DECLARATION OF PATRICIO SILVA

I, Patricio Silva, declare:

1. I am a Principal Associate at Synapse Energy Economics, a research and consulting firm that specializes in power sector, environmental, and climate analysis. I received my J.D. from the University of Arizona College of Law and a B.A. in Government from Colby College. In my role at Synapse, I provide economic analysis of technologies and policies, perform electricity policy modeling, evaluate distribution system infrastructure, evaluate utility mergers, and evaluate air emissions of electricity generation.

2. Prior to working at Synapse, I worked for 12 years for the New England Independent System Operator, which manages the wholesale electricity markets for six states in the northeastern United States. There, I evaluated the impact of air pollution, water use, wildlife protection, and state and federal land-use laws and regulations on power system operations and system reliability. I also conducted assessments on environmental compliance impacts on all aspects bulk power system operations including restoration and interconnection constraints.

3. I have participated in state and federal regulatory proceedings on a range of matters related to electric power generation and fuel supply: carbon emissions reduction trading markets; winter and summer power and fuel supply adequacy assessments; interregional transmission constraint studies; and integrating renewable generation into bulk power systems. I have testified before Congress and electric power siting boards and environmental review commissions in Illinois, Indiana, and Wisconsin. I have also participated in proceedings before the Federal Energy Regulatory Commission, state public utility commissions, electric power siting boards, and environmental review commissions in California, Connecticut, Massachusetts, Maine, Illinois, Indiana, Ohio, Oregon, New Hampshire, New Mexico, and Wisconsin involving preparing discovery, testimony, and affidavits. My CV is attached as Exhibit A.

4. The U.S. Environmental Protection Agency ("EPA") has promulgated a Final Rule establishing its Federal "Good Neighbor Plan" to address states' obligations to eliminate significant contribution to nonattainment, or interference with maintenance, of the 2015 Ozone National Ambient Air

Quality Standards in other states, published at 88 Fed. Reg. 36,654 (June 5, 2023) ("Final Rule"). The Final Rule will help reduce nitrogen oxides ("NO_X") emissions both from electric generating units ("EGUs"), such as coal-fired and natural-gas-fired power plants, and from non-EGU facilities in the iron and steel, paper, glass, cement, and other industries. Those NO_X reductions will create substantial public health and other economic benefits that dramatically outweigh the costs of implementing the Final Rule.

5. One key element of the Final Rule is a set of changes to the Cross State Air Pollution Rule ("CSAPR") Group 3 Trading Program, a cap-and-trade system that allocates emissions permits called allowances to a market that limits the ozone-season NO_X emissions of regulated EGUs. EPA's Final Rule, among other requirements, requires EGUs in 22 states to participate in the revised version of the CSAPR Group 3 Trading Program, establishes the number of emissions allowances allocated to each state in the years 2023 through 2029, and establishes a mechanism for determining the number of emissions allowances available in subsequent years. Simultaneously, the Final Rule confirms the addition of new features to the allowance-based trading program such as backstop daily emissions rate limits for large coal-fired units and banking recalibration, to name a few.

6. In this Declaration, I discuss analysis I performed that shows there will very likely be sufficient NO_X allowances available for compliance with the Final Rule in 2023 through 2030 in light of ongoing changes in the electric generation industry. Although judicial stays have affected near-term implementation, my analysis of NOx allowance budget adequacy focuses on the Final Rule as a whole, across all 22 covered states. I also discuss how the Final Rule will support fuel diversity and reliability, how the *Inflation Reduction Act of 2022* ("Inflation Reduction Act") will support compliance, and how the Final Rule will create substantial public health and economic benefits. Last, I discuss reasons why the Final Rule, despite imposing compliance costs on certain EGUs, does not guarantee an increase in electricity rates.

There Is Sufficient Liquidity in the NO_X Allowance Market to Accommodate EPA's Changes to the Group 3 Emissions Trading Program

7. As I explain below, opponents of the Final Rule have argued that EPA developed an unrealistically stringent emissions allowance allocation for at least certain regulated states. According to my analysis, however, not only are there sufficient allowances, but there will be excess allowances in the market in 2023 through 2025, and very likely through 2026 and beyond.

8. EPA developed the number of Group 3 ozone season NO_X emissions allowances budgeted in the Final Rule by modeling different methods for reducing NO_X across all regulated EGUs.[1] The sum of a state's remaining EGU emissions in each year, accounting for modeled emissions reductions, became each state's emissions budget in each year from 2023 to 2029. Across these years, additional NO_X reduction measures as part of a staged compliance plan yield progressively lower emissions budgets.

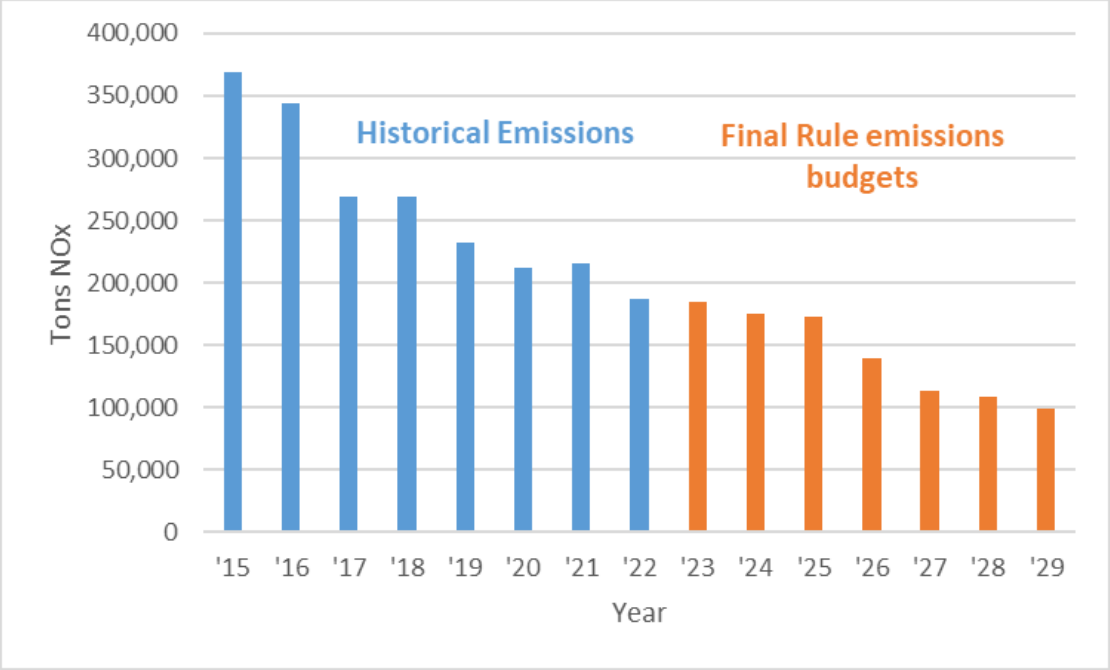
9. In 2023, for example, EPA modeled the impact of unit-level optimization of existing NO_X controls during the ozone season.[2] Starting in 2024, the same optimization was included, with the addition of state-of-the-art combustion controls.[3] Also starting in 2024, the Final Rule includes a daily backstop emissions rate for all coal EGUs equipped with selective catalytic reduction ("SCR"). In 2026, allowance budgets declined further because the modeling reduced emissions for coal units larger than 100 megawatts by one half of the amount equivalent to retrofitting with SCR. In 2027, all these coal units were modeled with ozone season NO_X emissions reductions equivalent to SCR installation. Later years involve continued emissions reductions in line with available control options. Collectively, these measures and others result in a year-over-year decline in the Final Rule's ozone season NO_X budget similar to the decline in emissions seen in previous years (Figure 1).

