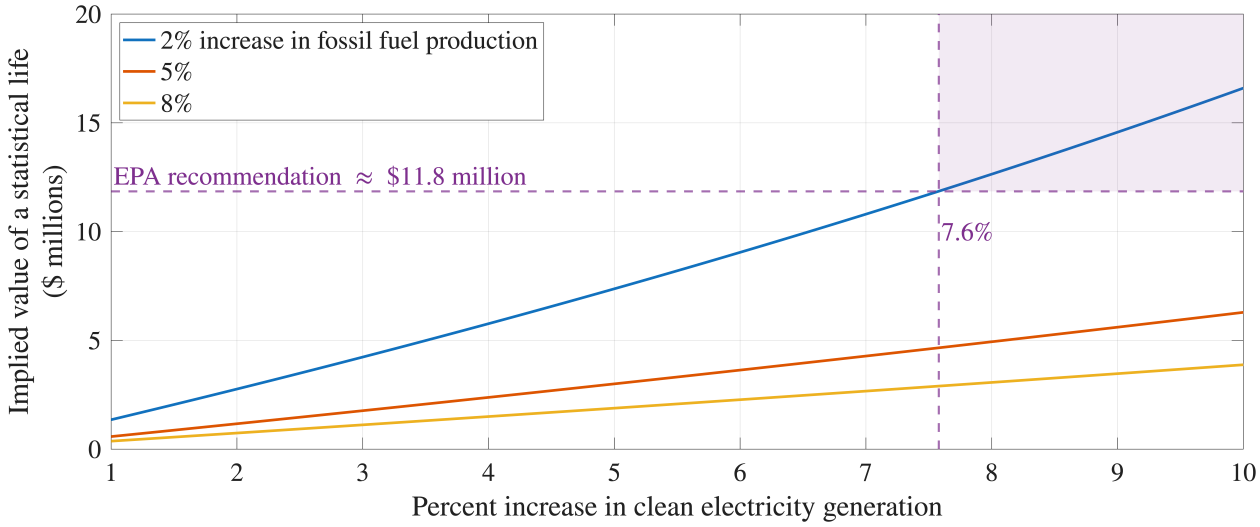


Figure 7: Scaling of the implied value of a statistical life (vertical axis) with BAAJA's effectiveness in accelerating clean electricity generation (horizontal axis) and fossil fuel production (blue, orange, and yellow curves). The implied value of a statistical life is better (higher) than the value recommended by the EPA only if BAAJA is highly effective at accelerating clean electricity generation and highly ineffective at accelerating fossil fuel production (for example, in the shaded purple area).

tradeoffs between BAAJA's likely economic benefits and environmental harms. I adopt the perspective of a hypothetical decision-maker who views support for BAAJA as a compromise between the beneficial outcomes of increasing clean electricity revenues and jobs versus the harmful outcomes of increasing greenhouse gas emissions and American mortality. This section does not consider fossil fuel revenues or jobs, climate or mortality impacts associated with fossil fuel exports, or impacts on non-human species.

To characterize BAAJA's tradeoffs for this hypothetical decision-maker, I consider two metrics. The first metric is the ratio of the increase in domestic CO_{2e} emissions to the increase in clean electricity generation. I view this metric as the implied CO_{2e} intensity of new clean electricity generation enabled by BAAJA. A lower value means a more favorable tradeoff: Fewer new emissions per unit of new clean energy. The second metric is the ratio of the increase in clean electricity revenue to the increase in clean electricity generation. I view this metric as the value of a statistical life implied by support for BAAJA. A higher value means a more favorable tradeoff: More new revenue per new lost life. I study these two metrics using deterministic sensitivity analysis, sweeping two uncertain parameters while holding the others at their mean values.

Figure 6 shows how the implied CO_{2e} intensity of new clean electricity generation (vertical axis) scales with the percent increase in clean electricity generation (horizontal axis) and the percent increase in fossil fuel production (blue, orange, and yellow curves). The high-end value of a 10% increase in clean electricity generation could come, for example, from a 23.9% increase in combined wind, solar, and geothermal generation (see Section 5). The implied CO_{2e} intensity improves (decreases) if BAAJA is more effective at increasing clean electricity generation (moving rightward on the horizontal axis) and less effective at increasing fossil fuel production (moving from yellow to orange to blue curves). The implied CO_{2e} intensity is better (lower) than the CO_{2e} intensity of a typical natural-gas-fired power plant (0.45 kg/kWh) only if BAAJA is highly effective at increasing clean electricity generation (at least 6.6% increase) and largely ineffective at increasing fossil fuel production (blue curve, 2% increase).

