APPENDICES

COMMENTS FROM THE EDISON ELECTRIC INSTITUTE ON THE ENVIRONMENTAL PROTECTION AGENCY'S PROPOSED RULE NEW SOURCE PERFORMANCE STANDARDS FOR GREENHOUSE GAS EMISSIONS FROM NEW, MODIFIED, AND RECONSTRUCTED FOSSIL FUEL-FIRED ELECTRIC GENERATING UNITS; EMISSION GUIDELINES FOR GREENHOUSE GAS EMISSIONS FROM EXISTING FOSSIL-FUEL FIRED ELECTRIC GENERATING UNITS' AND REPEAL OF THE AFFORDABLE CLEAN ENERGY RULE

Docket No. EPA-HQ-OAR-2023-0072

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APPENDIX A

Clean Air Act Section 111 Standards and the Power Sector: Considerations and Options for Setting Standards and Providing Compliance Flexibility to Units and States

Edison Electric Institute
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Introduction

The U.S. Environmental Protection Agency (Agency or EPA) is moving forward with regulations under Clean Air Act (CAA) section 111 to address carbon dioxide (CO_2) emissions from fossil-based electric generating units (EGUs or units). The existing regulatory framework and recent court decisions include some limitations, but also some latitude, as to how to set standards to address emissions from EGUs. Indeed, EPA has numerous options available to it, in both setting standards for new units and developing guidelines for states to set standards for existing units, after determining what constitutes the Best System of Emissions Reduction (BSER). EPA also has significant flexibility in how standards are set and how the options for compliance are designed. This flexibility is essential to achieving emissions reductions from new and existing EGUs while also supporting the delivery of affordable and reliable electricity to customers. This paper explores these options and flexibilities to help EPA design standards for both new and existing units that achieve emissions reductions goals, are consistent with electric company clean energy commitments, and support affordable and reliable electricity, which will be essential for customers and for larger economy-wide decarbonization efforts.

The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. EEI members provide electricity for more than 235 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than seven million jobs in communities across the United States. EEI member companies invest more than $120 billion annually to make the energy grid smarter, cleaner, more dynamic, more flexible, and more secure in order to provide affordable and reliable electricity to customers. EEI's members are committed to getting the energy they provide as clean as they can as fast as they can, keeping affordability and reliability front and center.

EEI members are in the middle of a profound, long-term transformation in how electricity is generated, transmitted, and used. This transformation is being driven by a wide range of factors, including relatively lower prices for natural gas, particularly as compared to historic high prices, and renewable energy resources, energy efficiency and demand-side management, technological improvements, changing customer, investor and owner expectations, federal and state regulations and policies, and the increasing use of distributed energy resources. EEI members are well-positioned to continue to lead the nation's clean energy transformation. With the right policies and technologies, a 100 percent clean energy future can be more than a goal, it can be a reality. Across the industry, companies are investing in a broad range of affordable, carbon-free technologies and approaches with the goal of finding the most cost-effective ways to deliver resilient clean energy.

1. *EEI members continue to lead the clean energy transformation*

The mix of resources used to generate electricity in the United States has changed dramatically over the last decade and is increasingly cleaner. 2016 marked the first year that natural gas exceeded coal as the main source of electricity generation in the United States. In 2021, natural gas powered about 38 percent of the country's electricity, compared to coal-fired generation at about

22 percent.[1] Renewables[2] generated approximately 21 percent of total generation.[3] In total, approximately 40 percent of America's electricity came from clean carbon-free resources in 2021, including nuclear energy, hydropower, solar, and wind.[4]

Energy storage is a key asset in helping the grid integrate increasing amounts of renewables and offering resilience and reliability. Electric companies are the largest users and operators of the approximately 25 gigawatts (GW) of operational storage in the country—representing 96 percent of active energy storage projects.[5] Over the period of 2015 to 2020, there was a 544 percent increase in advanced energy storage devices.[6]

Renewable energy deployments will continue. By 2025, EIA projects approximately 125 GW of renewables capacity will be online.[7] Further, EIA projects that in the United States the share of renewables in the electricity generation mix will more than double by 2050.[8] EIA projects that

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[1] *See* U.S. Energy Information Administration (EIA), *Electric Power Monthly: with Data for December 2021* 12 (Feb. 2022), https://www.eia.gov/electricity/monthly/current_month/february2022.pdf.

[2] Renewables here are defined as wind, hydroelectric, solar, biomass, and geothermal energy.

[3] *See* EIA, *supra* note 1.

[4] *See id.*

[5] *See* EEI, Harnessing the Potential of Energy Storage (June 2021), https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Energy-Storage/Harnessing_Energy_Storage_Factsheet.pdf?la=en&hash=F1AB8CC768C880975C5AD28DA798B2AAF01DA2FF.