[1] CSAPR NO_X Ozone Season Group 3 Trading Program includes EGUs in twenty-two states (Alabama, Arkansas, Illinois, Indiana, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nevada, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wisconsin), beginning with the 2023 ozone season.

[2] These include Selective Catalytic Reduction ("SCR") units and Selective Non-Catalytic Reduction ("SNCR") units.

[3] This includes reducing the allowance bank in each state, after compliance, by multiplying it by the ratio of the sum of banked allowances across all states and 21 percent of the sum of state emissions budgets in the upcoming year. For example, if the banked allowances at the end of 2023 were 1000 allowances and the budget in 2024 were 100 allowances, each state's bank would be multiplied by (21/1000), and only the allowances remaining would roll over into 2024.

Figure 1. Historical ozone season NOx emissions and future NOx emissions according to Final Rule emissions budgets



Source: Historical data from EPA Clean Air Markets Program Data 2015–2022 for ozone season NO_X emissions.[4] Final Rule emissions summed from state emissions budgets.[5] Pictured data includes 22 states: Alabama, Arkansas, Illinois, Indiana, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Texas, Virginia, West Virginia, and Wisconsin.

10. EPA's method responded to technical comments and concerns raised in response to the Proposed Plan, published at 87 Fed. Reg. 20,036 (Apr. 6, 2022) ("Proposed Rule"). Commenters raised concerns that EPA's budget-setting method and the NO_X mitigation measures modeled were too strict and inflexible. Specifically, they argued that the backstop emissions rate was too strict,[6] that emissions

[4] EPA, *Clean Air Markets Program Data*, https://campd.epa.gov/data/custom-data-download (last updated Mar. 6, 2023).
[5] EPA, *State Budgets Under the Good Neighbor Plan for the 2015 Ozone NAAQs*, https://www.epa.gov/csapr/state-budgets-under-good-neighbor-plan-2015-ozone-naaqs (last updated Mar. 15, 2023).
[6] *See, e.g.*, Power Generators Air Coalition, Comment Letter on Proposed Rule: Federal Implementation Plan Addressing Regional Ozone Transport for the 2015 Ozone NAAQS ("Proposed Rule"), at 45 (June 21, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0668-0551.

reductions achieved through SCR and SNCR optimization were too ambitious,[7] that generation-shifting was "unrealistic,"[8] and that not all units could realistically retrofit with SCR units in 2026.[9]

11. In response to those concerns, EPA adjusted the Final Rule to increase flexibility while maintaining stringency. For example, from the Proposed Rule to the Final Rule, EPA modified the allowance bank adjustment mechanism to increase the number of allowances that can roll over each year until 2029.[10] EPA also added a 50-ton threshold to the backstop emissions rate for large coal units with SCR controls, which will give units greater flexibility during start-up (88 Fed. Reg. at 36,673). The Final Rule also extended the application of the backstop emissions rate for large coal-fired units without existing SCR controls from 2027 to 2030 (*compare id.* at 36,667, *with* 87 Fed. Reg. at 20,105 as late as 2030). For further flexibility, EPA decided to phase in the emissions reductions commensurate with assumed EGU post-combustion emissions control retrofits across two years—2026 and 2027 (88 Fed. Reg. at 36,755). EPA also removed generation-shifting as a compliance strategy from its calculation of state emissions budgets.[11] As a result, the emissions budgets in the Final Rule, while still stringent, have increased by a total of about 8 percent from 2023 to 2026 (*compare* 87 Fed. Reg. at 20,118-19, *with* 88 Fed. Reg. at 36,785-86).

12. To analyze whether there will be adequate allowances in the NO_X market given the budgets set in the Final Rule, I built a spreadsheet model that forecasts state-level ozone season NO_X

[7] *See, e.g.*, Kentucky Attorney General Office et al., Comment Letter on Proposed Rule, at 9-10 (June 21, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0668-0382.
[8] *See, e.g.*, J. Edward Cichanowicz et al., Nt'l Rural Elec. Coop. Ass'n, Technical Comments on Electric Generating Unit Control Technology Options and Emission Allocations Proposed by the Environmental Protection Agency in Support of the Proposed 2015 Ozone NAAQS Transport Rule, at 2 (June 21, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0668-0409.
[9] *See id.* at 1.
[10] The bank adjustment mechanism in the Proposed Rule and Final Rule reduces each state's bank available for the following ozone season's compliance by multiplying it by the ratio between the sum of banked allowances left after compliance, and a fraction of the sum of state emissions budgets. In the Proposed Rule, that fraction was equal to the sum of state emissions budgets multiplied by 10.5 percent; the Final Rule replaced the 10.5 percent multiplier with 21 percent.
[11] *See* EPA, *Regulatory Impact Analysis for the Final Federal Good Neighbor Plan Addressing Regional Ozone Transport for the 2015 Ozone National Ambient Air Quality Standard*, at 20 nn.4 (Mar. 2023), https://www.epa.gov/system/files/documents/2023-03/SAN%208670%20Federal%20Good%20Neighbor%20Plan%20202303 15%20RIA_Final.pdf ("Final Rule RIA").

emissions and available Group 3 allowances in each year from 2023 to 2026. Table 1 shows my methods for estimating ozone season NO_X emissions in each year, banked allowances, total allowances available, and total allowances needed for compliance. As the table shows, I was very conservative in how I estimated regulated EGU's annual NO_X emissions; I assumed no additional reductions whatsoever as a result of the Final Rule and I held natural gas NO_X emissions constant after 2022, despite a projected decline in natural gas generation by the U.S. Energy Information Administration ("EIA").[12] I estimated the change in NO_X emissions after 2022 in each year from 2023–2026 based solely on a decline in coal generation as forecast by the EIA's 2023 Annual Energy Outlook (AEO 2023) Reference Case, which was released shortly after the Final Rule but which does not include the impact of the Final Rule.[13] The purpose of this method is to show that given a continuation in the longstanding trend of declining coal generation that predates and is independent of the Final Rule, the Group 3 allowance budget prescribed in the Final Rule will very likely be sufficient to meet market needs.

Table 1. Methods used in analysis

Methodology Type	**2023**	**2024**	**2025**	**2026**
Methodology for estimating banked allowances heading into the year	Data on Group 3 allowances rolling over from 2021 to 2022 is from EPA CAMPD for all 12 states in Group 3. 2022's ozone season NO_X emissions from each of these states was then subtracted to yield a remaining bank of Group 3 allowances at the end of 2022. The model does not account for conversion of Group 2 to Group 3 allowances by any state.	After subtracting allowances needed for compliance in the previous year, the remaining bank was multiplied by the ratio between the total emissions budget of this year across all 22 states (prescribed by the Final Rule) multiplied by 21% and the total quantity of banked allowances. This adjusted the bank downward for each state.	Same method as 2024	Same method as 2024

[12] Although EPA modeled an increase in EGU natural gas consumption in its baseline modeling without the Final Rule and in its supplemental baseline modeling that includes the Inflation Reduction Act, EPA's same baseline model runs forecast a decrease in NO_X emissions of about 30 percent from 2023 to 2026 in the 22 covered states. This is about three times the reduction that I assume in the same timeframe, reinforcing the conservativeness of my NO_X reduction forecast. EIA, ANNUAL ENERGY OUTLOOK 2023, tbl.8, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2023&region=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.8-8-AEO2023&ctype=linechart&sourcekey=0 (last visited Apr. 13, 2023). *See also* Final Rule RIA, *supra* note 11, at 20.

[13] EIA, ANNUAL ENERGY OUTLOOK 2023 (Mar. 16, 2023), https://www.eia.gov/outlooks/aeo/.