Figure 7 shows how the implied value of a statistical life (vertical axis) scales with the percent increase in clean electricity generation (horizontal axis) and the percent increase in fossil fuel production (blue, orange, and yellow curves). The implied value of a statistical life improves (increases) if BAAJA is more effective

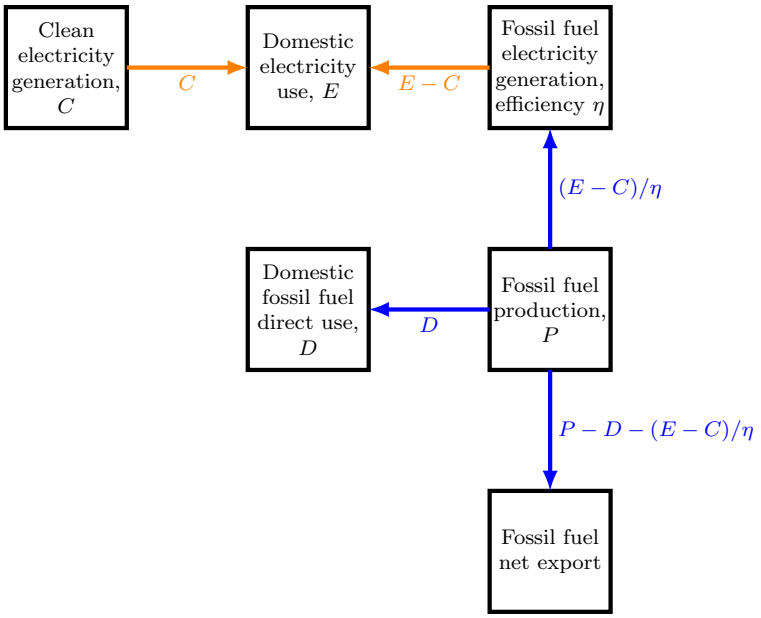


Figure 8: Modeled electricity (orange) and fossil fuel (blue) flows in the 2025 United States energy system.

at increasing clean electricity generation (moving rightward on the horizontal axis) and less effective at increasing fossil fuel production (moving from yellow to orange to blue). The implied value of a statistical life is better (higher) than the EPA's recommended value ($11.8 million) only if BAAJA is highly effective at increasing clean electricity generation (at least 7.6% increase) and largely ineffective at increasing fossil fuel production (blue curve, 2% increase).

5 Methodology details

This section describes the modeling assumptions, equations, input data, and uncertainty characterization.

5.1 Baseline: 2025 as it was

Figure 8 shows the modeled electricity (orange) and fossil fuel (blue) flows in the 2025 United States energy system. In 2025, total electricity generation was $E = 15.9$ EJ[13] (one exajoule, EJ, equals 0.948 quadrillion Btu or 277.8 TWh), of which clean generators supplied $C = 6.7$ EJ and fossil fuel generators supplied $E - C = 8.5$ EJ. The fleet-average fossil generator efficiency was 0.408[14]. Fossil fuel production $P = 94.6$ EJ flowed into $(E - C)/\eta = 22.6$ EJ of input fuel for electricity generation, $D = 61.1$ EJ of domestic fossil fuel direct use, and net exports $P - D - (E - C)/\eta = 10.9$ EJ[15]. The expressions for these energy flows follow from conservation of energy.

This energy system model uses lumped representations of energy flows from all fossil fuels (including oil, natural gas, coal, and others) and all clean electricity (including nuclear, hydropower, biomass, geothermal, wind, and solar). A higher-resolution model, such as a detailed Sankey diagram[16], could track fuels individually. A higher-resolution model could also track energy demand by economic sector, rather than categorizing all domestic demand as either electricity or fossil fuel direct use. I choose the lumped representations here to make the model more transparent and to reduce the numbers of equations and parameters that a skeptical reader would need to audit to understand the model structure and inputs.

Model outputs of potential interest include the revenue $\pi_f P = \$568.7$ billion[17] from fossil fuel production, the revenue $\pi_e C = \$87.2$ billion[18] from clean electricity generation, the revenue $\pi_e(E-C) = \$121$ billion from