[6] *See id.*

[7] *See* EIA, Annual Energy Outlook 2022: Reference Case Projections Tables – Table 16 Renewable Energy Generating Capacity and Generation (Mar. 3, 2022), https://www.eia.gov/outlooks/aeo/data/browser/#/?id=16-AEO2022&cases=ref2022&sourcekey=0.

[8] *See* EIA, Annual Energy Outlook 2022: With Projections To 2050 – Narrative 17 (Mar. 3, 2022), https://www.eia.gov/outlooks/aeo/pdf/AEO2022_Narrative.pdf. EIA estimates are intentionally conservative, focusing on policies currently on the books and not other potential drivers of increased renewable energy deployment, including the suite of new and expanded clean energy tax credits included in the Inflation Reduction Act. These credits will drive reductions in the costs of a range of clean energy sources, increasing both deployment and emissions reductions relative to the EIA base case. *See, e.g.*, Michael Greenstone, et al., Assessing the Costs and Benefits of Clean Electricity Tax Credits (Feb. 9, 2022), https://rhg.com/research/assessing-the-costs-and-benefits-of-clean-electricity-tax-

wind will continue to be most of the growth in renewables generation through 2024, accounting for more than two-thirds of those increases in electricity generation during that period and that solar will then dominate deployments until 2050.[9]

These changes have profoundly decreased the sector's carbon dioxide (CO_2) emissions, the primary greenhouse gas emissions associated with electricity production. Preliminary full-year estimates are that electric power sector emissions were 36 percent below 2005 levels as of the end of 2021, as low as they were in 1984.[10] These reductions will continue. Fifty EEI members have announced forward-looking carbon reduction goals, two-thirds of which include a net-zero by 2050 or earlier equivalent goal, and members are routinely increasing the ambition or speed of their goals or altogether transforming them into net-zero goals.

In addition, the electric industry has significantly reduced air pollutants such as mercury, hazardous air pollutants (HAPs), sulfur dioxide (SO_2), and nitrogen oxides (NOx). As of 2021, SO_2 and NOx emissions have declined 94 and 88 percent, respectively, since 1990.[11] In addition, mercury emissions have declined by 90 percent since 2010, and total HAPs—including all acid gas emissions—declined by 96 percent between 2010 to 2017.[12]

EEI's member companies see a clear path to continued emissions reductions over the next decade using current technologies, including nuclear power, natural gas-based generation, energy demand efficiency, energy storage, and deployment of new renewable energy—especially wind and solar—as older coal-based and less-efficient natural gas-based generating units retire. These technologies will continue to enable significant, cost-effective carbon and NOx reductions. In addition, EIA notes that coal use will continue to decline with the retirement of most of the relatively old and inefficient coal-fired electricity generating units in the United States.[13]

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credits/#:~:text=Building%20on%20previous%20modeling%20conducted,a%20scenario%20without%20these%20policies.

[9] *See id*.

[10] *See* EIA, March 2022 Monthly Energy Review, Table 11.16—Electric Power Sector (Mar. 29, 2022), https://www.eia.gov/totalenergy/data/monthly/archive/00352203.pdf.

[11] *See* EPA, EPA Issues Power Plant Emissions Data for 2021 (Feb. 22, 2022), https://www.epa.gov/newsreleases/epa-issues-power-plant-emissions-data-2021.

[12] *See* National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units-Reconsideration of Supplemental Finding and Residual Risk and Technology Review, 84 *Fed. Reg.* 2,670, 2,689 (Feb. 7, 2019).

[13] *See* EIA, *supra* note 8, at 18.

2. *Key overarching considerations for the development of CAA section 111 regulations for the power sector.*

Section 111 flexibility—in both the setting of standards and in how compliance with those standards is demonstrated—supports the ongoing clean energy transition. To achieve their carbon reduction goals, EEI members are deploying more zero-emitting resources, closing older fossil-based generation, and investing in the research, development, demonstration, and deployment (RDD&D) of new, 24/7 clean technologies. Standards and requirements that are more flexible allow electric companies to make strategic investment decisions that support the clean energy transition, reliability, and affordability.