Methodology Type	2023	2024	2025	2026
Methodology for total allowances available for compliance	Available banked allowances were added to each state's emissions budget as specified by the Final Rule.	Available banked allowances (after the bank adjustment) were added to the state emissions budgets specified by the Final Rule.	Same method as 2024	Same method as 2024
Methodology for estimating NO_X emissions	2022 ozone season NO_X emissions for all 22 states with regulated EGUs is from EPA CAMPD annual data. The proportion of ozone season NO_X in 2022 from coal plants (approximately 75 percent) was adjusted in each year 2023–2026 for each state according to the change in national coal generation forecast by EIA's 2023 Annual Energy Outlook. Remaining NO_X emissions were held the same as 2022 from 2023–2026.			
Methodology for estimating allowances needed for compliance	Each forecasted ton of ozone season NO_X was assumed to retire one Group 3 allowance.	The quantity of allowances turned in for compliance was equal to the sum of two elements: (1) tons of NO_X emissions emitted in a state above 121% of a state's emissions budget (known as each state's "assurance level") consumed 3 allowances rather than one. (2) tons of NO_X equal to or less than 121% of a state's emissions budget each consumed one allowance.	Same method as 2024	Same method as 2024

13. As I have noted, my analysis depends on the Reference Case of EIA's AEO 2023, which forecasts that coal generation throughout the United States will initially increase in 2024, then continue to decrease (Table 2). Since coal generation contributed approximately 75 percent of ozone season NO_X emissions in 2021, I adjusted the effect that changes in coal generation have on total NO_X appropriately. The total reduction I modeled from 2023 to 2026 is about 10 percent, which is approximately one-third of what EPA's baseline modeling forecasts will occur in the 22 states covered under the Final Rule independent of the Final Rule.[14]

Table 2. Change in coal generation from AEO 2023 and assumed impact on ozone season NO_X

Year	2023	2024	2025	2026
Annual change in coal generation	-5.9%	5.2%	-8.4%	-14.3%
Assumed annual change in NO_X due to change in coal generation	-4.1%	3.8%	-5.7%	-8.3%

[14] Final Rule RIA, *supra* note 11, at 148 tbl.4-6.

14. Notably, AEO 2023 did not factor in the impact of the Proposed Rule or Final Rule. It also did not factor in recent changes to coal unit effluent limitation guidelines.[15] This means that the decline in coal generation seen in AEO 2023 is due to entirely independent factors—primarily the lower cost of alternative generation from gas and clean energy sources.

15. Using this estimate of annual NO_X emissions, my analysis shows that based upon the decline in coal generation alone, there will likely be an allowance surplus of between 12 percent and 24 percent in each year until 2026. This shows that even if the emissions reduction measures anticipated by the Final Rule dramatically underperform or regulated EGUs fail to adopt the control measures EPA expects, there will still very likely be adequate allowances in the market until 2026 (Table 3).

Table 3. Model results

Year	**2023**	**2024**	**2025**	**2026**
Incoming bank	59,089	44,405	27,959	40,849
Total budget	208,119	198,014	195,259	151,329
Total available allowances	267,208	242,419	239,921	192,178
Estimated ozone season emissions	202,266	210,038	197,992	181,534
Allowances needed	202,266	214,460	199,497	213,535
Remaining allowances before bank recalibration	64,942	27,959	40,424	-21,357
Remaining allowances as % of available allowances at the start of the year	24%	12%	17%	-11%

16. In addition, NO_X emissions will certainly be lower than my estimates, so the likelihood increases that there will be adequate Group 3 allowances in the market to meet total market demand not only from 2023 to 2025, but also in 2026 and beyond. For example, the EIA projects that natural-gas-

[15] As stated in the Coal Market Module documentation of AEO 2023, AEO 2023 is based on current laws and regulations in effect as of September 30, 2022. While the coal market module does account for CSAPR, it includes only the CSAPR finalized in 2015 and updated in 2021, which established Group 3 and required 12 states to update white emissions budgets for NO_X. EIA, *Assumptions to the Annual Energy Outlook 2023: Coal Market Module* (Mar. 2023), https://www.eia.gov/outlooks/aeo/assumptions/pdf/CMM_Assumptions.pdf.

fired generation will decline each year until 2035[16] and compliance with EPA's Final Rule includes measures that will further reduce NO_X emissions, namely: SCR and SNCR optimization; state-of-the-art combustion controls; a backstop daily emissions rate; and emissions reductions commensurate with SCR or SNCR retrofitting beginning in 2026. Crucially however, as my results show, ozone season NO_X emissions reductions beyond what I have forecasted—that is, in line with the Final Rule—will be necessary in the early years of implementation from 2023 to 2025 for there to be adequate emissions allowances in 2026 and beyond.

17. One element I did not directly model in my analysis was the Final Rule's backstop daily emissions rate, which will take effect for coal units greater than 100 megawatts with SCR controls in 2024. If one of these units exceeds the backstop emissions rate, the Final Rule mandates that each ton of NO_X after the first 50 will require three allowances to be turned in rather than one. This facet of the Final Rule will likely increase demand for allowances. However, as I have explained, I have conservatively overestimated NO_X emissions by not including any reductions due to SCR optimization, SNCR optimization, state-of-the-art combustion controls, or mandatory emissions reductions commensurate to installing additional post-combustion emissions controls. Further, the imposition of the backstop emissions rate will itself reduce demand for allowances, since compliance across most units and most hours will reduce emissions relative to what I have modeled. Finally, the 50-ton limit before the 3:1 allowance ratio takes effect has increased flexibility, further ensuring that there will be adequate allowances to satiate demand.

EPA's Final Rule Will Support Generation Diversity and System Reliability

18. Some opponents of EPA's Good Neighbor Plan have argued that EGU closures and the subsequent shift in the resource mix as a result of the Final Rule will negatively impact fuel diversity and

[16] EIA, ANNUAL ENERGY OUTLOOK 2023, *Reference Case, Table 8: Electricity Supply, Disposition, Prices, and Emissions*, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2023&region=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.8-8-AEO2023&ctype=linechart&sourcekey=0.

threaten electric system reliability.[17] Independent system operators, regional transmission organizations, and other entities tasked with maintaining the reliability of the bulk power system in the Eastern, Western, and Texas grids also raised concerns following the release of EPA's Proposed Rule.[18] In response, EPA worked extensively with affected regional transmission organizations to address their reliability concerns.[19] Based on my analysis, I do not find that implementation of the Final Rule will cause many coal plant retirements and in any case, coal plant closures have not and will not cause reliability problems. In addition, as I discuss, there is strong evidence that accelerated coal unit closures and the continued build-out of clean generation sources will improve overall system reliability, energy security, and resiliency.

19. EPA's Final Rule does not mandate fossil unit retirement or a decline in generation. As EPA states, the "owner or operator of an EGU has flexibility in determining how it will meet [emissions reduction] requirement[s], whether through the add-on emissions controls that the EPA has selected […], or through some other method or methods of compliance" (88 Fed. Reg. at 36,680). Nor does the Final Rule impose an "anti-coal bias" on states and the nation's electricity supply, as the coal advocate group America's Power suggests.[20] Rather, the Final Rule regulates NO_X emissions, which represent one component of EGU operations. It does so by offering a variety of compliance options that enable units to continue functioning into the future: retrofitting with additional environmental controls, adjusting fuel inputs, improving efficiency of current environmental controls, or buying emissions allowances, to name a few.[21]

[17] *See, e.g.*, Cichanowicz et al., *supra* note 8, at 63-64.
[18] *See, e.g.*, PJM Interconnection, Comment Letter on Proposed Rule (June 21, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0668-0412; Electric Reliability Council of Texas et al., Comment Letter on Proposed Rule (June 21, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0668-0413.
[19] *See* 88 Fed. Reg. at 36,679; *EPA Good Neighbor Rule Plan Reflects PJM and Industry Input*, PJM INSIDE LINES (Mar. 16, 2023), https://insidelines.pjm.com/epa-good-neighbor-plan-reflects-pjm-and-industry-input/.
[20] Ethan Howland, *Power Plant Owners in 22 States Face Tighter NO_X Requirements Under EPA's Final Good Neighbor Rule*, UTIL. DIVE (Mar. 15, 2023), https://www.utilitydive.com/news/EPA-ozone-good-neighbor-rule-nox-coal-power-plant-/645082/.
[21] *See* Final Rule RIA, *supra* note 11, at ES-9.