fossil fuel electricity generation (assuming clean and fossil fuel generators sell electricity at the same average wholesale price π_e), the carbon dioxide (CO_2) emissions $\lambda_d(D + (E - C)/\eta) = 3.45$ Gt[19] from domestic fossil fuel direct use, the CO_2 emissions $\lambda_e(E - C)/\eta = 1.45$ Gt[20] from domestic electricity generation, the CO_2 emissions $\lambda_d(P - D - (E - C)/\eta) = 0.61$ Gt from exported fossil fuel use (assuming the CO_2 intensity is the same for fossil fuel exports and domestic direct use), the CO_2-equivalent (CO_{2e}) emissions $\mu P = 0.98$ Gt[21] associated with methane (CH_4) from fossil fuel production, the $\delta(D + (E - C)/\eta) = 83{,}000$[22] avoidable United States deaths associated with fine particulate air pollution from domestic fossil fuel use, the $\gamma_c C = 632{,}000$[23] jobs associated with clean electricity generation, the $\gamma_{fe}(E - C) = 200{,}700$[24] jobs associated with fossil fuel electricity generation, and the $\gamma_{fp}P = 865{,}500$[25] jobs associated with fossil fuel production. The fossil fuel production revenue estimates in this white paper do not include revenues from fossil fuel transmission, processing, distribution, or other midstream or downstream activities. Similarly, electricity generation revenue estimates include only wholesale revenues, not utility revenues from electricity distribution.

The 'output = (price or intensity) × input' expressions in the previous paragraph entail the assumption that outputs (revenues, emissions, avoidable deaths, or jobs) scale linearly with the relevant inputs (such as electricity generation or fossil fuel production). While this assumption of linear scaling produces estimates that have appropriate orders of magnitude, the true scaling relationships are generally more complicated. The estimated impacts in this document should therefore be viewed as directional rather than exact.

5.2 Alternative: 2025 as if BAAJA had been in full effect

As an alternative to the baseline scenario of '2025 as it was,' I imagine 2025 in an alternate history where BAAJA had been implemented years ago and, by 2025, the energy system had adjusted to BAAJA's impacts. Figure 9 shows electricity (orange) and fossil fuel (blue) flows in this alternative scenario. The model structure is the same as in the baseline scenario, but the energy flows are different. I model BAAJA's impacts in four ways: 1) changing clean electricity generation from the baseline value of C to an alternative value of $\alpha_c C$, 2) changing total electricity use from E to $\alpha_e E$, 3) changing domestic fossil fuel direct use from D to $\alpha_d D$, and 4) changing fossil fuel production from P to $\alpha_p P$.

The other energy flows and model outputs in the alternative scenario follow from these changes and conservation of energy. Fossil fueled generators output electrical energy $\alpha_e E - \alpha_c C$ from input energy $(\alpha_e E - \alpha_c C)/\eta$. (I assume the fleet-average fossil generator efficiency η is the same in the baseline and alternative scenarios.) Fossil fuel exports are $\alpha_p P - \alpha_d D - (\alpha_e E - \alpha_c C)/\eta$. The fossil fuel production revenue is $\pi_f \alpha_p P$, the clean electricity revenue is $\pi_e \alpha_c C$, and the fossil fuel electricity revenue is $\pi_e(\alpha_e E - \alpha_c C)$. The CO_2 emissions from domestic fossil fuel direct use are $\lambda_d \alpha_d D$, the CO_2 emissions from domestic fossil fuel electricity generation are $\lambda_e(\alpha_e E - \alpha_c C)/\eta$, the CO_2 emissions from fossil fuel exports are $\lambda_d(\alpha_p P - \alpha_d D - (\alpha_e E - \alpha_c C)/\eta)$, and the methane emissions from domestic fossil fuel production are $\mu \alpha_p P$. The number of avoidable United States deaths associated with fine particulate air pollution from domestic fossil fuel use is $\delta(\alpha_d D + (\alpha_e E - \alpha_c C)/\eta)$. The numbers of jobs associated with clean electricity generation, fossil fuel electricity generation, and fossil fuel production are $\gamma_c \alpha_c C$, $\gamma_{fe}(\alpha_e E - \alpha_c C)$, and $\gamma_{fp} \alpha_p P$, respectively.

The formulas above entail the assumption that the average fossil fuel production price π_{fp}, average wholesale electricity price π_e, fossil fuel greenhouse gas intensities λ_d, λ_e, and μ, fossil fuel mortality intensity δ, clean electricity job intensity γ_c, fossil fuel electricity job intensity γ_{fe}, and fossil fuel production job intensity γ_{fp} each is approximately constant between the baseline and alternative scenarios. In reality, these values could change in response to changing energy supply volumes or compositions. I make this assumption to keep the number of uncertain parameters manageable, improving model transparency and facilitating uncertainty quantification.