Section 111 flexibility also is consistent with EPA's stated goal of providing a holistic approach to power sector regulations. Aware of the clean energy transition led by EEI's members, EPA Administrator Regan has announced his intent to pursue an integrated and coordinated approach to regulating EGUs under its air, water, and waste programs, so as to provide "greater transparency, regulatory certainty for long-term investments, opportunities to reduce compliance complexity, and the right signals to create market and price stability."[14] To the maximum extent possible, these regulations should support and facilitate the emissions reductions and clean energy progress already being made by electric companies and their fleet transition plans. To achieve these goals, there are three key considerations for any rulemaking that EPA might propose for EGUs, especially for CAA section 111 regulations:

- *Align the Timing of Compliance Obligations to the Extent Possible* – EPA has multiple authorities with overlapping statutory timelines; efforts to align those rulemaking timetables and those of the related compliance obligations will be especially helpful to EEI members as they make decisions about retiring older assets and bringing on new, cleaner sources of generation and build the infrastructure to support this transition. Specifically, EPA should seek to:
    - Provide timelines that accommodate the expected retirement of coal-based EGUs over the next decade;
    - Provide approaches that allow for the retirement of units as opposed to investments in new control technologies, which could prolong the lives of higher-emitting EGUs; this will achieve maximum and durable environmental benefits; and,
    - Allow companies to choose pathways that protect customers and address specific reliability concerns through least-cost compliance pathways that are consistent with resource planning horizons.

- *Provide Tailored Compliance Flexibilities* – Compliance flexibilities are a practical and longstanding method of helping affected sources achieve the goals of environmental regulations in efficient, cost-effective, and commonsense ways. The electric sector has

[14] Administrator Michael Regan, Remarks to CERAWeek About EPA's Approach to Deliver Certainty for Power Sector and Ensure Significant Public Health Benefits, (Mar. 10, 2022), https://www.epa.gov/speeches/administrator-michael-regan-remarks-ceraweek-about-epas-approach-deliver-certainty-power.

extensive experience implementing flexible compliance approaches, which have contributed to the broad and continued success of the CAA and the other environmental statutes, while reducing compliance costs. For example, EPA has set standards and then provided multiple compliance pathways instead of limiting the methods and manners that sources can use to meet standards. As it implements the holistic approach, EPA should:

- Where permissible, provide the ability to "opt-in" to more compliance pathways for new standards, allowing multiple compliance pathways for members to provide situational flexibility;
- Use subcategories as part of its approach in order to tailor standards as much as possible and provide additional, opt-in compliance options;
- Ensure that the environmental and investment certainty benefits of EGU retirements provide broader system flexibility to minimize costs to customers and promote reliability; and,
- Where allowable, provide market mechanisms for compliance and expand averaging options.

- *Recognize the Important Role of Natural Gas-Based Turbines in Integrating Zero-Carbon Resources and Maintaining Broader System Reliability* – New and existing natural gas-based combustion turbines have played and will play a significant role in reducing emissions from the power sector while helping to keep electricity reliable for customers. To acknowledge these benefits, EPA should:
  - Set standards that acknowledge that natural gas generation will continue to play an essential role in continuing the clean energy transition by emitting significantly less carbon than coal-based EGUs and by providing both 24/7 and quick start power, which allows for increased renewable integration and reliable power for customers;
  - Finalize upstream CAA section 111 methane regulations as ensuring that methane emissions from the entire natural gas supply chain are reduced is essential to the industry's ability to continue to use natural gas;
  - Work with industry to set standards that provide for flexibility and allow for the future integration of lower carbon or carbon-free fuels, like hydrogen, and carbon reduction technologies, like CCS, as these technologies develop; and,
  - Encourage RDD&D in other new technologies and fuels that could be used by or in connection with combustion turbines.

EPA has multiple options available to it in determining what flexibilities should be offered to states and units. EPA's approach to these in the context of these new rulemakings should be expansive: flexibility should be considered concurrently and holistically, with the goal of providing maximum flexibility for both new and existing units to successfully capture and aid the industry's ongoing clean energy transformation and aid states in the development of approvable compliance plans.

3. *Organization of this submission.*

This paper is organized into five general chapters:

- Chapter 1: Flexibility in regulatory approaches, compliance, and implementation are essential to EPA's long-term success under the CAA and are supported by the statute.

This chapter focuses briefly on EPA's underlying statutory authority and focuses on viable regulatory pathways consistent with that authority.

- Chapter 2: New technologies will be essential to achieving the sector's clean energy transformation, and EPA's regulatory structures can help advance those technologies. This chapter addresses current turbine technologies, as well as new clean energy developments regarding carbon capture, hydrogen, and ammonia.

- Chapter 3: Subcategories are an effective flexibility tool for both new and existing sources, and EPA should utilize them as part of its holistic, integrated approach. This section focuses on potential subcategories for EPA to consider in both new source and existing source rulemakings.

- Chapter 4: Existing source compliance flexibilities are crucial and should be included in proposed existing source guidelines for states that will support their development of approvable compliance plans. This section identifies compliance flexibilities that EPA should consider including in its existing source guidelines, with a focus on program design features that have been successful for members in multiple contexts.