S&P Global projects that of the 58.7 gigawatts of U.S. coal generating capacity projected to retire through 2030, an estimated 24.3 gigawatts (or 41.4 percent) are attributable to Inflation Reduction Act incentives for other generating technologies.[22]

20. In the event of a reliability emergency, the Final Rule would not constrain a unit's ability to obtain emergency waiver authorizations from the Department of Energy under *Federal Power Act* 202(c), 16 U.S.C. § 824a(c), which may allow it to operate beyond its environmental permit limits for a limited period to restore system reliability.[23] The Department of Energy and EPA also announced a memorandum of understanding detailing a framework for interagency consultation to coordinate monitoring and any actions that might be required to ensure continued system reliability.[24]

21. To the extent that coal-unit or grid operators make the economic decision to reduce coal generation following the implementation of the Final Rule, that is consistent with the principle of economic dispatch that underlies the modern grid. It is also consistent with longstanding trends in the electric power industry, which has steadily replaced coal capacity with a combination of less expensive gas, solar, wind, storage, energy efficiency, and demand response for more than two decades. This decline predates the Final Rule and indicates a larger industry trend toward resource diversification and away from coal-powered generation. According to the EIA, roughly 10 gigawatts of coal-fired EGUs retired each year between 2012 to 2021. Evidence for a continuation of this decline independent of the Final Rule is very strong; coal owners have already planned to retire nearly a quarter of the U.S. coal fleet operating

[22] Taylor Kuykendall et al., *Inflation Reduction Act to Accelerate U.S. Coal Plant Retirements*, S&P GLOBAL (Feb. 10, 2023), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/inflation-reduction-act-to-accelerate-us-coal-plant-retirements-74196498.
[23] *See* DOE, *DOE's Use of Federal Power Act Emergency Authority*, https://www.energy.gov/ceser/does-use-federal-power-act-emergency-authority (last visited Apr. 13, 2023) (listing past section 202(c) emergency orders).
[24] DOE & EPA, *Joint Memorandum on Interagency Communication and Consultation on Electric Reliability* (Mar. 9, 2023), https://www.epa.gov/system/files/documents/2023-03/DOE-EPA%20Electric%20Reliability%20MOU.pdf.

today by 2029.[25] EIA's AEO 2023, which as I have stated did not account for the Final Rule at issue here, forecasts that coal capacity will decline even further due to market forces:

> "As a result of renewables growth, we project that U.S. coal-fired generation capacity will decline sharply by 2030 to about 50% of current levels (about 200 [gigawatts]) with a more gradual decline thereafter. We project between 23 [gigawatts] and 103 [gigawatts] of coal-fired capacity operating in 2050 (Figure 6). The [Inflation Reduction Act of 2022] provides additional incentives to wind and solar power generation, which accelerates the near-term decline of electric power sector coal-fired generating capacity and hastens the timeline for retirement in the U.S. coal fleet."[26]

According to EPA's Regulatory Impact Analysis for the Final Rule, 14 gigawatts of coal units in total are expected to retire as a result of implementation of the Final Rule by 2030, representing less than 1.5 percent of all capacity in the United States.[27] This is also equivalent to about 7 percent of the coal capacity forecasted to retire by 2030 according to EIA's AEO 2023, quoted above. Since EPA and EIA both use optimization models that retire the least economic units first, it is likely that there is considerable overlap between the coal units that retire in EPA's analysis as a result of the Final Rule and those that retire in EIA's forecast regardless of the Final Rule.

22. Nor should retiring coal generation be viewed through an oversimplified lens as a reduction in grid reliability. Rather, it should be viewed as a transition away from older and increasingly less reliable units poorly suited to meet the needs of the modern grid. Coal plants have relatively slow

---

[25] Tyson Brown, *Nearly a Quarter of the Operating U.S. Coal-Fired Fleet Scheduled to Retire by 2029*, EIA (Nov. 7, 2022), https://www.eia.gov/todayinenergy/detail.php?id=54559#:~:text=Between%202012%20and%202021%2C%20an,capacity%20was%20retired%20each%20year. According to EIA, planned retirements are concentrated amongst relatively older, less efficient coal units facing higher operating and maintenance costs, which make them less competitive.

[26] EIA, ANNUAL ENERGY OUTLOOK 2023, *Administrator's Forward* (Mar. 16, 2023), https://www.eia.gov/outlooks/aeo/narrative/#casedescriptons.

[27] Final Rule RIA, *supra* note 11, at 272. In 2022, the electricity sector had roughly 1,200 GW of capacity installed in the U.S. *See* Am. Pub. Power Ass'n, *America's Electricity Generating Capacity 2022 Update* (Mar. 2022), https://www.publicpower.org/resource/americas-electricity-generating-capacity.

ramp rates compared to faster ramping resources, such as natural gas units and storage, and analyses have found that some coal units will not show up for a capacity or energy need within the operating day if they are not committed in advance.[28] This makes coal units poorly suited to provide the flexibility needed to manage the needs of a grid increasingly composed of intermittent renewables.[29] Furthermore, the 41 year-old average age of a coal unit in the United States as of 2022 is concerning.[30] As this machinery continues to age, the cost of maintenance goes up and units become more prone to mechanical failure, leading to unforced outages that are difficult to predict and can prevent units from coming online or functioning as expected.[31] Lastly, events like the Great Texas Freeze illustrate that coal cannot always be counted on in critical conditions such as extreme weather events. During the infamous blackouts in February of 2021, almost half of Texas's coal fleet tripped offline.[32]

23. Meanwhile, there is over a terawatt (1,300 gigawatts) of solar, wind, and battery capacity seeking grid interconnection according to the Department of Energy.[33] While solar and wind are intermittent, their generation profiles are increasingly well understood, and energy storage is increasing the amount of clean energy that can be delivered on demand to the grid.[34] The National Renewable

---

[28] Jason Frost et al., *The Impact of Resource Inflexibility on Capacity Accreditation in New England*, SYNAPSE ENERGY ECON. 4, 12 (Mar. 2023), https://www.sierraclub.org/sites/www.sierraclub.org/files/2023-03/Capacity%20Accreditation%20for%20Inflexible%20Resources%202023_03_07%20%281%29.pdf.
[29] DOE, *The Importance of Flexible Electricity Supply* (May 2011), https://www1.eere.energy.gov/solar/pdfs/50060.pdf.
[30] *Average Age of Existing Coal Power Plants in Selected Regions in 2020*, INT'L ENERGY AGENCY, https://www.iea.org/data-and-statistics/charts/average-age-of-existing-coal-power-plants-in-selected-regions-in-2020 (last updated Oct. 26, 2022).
[31] EIA, *Generating Unit Annual Capital and Life Extension Costs Analysis* (2019), https://www.eia.gov/analysis/studies/powerplants/generationcost/pdf/full_report.pdf.
[32] Garrett Golding, *Texas Electrical Grid Remains Vulnerable to Extreme Weather Events*, FED. RES. BANK DALL. (Jan. 17, 2023), https://www.dallasfed.org/research/economics/2023/0117. Noting improvements in regional weatherization standards, fuel supply chain mapping, and operating standards adopted since the February 2021 winter storm event did not alleviate continuing power system vulnerabilities, observed during the December 2022 cold snap that included forced outages of 10 GW of fossil-fired capacity and 6 GW of renewable capacity during winter peak demand of 73 GW.
[33] DOE, *DOE Launches New Initiative to Improve Clean Energy Interconnection* (Oct. 17, 2022), https://www.energy.gov/eere/wind/articles/doe-launches-new-initiative-improve-clean-energy-interconnection.
[34] *See* Nat'l Renewable Energy Lab., *Wind Integration Data and Tools*, https://www.nrel.gov/grid/wind-integration-data.html (last visited Apr. 13, 2023); Nat'l Renewable Energy Lab., *Solar Resource Data and Tools*, https://www.nrel.gov/grid/solar-resource/renewable-resource-data.html (last visited Apr. 13, 2023); EIA, *Battery Storage in the United States: An Update on Market Trends* (Aug. 16, 2021), https://www.eia.gov/analysis/studies/electricity/batterystorage/.