5.3 Uncertainty modeling

The parameters α_c, α_e, α_d, and α_p are uncertain and influential. The parameter α_c represents how effectively BAAJA accelerates clean electricity generation. For example, a value of $\alpha_c = 1.1$ encodes the belief that,

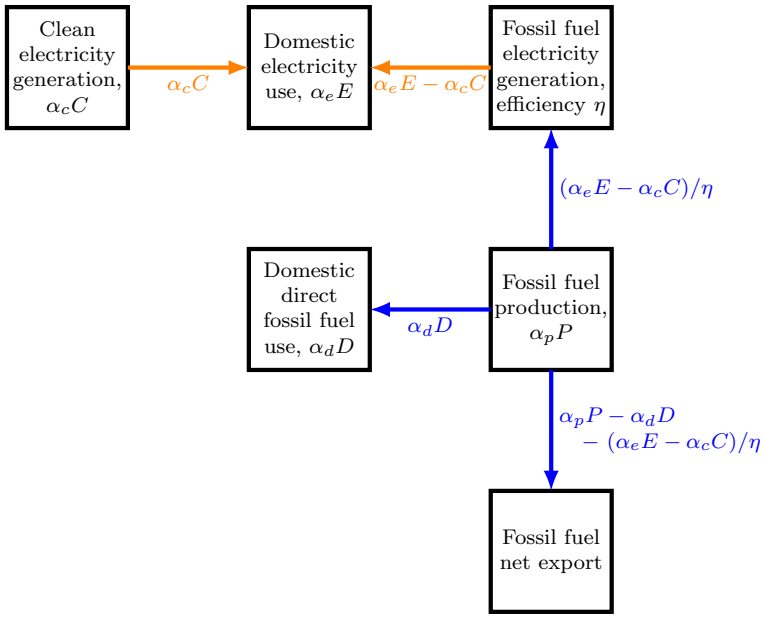


Figure 9: Modeled electricity (orange) and fossil fuel (blue) flows in an alternate-history version of the 2025 United States energy system. In this alternate history, BAAJA was implemented long enough ago that the energy system had adjusted to its impacts. BAAJA's modeled direct impacts include changing clean electricity generation, domestic electricity use, fossil fuel production, and fossil fuel direct use. The uncertain parameters α_c, α_e, α_d, and α_p determine these direct impacts, from which indirect impacts follow.

in the alternate history where BAAJA had been implemented years ago, the clean electricity sector would have generated 10% more energy in 2025 than it actually generated in our timeline. Similarly, the parameter α_e represents how effectively BAAJA accelerates total electricity demand, for example, by expediting interconnection (to bulk power grids or to natural gas pipeline networks that enable on-site generation) for data centers or other large loads. The parameters α_p and α_d represent how effectively BAAJA accelerates fossil fuel production and domestic direct use, respectively. This acceleration could follow, for example, from BAAJA accelerating construction of infrastructure for coal, oil, or natural gas extraction, gathering, processing, storage, domestic transport, or export.

I do not claim to know the true values of α_c, α_e, α_d, or α_p, which depend in complex ways on how presidential administrations would implement BAAJA, on how courts would rule in legal challenges, on how media would cover BAAJA implementation and legal interpretation, on how influential actors in energy companies and the banks that fund them would respond to media coverage, and on other uncertain events. The uncertainties inherent in α_c, α_e, α_d, and α_p make all model outputs also uncertain. For these reasons, instead of specifying deterministic values for these parameters—and possibly conveying a false impression of certainty—I a) specify probability distributions that I believe cover plausible ranges of parameter values, then use these distributions to quantify uncertainty in model outputs, b) analyze the sensitivity of model outputs to parameter variation, and c) make my code open source so others can run the model with different values if they want to.

I make the following assumptions on α_c, α_e, α_d, and α_p.

1. The fossil fuel production scalar α_p is greater than one, meaning BAAJA would accelerate fossil fuel production. I make this assumption in part because legal experts have outlined specific mechanisms through which BAAJA would weaken regulation of fossil fuel infrastructure[26]. By reducing timelines and costs associated with fossil fuel project permitting, as well as subsequent exposure to legal challenges, BAAJA could increase production by accelerating buildout of fossil fuel extraction sites,

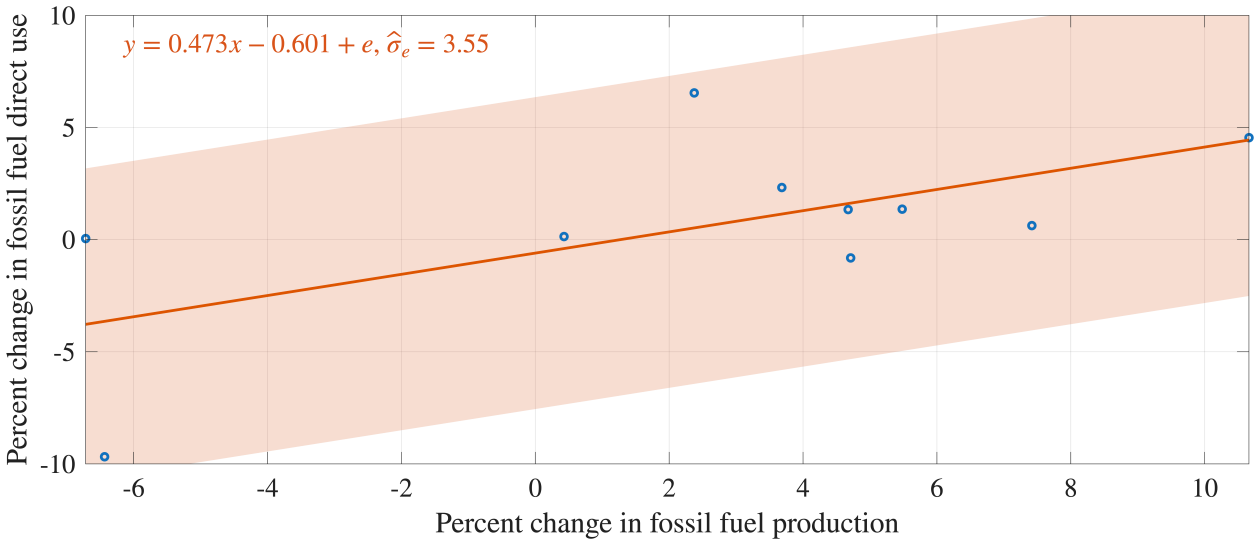


Figure 10: Linear regression of fossil fuel direct use on fossil fuel production, with data from 2015 through 2025. The best-fit line (dark orange) fits the data (blue circles) with a root mean square error of 0.0317 and a coefficient of determination of 0.383. The shaded area is the 95% confidence interval.

transmission or distribution pipelines, processing facilities, or export terminals. Furthermore, fossil fuel industry spokespeople have supported both BAAJA[27] and its predecessor, the Energy Permitting Reform Act of 2024[28]. I trust experts in oil and gas companies, who I view as extremely competent economic and political actors, to advocate for policy that would expand their production and revenues. I model BAAJA as increasing fossil fuel production by 2% to 8% (following a symmetric triangular distribution) from the baseline to the alternative scenario. Sector-specific modeling of BAAJA's potential impacts on fossil fuel production could refine this distribution, which itself is highly uncertain. For context, United States fossil fuel production increased by 28%[29] from 2015 to 2025.

2. Domestic fossil fuel direct use increases with fossil fuel production. Specifically, $\alpha_d - 1 = \beta_0 + \beta_1(\alpha_p - 1) + e$, where e is a zero-mean Gaussian random variable with standard deviation σ. I fit the intercept $\beta_0 = -0.0060$, slope $\beta_1 = 0.4729$, and standard deviation $\sigma = 0.0355$ in this linear model to production and direct use data[30] from 2015 to 2025. Figure 10 shows the results of linearly regressing the year-over-year percent change in fossil fuel direct use on the year-over-year percent change in fossil fuel production. From 2015 to 2025, each 3% increase in fossil fuel production corresponded to a roughly 1% increase in fossil fuel direct use.

3. The clean electricity generation scalar α_c is between 0.97 and 1.1 (following a symmetric triangular distribution). The high-end value $\alpha_c = 1.1$ could come, for example, from a 23.9% increase in combined wind, solar, and geothermal generation, which collectively comprised 41.8% of clean electricity generation in 2025. For context, a value of $\alpha_c = 1.1$ corresponds to an $8.7 billion increase in 2025 clean energy generation revenue due to BAAJA. The low-end value $\alpha_c = 0.97$ represents BAAJA decreasing clean electricity generation by 3%. The event $\alpha_c < 1$ (meaning BAAJA decreases clean electricity generation) occurs with 10.7% probability. This event could occur, for example, if BAAJA provided the executive branch with new tools to delay or derail clean electricity projects, as some legal experts argue that Section 1402 or other provisions might do[31]. The mean value of α_c, 1.035, corresponds to BAAJA increasing clean electricity generation by 3.5%, a value comparable to the central case reported in the Resources for the Future study[32].

4. If BAAJA is more effective at accelerating siting and interconnection of clean electricity generation, then BAAJA also tends to be more effective at accelerating siting and interconnection of electricity load (such as data centers and industrial facilities), although to a lesser degree. Specifically, the electricity demand scalar α_e is between 1 and 1.05 and increases linearly with the clean electricity generation scalar α_c within that range: $\alpha_e = 0.627 + 0.385\alpha_c$. To reflect uncertainty in this relationship, I perturb α_e with symmetric triangular noise supported on $[-0.01, 0.01]$. For context, industrial loads used 25.7%[33] of United States electricity in 2025, so the high-end value of $\alpha_e = 1.05$ could come, for example, from BAAJA increasing industrial electricity demand by 19.5%. This effect has similar strength to the 23.9% increase in wind, solar, and geothermal generation that could correspond to the high-end value of $\alpha_c = 1.1$. The positive correlation between α_e and α_c could represent, for example, BAAJA accelerating buildout of power lines or processing of generation interconnection queues, alleviating transmission or resource-adequacy constraints that would otherwise slow interconnection of large loads to electricity networks; or it could represent BAAJA accelerating buildout of pipelines or natural gas production, alleviating analogous transmission or resource-adequacy constraints that would otherwise slow interconnection of large loads to natural gas networks.