Energy Laboratory has also found that renewable energy strengthens energy security because it further diversifies the grid's resource mix. Resource diversification reduces reliance on any one specific fuel type and hedges against reliability and security risks such as fuel supply constraints and price fluctuations.[35] Because renewable energy increases the share of domestic production of "fuel," it also insulates ratepayers and energy markets from major geopolitical events, thereby increasing energy security. Furthermore, deploying distributed renewable energy resources promotes electric reliability by reducing the likelihood of outages due to large-scale, single-point of failure power plants.[36] This strengthens the system's overall resiliency to extreme weather impacts and security threats since there are fewer points of critical energy infrastructure.

The Emissions Allowance Prices of the 2022 Ozone Season Are Not Indicative of the Cost of Compliance with the Final Rule

24. Group 3 allowance prices in 2022 are not an indicator of the forward-going cost of Group 3 allowances or of the cost of compliance with the Final Rule.

25. There are several reasons for this. First, the increase in CSAPR Group 3 seasonal allowance prices in 2022 was due, in large part, to temporary phenomena unique to that year. Russia's invasion of Ukraine in February 2022, for example, had the effect of increasing natural gas prices, which increased the cost to run gas power plants in the United States. This along with record high summer power burn domestically, in some cases associated with extreme weather conditions in portions of the United States, drove the average cost of wholesale natural gas in 2022 to its highest level since 2008.[37] Higher marginal costs to run gas units meant that coal units competing with gas could afford to pay more for allowances while maintaining a similar level of competitiveness.[38] This contributed to higher demand

[35] Sadie Cox, Laura Beshilas & Eliza Hotchkiss, *Renewable Energy to Support Energy Security*, NAT'L RENEWABLE ENERGY LAB. (2019), https://www.nrel.gov/docs/fy20osti/74617.pdf.
[36] EPA, *The Multiple Benefits of Energy Efficiency and Renewable Energy*, at I-10 (2018), epa.gov/sites/default/files/2018-07/documents/mbg_1_multiplebenefits.pdf.
[37] Kirby Lawrence, *Average Cost of Wholesale U.S. Natural Gas in 2022 Highest Since 2008*, EIA (Jan. 9, 2023), https://www.eia.gov/todayinenergy/detail.php?id=55119#.
[38] *2022 Ozone Season NOx Prices Rise with Natural Gas Prices*, S&P GLOBAL (July 14, 2022), https://www.spglobal.com/commodityinsights/en/ci/research-analysis/2022-ozone-season-nox-prices-rise-with-natural-gas-prices.html.

for allowances, and higher prices. Natural gas prices, however, are expected to decline,[39] thereby lessening this upward pressure on allowance prices.

26. Second, as stated by S&P Global, uncertainty over the publication of the Final Rule also increased the allowance price by increasing demand.[40] That uncertainty is now largely resolved, and emissions budgets established with greater certainty through 2029. With this information, unit operators can optimize allowance purchases and other compliance options. Allowance prices over the next several years will depend on the extent to which covered units decrease their emissions, power market prices, fuel price volatility, and many other factors. Historical examples of other emissions trading programs show that short-term trends and price volatility, particularly in response to new program design implementation, do not indicate the long-term price of compliance.[41] For example, initial allowance price volatility observed during implementation of the NO_X Budget Program in 2003 were attributable in part to uncertainty flowing from litigation-related delays in adopting certain requirements.[42]

27. In 2022, reported CSAPR Group 3 NO_X compliance costs varied amongst affected generators due to generating technology, fuel type, age, and location. The latter factor subjects them to differences in design elements of the energy markets and fuel supply chains across the eastern United States. The estimated portion of load-weighted average locational marginal price during 2022 for Group 3 allowances ranged from $2.31 to $20 per megawatt-hour across regional energy markets that require generators to decompose their power generation offers.[43] Figure 2 below shows how CSAPR Group 3

---

[39] EIA, ANNUAL ENERGY OUTLOOK 2023, tbl.3, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2023&region=1-0&cases=ref2023&start=2021&end=2050&f=A&linechart=~ref2023-d020623a.38-3-AEO2023.1-0&map=ref2023-d020623a.4-3-AEO2023.1-0&ctype=linechart&sourcekey=0.

[40] *2022 Ozone Season NOx Prices*, *supra* note 39.

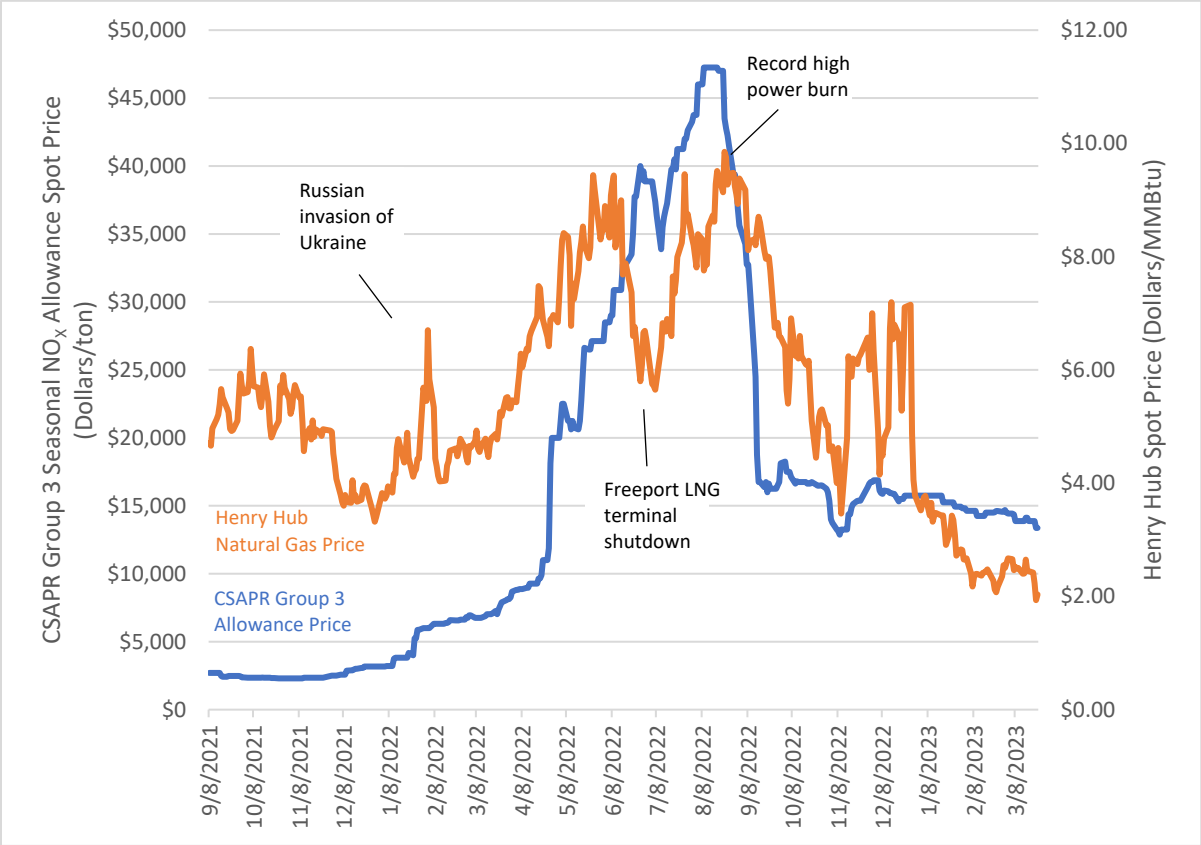
[41] *See* Richard Schmalensee & Robert N. Stavins, *Lessons Learned from Three Decades of Experience with Cap and Trade*, 11 REV. ENVTL. ECON. & POL'Y 59 (2017).

[42] *Id*. at 65; Alan Farrell, *The NO_X Budget: A Look at the First Year*, 13 ELECTRICITY J. 83 (2000).

[43] Monitoring Analytics, L.L.C., *2022 State of the Market Report for PJM*, § 8, at 436 (Mar. 9, 2023), https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2022/2022-som-pjm-sec8.pdf. Based on offer data submitted by affected CSAPR generators during 2022, the market monitor calculated CSAPR Group 3 NO_X compliance costs averaged $2.31/MWh in PJM (or 2.88% of the 2022 PJM load-weighted, average, real-time locational marginal price, $80.14/MWh). Midcontinent Independent System Operator (MISO) internal market monitor calculated that CSAPR Group 3 NO_X allowance prices "increased production costs of affected units by around $20 per MWh, despite several suppliers not fully reflecting these costs in their offers." David Patton,

allowance spot prices tracked natural gas spot prices at the Henry Hub (Louisiana) national benchmark. As the figure shows, allowance spot prices reacted to increasing demand for U.S. liquefied natural gas ("LNG") exports to Europe and weather-related demand for natural-gas-fired electricity generation, which was interrupted by the June 8, 2022 shutdown of the Freeport LNG terminal

Figure 2. CSAPR Group 3 seasonal NO_X allowance spot price vs. Henry Hub spot price



Sources: S&P Capital IQ Commodity Charting, 2022 CSAPR NO_X Allowance Seasonal, Henry Hub Sport Natural Gas Price (Accessed March 24, 2023); EIA, Average cost of wholesale U.S. natural gas in 2022 highest since 2008 (January 9, 2023), https://www.eia.gov/todayinenergy/detail.php?id=55119.

28. Since the release of the Proposed Rule, the passage of the Inflation Reduction Act has also dramatically altered the energy cost landscape. As EPA states, "The impact of the Inflation Reduction Act is to increase the economic competitiveness of lower emitting and renewable technologies

Potomic Econ., *IMM Quarterly Report: Summer 2022*, slide 4 (Oct. 13, 2022), https://cdn.misoenergy.org/2022%20IMM%20Quarterly%20Report%20Summer626733.pptx.

relative to the higher emitting technologies that this rule seeks to regulate."[44] This is primarily through expanded and extended tax credits for wind, solar, energy storage, and other clean energy resources.[45]

29. The Inflation Reduction Act will also reduce the cost of regulatory compliance.[46] In the near term, from 2023 to 2027, EPA's modeling shows that the Inflation Reduction Act will reduce compliance costs at EGUs by 7 percent; from 2023 to 2045, the estimated impact is a compliance cost reduction of 57 percent. Annual costs are also substantially lower through 2026 (Table 4).

Table 4. EPA's forecasted compliance costs at EGUs with and without the Inflation Reduction Act (2022$)

Timeframe	Final Rule	Final Rule + Inflation Reduction Act	Impact of Inflation Reduction Act
2023-2027 (Annualized)	17	16	-7%
2023-2045 (Annualized)	540	236	-56%
2023 (Annual)	69	57	-18%
2024 (Annual)	-6	-20	-240%
2025 (Annual)	-6	-20	-240%
2026 (Annual)	-6	-20	-240%
2027 (Annual)	29	81	179%
2030 (Annual)	848	694	-18%
2035 (Annual)	983	357	-64%
2045 (Annual)	219	196	-10%

Source: Regulatory Impact Analysis for the Final Rule, Table 4A-2, adjusted from 2016$ to 2022$.

The Final Rule Will Create Significant Public Health and Economic Benefits that Vastly Outweigh Compliance Costs in Each Year of Implementation

30. Opponents of EPA's Final Rule have argued that impacts on EGUs and non-EGUs will cause closures that result in job losses, lost tax revenues, and other economic impacts. They have argued that these economic impacts will interfere with the prosperity and growth of state economies or the United States economy at large. Those arguments, however, omit the significant economic and public health

[44] Final Rule RIA, *supra* note 11, at 186.
[45] EPA, *The Inflation Reduction Act*, https://www.epa.gov/green-power-markets/inflation-reduction-act (last updated Mar. 28, 2023).
[46] These elements include production tax credits and investment tax credits, a capital cost adjustment to reflect the Inflation Reduction Act's impact on improvements to manufacturing capability, a carbon capture and storage tax credit, disabled nuclear retirements, and additional features. *See* Final Rule RIA, *supra* note 11, at 185 tbl.4A-1 (describing Inflation Reduction Act provisions modeled by EPA).

benefits of the implementing the Final Rule. They also omit the fact that coal generation and capacity are already in rapid decline and will continue to decline regardless of the Final Rule. This ongoing shift demands attention as part of a transition to clean energy but is not rooted exclusively in the design of the Final Rule and should not be a barrier to its implementation. Likewise, as EPA acknowledges in its Regulatory Impact Analysis, labor impacts from the Final Rule on non-EGU facilities are difficult to assess due to background changes in the regulated industries, but recent legislation provides resources to promote positive impacts.

31. Mitigating NO_X from EGUs and non-EGUs will create significant public health benefits. This is because NO_X undergoes a series of chemical reactions once emitted that contribute to downwind particulate matter ("PM") and ozone pollution, both of which negatively impact human health. According to EPA's Regulatory Impact Analysis, the Final Rule will create human health benefits with an estimated net-present-value between $112 million and $987 million in 2023 and between $3.3 billion and $16.8 billion (2022 dollars) in 2026, depending on the discount rate and methodology for calculating mortality risk.[47] This human health benefit includes reductions in PM and ozone due to NO_X reductions from EGUs and Non-EGUs.[48]

32. For my analysis, I examined a subset of the benefits created by the Final Rule. Specifically, I examined the beneficial health impacts of reducing ozone season NOx on PM only, from the EGU sector only, and from 2023 to 2026 only. This analysis shows that benefits from PM reductions from the EGU sector alone, across only the ozone seasons of the next four years, still substantially exceeds the expected cost of implementing the Final Rule in each year. To perform this analysis, I used EPA's Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool ("COBRA"). COBRA

[47] *See* Final Rule RIA, *supra* note 11, at 34 tbl.ES-8. These values have been adjusted from $2.8 billion and $14 billion in 2016$, respectively, using the GDP deflator available from FRED Economic Data. FRED Econ. Data, *Gross Domestic Product: Implicit Price Deflator*, https://fred.stlouisfed.org/series/GDPDEF (last visited Apr. 13, 2023).

[48] Final Rule RIA, *supra* note 11, at 42 tbl.ES-12. These values have been adjusted from $57 million and $570 million in 2016 dollars, respectively, using the GDP deflator available from FRED Economic Data. FRED Econ. Data, *supra* note 50.

enables a user to specify NO_X emissions reductions at the county level. It then uses air modeling to estimate the impact on downwind PM and associated health impacts. COBRA's final step is to convert these health impacts into economic impacts. As an input into COBRA, I aggregated the Final Rule's unit-level emissions reductions in each year at the county level and produced the results found in Table 5.