6 Sensitivity analysis

This section analyzes the sensitivity of model outputs to modeling assumptions.

6.1 Correlation between clean electricity growth and electricity demand growth

The central case in this white paper models the electricity demand scalar α_e as a linear function of the clean electricity generation scalar α_c, plus noise, inducing a strong positive correlation of 0.939. This models the assumption that if BAAJA is more effective at accelerating siting or interconnection of clean electricity generation, then it is also more effective at accelerating siting or interconnection of electricity demand, for example, from data centers or other large loads.

If a_c and a_e are instead independent, with a_e following a symmetric triangular distribution over $[1, 1.05]$ (0 to 5% electricity demand growth; 2.5% on average) and the other model inputs remain the same, then the electricity-sector results remain the same on average, but the extent to which BAAJA increases fossil fuel electricity generation becomes more variable. The increase in fossil fuel electricity generation due to BAAJA changes from 0.165 (0.0381 to 0.292) EJ to 0.165 (−0.301 to 0.631) EJ. The probability that BAAJA increases fossil fuel electricity generation, and the associated greenhouse gas emissions and mortality attributable to air pollution, drops from 99.9% (virtually certain) to 74.6% (very likely). The probability that BAAJA increases overall domestic CO_{2e} emissions drops slightly, from 85.7% to 84.8%. Clean electricity generation, fossil fuel production, domestic fossil fuel direct use, and fossil fuel exports are essentially unaffected.

This sensitivity analysis shows that the assumption of positive correlation between clean electricity growth and electricity demand growth has relatively little influence on high-level model outputs.

6.2 Influence on fossil fuel production

The central case assumes that BAAJA increases fossil fuel production by between 2% and 8% (5% on average). Specifically, α_p follows a symmetric triangular distribution on $[1.02, 1.08]$. In the central case, BAAJA increases domestic greenhouse gas emissions by 136 (−113 to 385) Mt. The probability that BAAJA increases domestic greenhouse gas emissions is 85.7% (very likely).

To model an alternative case where BAAJA is less effective at increasing fossil fuel production than in the central case, I sample α_p from a symmetric triangular distribution on $[1, 1.06]$ (0% to 6% fossil fuel production growth; 3% on average) and leave the other model inputs unchanged. In this case, BAAJA increases domestic greenhouse gas emissions by 83 (−166 to 332) Mt. The probability that BAAJA increases domestic greenhouse gas emissions is 74.4% (very likely).

To model an alternative case where BAAJA is more effective at increasing fossil fuel production than in the central case, I sample α_p from a symmetric triangular distribution on $[1.04, 1.1]$ (4% to 10% fossil fuel production growth; 7% on average) and leave the other model inputs unchanged. In this case, BAAJA increases domestic greenhouse gas emissions by 188 (−61 to 437) Mt. The probability that BAAJA increases domestic greenhouse gas emissions is 93% (extremely likely).

In the extreme case where $\alpha_p = 1$ deterministically, meaning it is impossible for BAAJA to influence fossil fuel production in any way, BAAJA increases domestic greenhouse gas emissions by 5 (−236 to 246) Mt. The probability that BAAJA increases domestic greenhouse gas emissions is 51.6% (about as likely as not).

These sensitivity analyses suggest that domestic greenhouse gas emissions are fairly sensitive to BAAJA's modeled influence on fossil fuel production. Shifting the distribution of α_c upward or downward by 0.02 changes mean domestic greenhouse gas emissions by about ±52 Mt, a relative change of about ±38%. However, in all cases considered here—including the extreme case where it is impossible for BAAJA to increase fossil fuel production—the probability that BAAJA increases domestic greenhouse gas emissions remains above 50%.

Notes

1. The Center for Climate and Energy Solutions and Greenline Insights policy brief reported $19 billion in electricity bill savings from 2026 to 2040 for the 54% of households in their study area. Spreading $19 billion over 15 years and 54% of the 135 million American households leaves $17.38 per household per year.

2. The Center on Global Energy Policy white paper reported $7 billion in wholesale electricity cost savings in 2035. Assuming electricity retailers passed 37% of these savings through to households, who use 37% of United States electricity, the annual residential electricity bill savings would be $19.19 per household per year.