Table 5. Health impacts of reduced PM due to EGU NO_x reductions attributable to the Final Rule

Health Endpoint	**Change in Incidence (Cases 2023-2026)**		**Net Present Value 2023-2026, 3% Discount Rate (Millions 2022$)**		**Net Present Value 2023-2026, 7% Discount Rate (Millions 2022$)**	
	Low	**High**	**Low**	**High**	**Low**	**High**
Mortality	212	481	$2,521.4	$5,708.6	$2,263.0	$5,123.5
Nonfatal Heart Attacks	22	204	$3.8	$35.6	$3.4	$32.0
Infant Mortality	1.1		$14.8		$13.3	
Hospital Admits, All Respiratory	52.6		$2.1		$1.9	
Hospital Admits, Cardiovascular (except heart attacks)	51.5		$2.9		$2.6	
Acute Bronchitis	280.7		$0.2		$0.2	
Upper Respiratory Symptoms	5,075.6		$0.2		$0.2	
Lower Respiratory Symptoms	3,568.7		$0.1		$0.1	
Emergency Room Visits, Asthma	108.7		$0.1		$0.1	
Asthma Exacerbation	5,311.7		$0.4		$0.4	
Minor Restricted Activity Days	151,384.6		$14.4		$12.9	
Work Loss Days	25,601.4		$5.6		$5.0	
Total NPV			**$2,565.9**	**$5,784.9**	**$2,302.9**	**$5,192.0**

33. As Table 5 shows, from 2023 to 2026, the net present value of the benefits from PM reduction due to ozone season NO_X reductions from regulated EGUs totals between $2.26 billion and $5.7 billion. Table 6 shows the discounted benefits on an annual basis.

Table 6. Annual health benefits from PM reductions due to NO_X reductions at EGUs

Discount Rate	**2023**		**2024**		**2025**		**2026**	
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
3% Discount Rate	$437	$985	$530	$1,196	$547	$1,233	$1,052	$2,370

7% Discount Rate	$421	$948	$491	$1,108	$488	$1,100	$903	$2,035

34. Using 2026 as an example, based only on the subset of benefits I estimated, the Final Rule's benefits exceed its costs. Table 7 shows EPA's benefit-cost analysis for 2026 in millions of 2022$ beside a benefit-cost analysis that includes my estimate of PM-related health benefits from EGU NO_X reductions during the ozone season. As shown in the table, the Final Rule still produces substantial net benefits when even accounting for just this subset of health benefits.

Table 7. Monetized benefits, costs, and net benefits of the Final Rule in 2026 (millions of 2022$)

	Final Rule, 2026	
	EPA's Benefit-Cost Analysis	Benefit-Cost Analysis using subset of health benefits only
	Health benefits include EGU and Non-EGU NO_X reductions, Ozone and PM impacts	*Health benefits include EGU NO_X reductions only and PM impacts only*
Health Benefits	$3,850 and $16,844	$1,184 to $2,668
Climate Benefits	$1,323	-
Total Benefits	$5,173 and $18,167	$1,184 to $2,668
Costs	$686	$686
Net Benefits	**$4,488 and $17,482**	**$498 to $1,982**

Source: Regulatory Impact Analysis for the Final Rule, Table ES-13, adjusted from 2016$ to 2022$. Note that EPA's two estimates are not a range; they are derived from different estimation methods. My estimate of health benefits, however, is a range derived from high and low values outputs from the COBRA model.

35. As NO_X reduction create health benefits throughout the United States, the Final Rule will also create labor impacts at regulated EGUs and non-EGUs. These labor impacts are likely to be very small at EGUs, particularly in the context of existing changes in the electric power industry. At non-EGUs, impacts are difficult to predict given significant background changes in labor utilization independent of the Final Rule; but as I describe below, new resources are now available through recent legislation to mitigate impacts.

36. EPA separates job-related impacts from the Final Rule into two categories: changes in non-recurring jobs related to construction, and changes in recurring labor utilization associated with jobs

such as operation and maintenance of facilities and fuel extraction.[49] Among covered EGUs, non-recurring construction jobs are expected to increase through 2030 due to a need to install new pollution controls and build additional generation capacity (primarily natural gas and solar photovoltaic).[50] In terms of recurring jobs, EPA's Regulatory Impact Analysis projects that in 2023, the impact is less than 100 job-years. In 2025, the loss of recurring jobs at existing EGUs is balanced by the gain in jobs at new EGUs. In 2030, EPA's analysis indicates that the loss of jobs from existing capacity will exceed the increase in jobs related to new capacity.[51] The total net decrease in recurring employment, however, is less than 4,000 job-years in 2030—a minute component of employment in the power sector, which employs approximately one million Americans.[52]

37. In the longer term, as the electric industry continues to shift to clean energy sources, the number of jobs available will continue to shift from coal to renewables.[53] This change is already well on its way; from 2015 to 2019, the solar and wind electric power generation sectors added 83,000 jobs while the coal fuels sector lost 17,000 jobs. (Also in this time, the petroleum and natural gas fuels sector added 73,000 jobs.)[54] The prospects for job growth in clean energy are strong and there are "relatively high job multipliers in renewables," according to an IMF study called, *Jobs Impact of Green Energy*.[55]

38. In the non-EGU sector, EPA acknowledges that the NO_X-emitting industries regulated by the Final Rule are already experiencing significant background changes in labor utilization. The pipeline transportation of natural gas and cement and concrete manufacturing categories, for example, experienced

[49] Final Rule RIA, *supra* note 11, at 272.
[50] *Id*.
[51] *Id*.
[52] *Id*. at 273; Int'l Renewable Energy Agency & Int'l Labour Org., *Renewable Energy and Jobs: Annual Review 2022*, at 38 (2022), https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_856649.pdf.
[53] Phil Jordan, BW Research P'ship, *Wages, Benefits, and Change*, at 13 (Apr. 6, 2021), https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/60772d6c9a200430a1ff75a5/1618423165067/2020+Wage+Report+Presentation-April+6+Webinar_+Final.pdf (presentation to National Association of State Energy Officials).
[54] See *id*.
[55] Jaden Kim & Adil Mohommad, *Jobs Impact of Green Energy*, INT'L MONETARY FUND 8 (May 27, 2022), https://www.imf.org/en/Publications/WP/Issues/2022/05/27/Jobs-Impact-of-Green-Energy-518411.

19 percent and 17 percent increases in employment from 2011 to 2020, respectively. In contrast, the iron, steel, and ferroalloy manufacturing category and the pulp, paper, and paperboard mills category experienced a 10 percent and 15 percent decline, respectively, in the same time period.[56] This changing background highlights how dynamic these industries already are, and the rapid changes make it difficult to predict how these industries will respond to the Final Rule. Covered non-EGU industries also show substantial differences in employment per million dollars of output, which highlights how differently they may respond to changes in cost that affect output.[57]

39. Additional measures of the Inflation Reduction Act and other sources of funding are likely to support non-EGU facilities' compliance with the Final Rule. These include grant awards under Section 50161 of the Inflation Reduction Act, the *Advanced Industrial Facilities Deployment Program*, which allocates more than $5.8 billion to the Department of Energy for competitive financial assistance to projects that implement advanced industrial technology at energy-intensive industrial and manufacturing facilities. Grants under this program award up to 50 percent of project costs for projects that include retrofits, upgrades, or operational improvements that reduce greenhouse gas emissions. In the process, industrial facilities can also reduce NO_X, supporting compliance with the Final Rule. This pool of funding will be available with the Office of Clean Energy Demonstrations until September 30, 2026.[58]

40. The Inflation Reduction Act also expanded the 48C Advanced Energy Project Credit to include industrial emissions reductions.[59] Eligible industrial projects include those that, along with additional options, equip industrial or manufacturing facilities with technology designed to reduce greenhouse gas emissions by at least 20 percent and will be eligible a 10 percent tax credit adder.[60] These

[56] Final Rule RIA, *supra* note 11, at 274.
[57] *Id*. at 275.
[58] White House, *Inflation Reduction Act Guidebook*, https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/ (last visited Apr. 13, 2023).
[59] White House, *Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action* (Jan. 2023), https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.
[60] *Id.*

tax incentives are already increasing the value of existing transmission grid interconnection points at facilities with retired coal-fired electric generating units.[61] An Energy Community Bonus Credit is also now available and will provide $10 billion of allocations, at least $4 billion of which are reserved for projects in to coal communities.[62]

41. Likewise, the DOE's Office of Clean Energy Demonstrations, funded by the *Bipartisan Infrastructure Law* and the Inflation Reduction Act, has $6.3 billion available through grants, cooperative agreements, and other arrangements to support decarbonization in the iron and steel, cement and concrete, chemicals and refining, food and beverage, paper and forest products, aluminum, and other energy-intensive manufacturing industries.[63] Again, decarbonizing these industries through advanced industrial technologies and greater efficiency offers a pathway to reduce fossil energy reliance, reduce NO_X, and comply with the Final Rule. The Office of Clean Energy Demonstrations will be looking for projects that have the highest impact for job creation.[64]

42. The Department of Energy also announced an "Industrial Efficiency and Decarbonization" funding opportunity, which is a $104 million funding opportunity through the Advanced Manufacturing Office. This opportunity will fund high-impact, applied research and demonstration projects in order to expedite the adoption of transformational industrial technology necessary to increase energy efficiency across industry. Selected projects are also expected to contribute

[61] Charles River Assocs., *Coal-Retirement Energy Communities: Analysis of Emerging Tax Credit Opportunities from the Inflation Reduction Act* (Nov. 1, 2022), https://www.crai.com/insights-events/publications/coal-retirement-energy-communities/.
[62] IRS, Notice 2023-29, *Energy Community Bonus Credit Amounts Under the Inflation Reduction Act of 2022* (Apr. 4, 2023), https://www.irs.gov/pub/irs-drop/n-23-29.pdf. Eligible energy communities include those hosting a coal-fired electric generating unit classified as retired at any time since December 31, 2009 in the EIA Electric Generator Inventory (EIA Form 860).
[63] DOE Office of Clean Energy Demos., *Industrial Demonstrations Program*, https://www.energy.gov/oced/industrial-demonstrations-program (last visited Apr. 13, 2023).
[64] DOE Office of Clean Energy Demos., *Portfolio*, https://www.energy.gov/oced/portfolio (last visited Apr. 13, 2023).

to the Justice40 initiative, which has set a goal that 40 percent of overall benefits of government energy and climate investments flow to disadvantaged communities.[65]

The Final Rule Will Not Necessarily Increase Electricity Rates

43. As I acknowledge, compliance with the Final Rule will impose additional costs on certain EGUs. However, EPA's Regulatory Impact Analysis forecasts that at a national level, changes in electric rates will be miniscule. In both 2023 and 2025, EPA forecasts an increase in average national retail rates of less than 0.2 percent—about 0.00019 cents per kilowatt-hour. By 2030, EPA estimates that the increase in national average retail electricity prices will still be less than 1 percent.[66] This average increase is already very small, but given the rate of technological change and utilities' ability to seek least-cost generation resources, even this small increase may be avoided.

44. The specter of increased costs at a subset of power units does not necessarily mean an increase in rates for electricity customers. As I explain in this section, utilities have the option—and in many states the responsibility—to reevaluate their portfolios when the energy cost landscape changes. That change may be prompted by a new EPA rule, by a new law like the Inflation Reduction Act, by falling clean technology costs, or other factors. Doing so not only minimizes risks for investors by avoiding the risk of stranded assets, but it also minimizes the risk of higher rates for the utility customers who will ultimately shoulder the cost of capital investments. Changes in forward-going unit operating costs caused by the Final Rule should therefore prompt prudent utilities to review covered units relative to alternatives to investigate whether they fit into a least-cost portfolio of resources capable of meeting system needs. If covered units do continue to operate, the cost that a utility seeks to recover in rates depends on the cost of its entire rate base, not just one segment that experiences higher costs. In the longer term, a continuation of the movement away from NO_X-emitting coal-fired power generation also

[65] DOE Office of Energy Efficiency & Renewable Energy, *EERE Funding Opportunity Exchange*, https://eere-exchange.energy.gov/Default.aspx#FoaId10dee44f-2348-4613-b787-cfe653cbe32b (last visited Apr. 13, 2023).
[66] Final Rule RIA, *supra* note 11, at 164-68.

represents a shift away from one of the costliest generation resources, both in terms of the levelized cost of energy and from the perspective of future environmental compliance costs.

45. Utilities interested in minimizing risk for investors and for ratepayers should base every financial decision on an objective economic analysis, and every major investment should prompt a reevaluation of alternatives. Increased compliance costs at an EGU will only increase that unit's contribution to rates if it is assumed that the EGU must continue to run at the same level, which is rarely the case. When the economics of a power unit change, the economics of the decision to use that plant should also change. This requires a utility to take responsibility and perform analysis to optimize its system, even if that analysis is not explicitly demanded by a regulatory commission.

46. Now that the Final Rule has been released, the onus is on utilities to perform resource planning, ideally using optimized capacity expansion modeling, to develop a least-cost portfolio of generation resources. Merchant generators must also now assess whether they would be best served to continue running or to retire and replace fossil generators with alternatives. This quantitative process can help determine if covered EGUs should continue to run or if it would be less costly to replace them with alternatives. This replacement can result in lower system costs overall, meaning that the potential for higher costs at a specific EGU, by prompting a transition to lower-cost alternatives, can have the counterintuitive effect of lowering that covered EGU's contribution to rates. The impact of a specific EGU's compliance costs on rates, therefore, is not as simple as adding the cost of compliance into the rate base. Rather, the incremental cost to rates as a result of new regulation is the difference between the cost of compliance and the cost of replacement with alternatives.

47. In the event that a subset of units' forward-going costs increases and those units continue to run, that also does not mean that rates must increase. The total cost that a utility seeks to recover through rates depends on many factors. The rising level of electric vehicle adoption, for example, which is unrelated to the Final Rule, can decrease electric rates for all customers if

utility revenues from EV charging exceed the utility system cost.[67] For this reason and many others it is not possible to make a blanket statement that increased compliance costs at EGUs that continue to run will increase electric rates of affected utilities.

48. What is certain is that for many years now, utilities have been diversifying away from NO_X-intensive coal generation by building gas, wind, solar, energy storage, and other resources. This diversification has reduced the amount of capacity that would have otherwise been subject to the Final Rule and increased the quantity of lower-cost capacity, buffering the cost impacts of fossil-energy-related environmental regulation. As shown in Lazard's most recent levelized cost of energy analysis, this diversification away from coal also largely represents a shift to cheaper generation types. Unsubsidized wind, solar, and combined-cycle gas plants are less expensive on a levelized cost basis than coal.[68] The Inflation Reduction Act has lowered the cost of clean energy even further, through extended and expanded tax credits now available for wind, solar, storage, and other forms of clean energy. A continued shift away from coal can help shift the overall system away from an expensive generation resource, which can put downward pressure on rates.

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Cambridge, Massachusetts on August , 2023.

_____

Patricio Silva

[67] Jason Frost et. al., Synapse Energy Econ., *Electric Vehicles Are Driving Electric Rates Down* (2019), https://www.synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf.
[68] Lazard, *Lazard's Levelized Cost of Energy Analysis - Version 15.0* (Oct. 2021), https://www.lazard.com/media/sptlfats/lazards-levelized-cost-of-energy-version-150-vf.pdf.