3. Visual inspection of Figure 3 from the Resources for the Future study suggests ~4,450 TWh of clean electricity generation in 2041 in the baseline scenario and ~4,600 TWh in their BAAJA central-case modeling. The ~150 TWh difference is ~3.3% of the ~4,450 TWh baseline.

4. The Resources for the Future authors reported $350 billion in electricity cost savings over 25 years, or $14 billion per year. Passing 37% of these savings through to households, who use 37% of United States electricity, would save $38.37 per household per year.

5. The remaining 5% of primary energy is biomass, mainly for ethanol and biodiesel production.

6. This white paper follows the Intergovernmental Panel on Climate Change's convention on terminology for assessing probabilities: 'About as likely as not' indicates 33% to 66% probability, 'likely' indicates at least 66% probability, 'very likely' indicates at least 90% probability, 'extremely likely' indicates at least 95% probability, and 'virtually certain' indicates at least 99% probability.

7. Energy Information Administration: How much carbon dioxide is produced per kilowatthour of U.S. electricity generation?

8. Until January of 2026, when the Trump administration set the value of a statistical life to zero for its internal calculations, the EPA used between $7.4 and $7.9 million in 2006 dollars. The lower value of $7.4 million inflation-adjusts to $11.85 million in 2025 dollars..

9. The specific air pollutants considered in the mortality studies cited here are PM2.5 (fine particulate matter less than 2.5 microns in diameter) and ozone.

10. Intergovernmental Panel on Climate Change: *Climate Change 2021: The Physical Science Basis*, Table 7.15: Emissions Metrics for Selected Species: Global Warming Potential (GWP), Global Temperature-Change Potential (GTP).

11. Energy Information Administration (2025): Table 7.2a, Electricity Net Generation: Total (All Sectors).

12. Legal scholars have argued that BAAJA provisions, such as Section 1402, could provide new tools for denying permits to renewable power plants. See, for example, Gerrard, Michael, Senate bipartisan permit reform bill would upend many environmental laws, *Columbia Public Law Research Paper*, 2026. 'Project Certainty' section, pages 6–7.

13. Energy Information Administration (2026): Table 7.2a, Electricity Net Generation: Total (All Sectors).

14. I estimate the fleet-average fossil generator efficiency η as the ratio of the fossil portion of output electricity, $E - C$, to the total fossil energy input to electricity generation. I calculate the latter using heat contents from here and coal, oil, and natural gas

energy flows from here, here, and here.

15. Energy Information Administration Table B1, Primary Energy Overview, Fossil Fuel Equivalency Approach.

16. Lawrence Livermore National Laboratory: United States Energy Consumption in 2024.

17. I estimate the 2025 average fossil fuel price π_f as the ratio of total 2025 revenue from fossil fuels (coal, oil, natural gas, and natural gas liquids) to total 2025 fossil fuel production. Coal production totaled 512.5 million short tons (∼11 EJ) in 2024, when the wholesale price (delivered to electricity generators) averaged $46.45 per short ton, giving an estimated $27 billion in revenue (2.4 billion $/EJ). Crude oil production averaged 13.7 million barrels per day in 2025 (∼5 billion barrels or ∼31 EJ), when the Brent wholesale price averaged $69 per barrel, giving an estimated $333 billion in revenue (10.7 billion $/EJ). Natural gas production totaled 40.7 quads (∼43 EJ) in 2025, when the Henry Hub wholesale price averaged $3.52 per million Btu, giving an estimated $143 billion in revenue (3.3 billion $/EJ). Natural gas liquids production totaled 9.8 quads (∼10 EJ) in 2025, when the average price was $6.75 per million Btu, giving an estimated $143 billion in revenue (3.34 billion $/EJ). In combination, the coal, oil, natural gas, and natural gas liquids estimates give an overall fossil fuel price estimate of $\pi_f = (\$27 + 333 + 143 + 66 \text{ billion})/(11 + 31 + 43 + 10 \text{ EJ}) = \$6$ billion/EJ. This price only models production, omitting revenue from midstream and downstream portions of the supply chain.

18. I estimate the electricity price π_e as the 2025 average wholesale electricity price, $\pi_e = \$13.06$ billion/EJ (47 $/MWh). This price only models generation, omitting revenue from distribution utilities.

19. I estimate the CO_2 intensity λ_d as the ratio of the 3.45 Gt of 2025 direct-use CO_2 emissions to the 61 EJ of domestic fossil fuel direct use. This gives a CO_2 intensity of 0.057 Gt/EJ (57 g/MJ; for reference, the emission factors for direct combustion of coal, gasoline, and natural gas are about 97, 72, and 56 g/MJ). This definition entails the implicit assumption that CO_2 emissions from non-fossil energy sources are negligible.

20. I estimate the CO_2 intensity λ_e as the ratio of the 1.45 Gt of 2025 electricity CO_2 emissions to the 23 EJ of domestic fossil fuel use for electricity generation. This gives a CO_2 intensity of 0.064 Gt/EJ (64 g/MJ).

21. I estimate the methane intensity of United States fossil fuel production as the ratio of the 2022 CH_4 emissions from oil and natural gas infrastructure, converted to CO_{2e} using the 100-year global warming potential, to the 91.6 EJ of 2022 fossil fuel production. The methane mass estimate is from Kircher, Kevin J., Accounting for methane from natural gas infrastructure in United States greenhouse gas emission estimates, *Energy Policy* (2025). This CH_4 intensity estimate does not include emissions from fossil fuel systems beyond oil and natural gas, such as coal.

22. I estimate the mortality intensity δ as the ratio of the number of excess United States deaths in a given year attributable to air pollution from fossil fuel use to the United States domestic fossil fuel use in the same year. The mortality estimate from Table 1 of Vohra et al., Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem, *Environmental Research* (2021), is 355,000 per year in 2012. Dividing by the 81.6 EJ of domestic fossil fuel use in 2012 gives an estimate of $\delta_V = 4,351$ deaths per EJ. The mortality estimate from Lelieveld et al., Air pollution deaths attributable to fossil fuels: Observational and modeling study (2023), comes from comparing the United States rows in two web appendix data supplement spreadsheets: 'Mortality countries, 2019, reference' and 'Mortality countries, 2019, no fossil fuels'. The reference case reports an estimate of 90,405 excess deaths in 2019 from fine particulates and ozone. The 'no fossil fuels' case reports an estimate of 6,026, giving a difference of 84,379. Dividing the difference by the 84.9 EJ of domestic fossil fuel use in 2019 gives an estimate of $\delta_L = 994$ deaths per EJ. I use the lower value $\delta = \delta_L$ for the central cases in this white paper.

23. I estimate the job intensity of clean electricity γ_c as the ratio of the 631,700 United States clean electricity generation jobs in 2025 to the 2025 clean electricity generation of 6.7 EJ. Jobs numbers are from the Department of Energy's 2026 United States Energy & Employment Report.

24. I estimate the job intensity of fossil fuel electricity γ_{fe} as the ratio of the 200,700 United States electricity generation jobs in 2025 to the 2025 fossil fuel electricity generation of 8.4 EJ.

25. I estimate the job intensity of fossil fuel production γ_{fp} as the ratio of the 865,500 United States fossil fuel production jobs in 2025 to the 2025 fossil fuel production of 94.7 EJ.

26. See, for example, Dillen, Abigail (Earthjustice): What Will BAAJA Do? Whatever the Trump Administration Wants; Gerrard, Michael, Senate bipartisan permit reform bill would upend many environmental laws, *Columbia Public Law Research Paper*, 2026; or former Biden climate advisor John Podesta's comments in this article.

27. American Petroleum Institute: API Welcomes Bipartisan American Affordability and Jobs Act to Modernize Permitting (September 30, 2026); What They are Saying: Energy Executives Urge Congress to Pass Bipartisan American Affordability and Jobs Act (November, 2026). American Gas Association: Permitting Reform Can Help Build the Energy Infrastructure America Needs (October 9, 2026).

28. American Petroleum Institute: API Statement on Energy Permitting Reform Act of 2024 (July 22, 2024). Natural Gas Supply Association: NGSA Statement on Energy Permitting Reform Act of 2024 (July 23, 2024).

29. Energy Information Administration: Table B1, Primary Energy Overview, Fossil Fuel Equivalency Approach.

30. Data are from the Energy Information Administration. Production: Table B2, Primary Energy Production by Source, Fossil Fuel Equivalency Approach. Total consumption: Table 83, Primary Energy Consumption by Source, Fossil Fuel Equivalency Approach. Coal consumption for electricity: Table 6.2, Coal Consumption by Sector. Oil consumption for electricity: Table 3.7c, Petroleum Consumption: Transportation and Electric Power Sectors. Natural gas consumption for electricity: Table 4.3, Natural Gas Consumption by Sector. Coal, oil, and natural gas heat contents: Appendix A, British Thermal Unit Conversion Factors.

31. Gerrard, Michael, Senate bipartisan permit reform bill would upend many environmental laws, *Columbia Public Law Research Paper*, 2026. 'Project Certainty' section, pages 6–7.

32. Rennart, Kevin and Bergman, Aaron. Projected Effects of the Bipartisan American Affordability and Jobs Act on the Power Sector (October 29, 2026).

33. Energy Information Administration: Electricity Explained.