- Chapter 5: There are additional considerations for EPA as the Agency moves forward. This includes continued engagement with industry and reliability considerations, as well as environmental justice, community transition, and energy equity considerations.

These chapters and this submission are not intended to be an exhaustive glossary on issues relating to EPA's holistic, integrated approach and how it may impact any CAA section 111 rulemakings. EPA has sent a list of questions and inquiries to stakeholders as part of its outreach process—many of the answers to these questions are contained in this submission, which is organized into this narrative for ease of access by multiple stakeholder audiences. This submission is intended to continue the conversation between the Agency and EEI's members and is intended to support the proposal and finalization of regulations that recognize and facilitate the emissions reductions and clean energy progress already being made by electric companies and their fleet transition plans.

Chapter 1 -- Flexibility in Regulatory Approaches, Compliance, and Implementation are Essential to EPA's Long-Term Success Under the CAA and are Supported by the Statute.

EPA's ability to provide a range of flexibilities in both the standard setting process and in defining compliance options is grounded in the text of CAA section 111 and, broadly, in EPA's decades-long implementation of the CAA. In general, regulatory and compliance flexibilities are a practical and longstanding method of helping affected sources—both mobile and stationary—comply with environmental regulations in efficient, cost-effective, and commonsense ways. The electric sector has long experience implementing emissions trading regimes, averaging provisions, and permit specific terms in cost effective and efficient manners. These flexibilities contribute to the broad and continued success of the CAA in reducing pollution and promoting public health and are features of environmental statutes: namely, EPA generally has set standards and then provided compliance pathways that enhanced options available to industry and states instead of limiting the methods and manners that sources can use to meet standards.

EPA's own most recent report acknowledges this reality: since the 1990 CAA amendments, the many flexible compliance regimes promulgated by the Agency have resulted in significant emissions reductions and a marked reduction in unhealthy air quality days, all at lower than predicted costs to industry and customers.[15] Many of the regulatory programs enacted by EPA to attain and maintain the NAAQS in the past three decades have contained significant regulatory flexibilities—from market-based trading,[16] to wide ranging averaging provisions,[17] to creative permit terms,[18] to innovative methods of estimating reductions from new industry activities.[19] In sum, EPA sets standards and targets, and American industry works to engineer the least cost and

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[15] EPA, Our Nation's Air, https://gispub.epa.gov/air/trendsreport/2019/#naaqs.

[16] *See, e.g.,* Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 63 *Fed. Reg.* 57356 (Oct. 27, 1998); the Clean Air Interstate Rule, 70 *Fed. Reg.* 25,161 (May 12, 2005); the Cross-State Air Pollution Rule (CSAPR), 76 *Fed. Reg.* 48,208 (Aug. 8, 2011); the CSAPR Update Rule, 81 *Fed. Reg.* 74,504 (Oct. 26, 2016); and the Revised CSAPR Update Rule, 86 *Fed. Reg*. 23,054 (Apr. 30, 2021).

[17] *See* Florida State Implementation Plan Approval for Hillsborough County, 82 *Fed. Reg.* 30,749 (July 3, 2017).

[18] *See* Prevention of Significant Deterioration/Title V Greenhouse Gas Tailoring Rule, 75 *Fed. Reg.* 31,513 (June 3, 2010).

[19] *See* EPA, Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans (July 2012), https://www.epa.gov/sites/production/files/2016-05/documents/eeremanual_0.pdf.

most effective way to get there with supportive regulatory frameworks from their states and EPA that incentivize flexible compliance.

EPA should build on these successes by incorporating regulatory and compliance flexibilities and market-based mechanisms to address GHG emissions from EGUs under CAA section 111. Indeed, the power sector has been the most successful implementer of these types of programs, and EPA should adopt these types of flexible approaches to power sector regulation here and in future rulemakings. The CAA underpins such an approach, and EPA should ground its flexibility-centric approach in the statute.

1. *Providing significant flexibility is supported by the statute and helps the Agency realize the statute's aims.*

The statutory text of CAA section 111 itself supports a flexibility-centered approach to both standard setting and compliance. The CAA requires EPA to determine the BSER as a first step in setting standards to limit emissions from new or existing sources in a source category. These standards are required to reflect the level of emission limitation that is achievable using that BSER by sources within that category.

CAA section 111(a) reads:

> The term "standard of performance" means a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.

In making its BSER determinations, EPA must engage in two separate inquiries. First, EPA must establish that the proposed system of emission reduction is "adequately demonstrated." Second, EPA must determine that the proposed emission limitation is "achievable" using that system. *See Nat'l Asphalt Pavement Ass'n* v. *Train,* 539 F2.d 775, 785 (D.C. Cir. 1976) ("[I]t is the system which must be adequately demonstrated and the standard which must be achievable.") Under section CAA 111(b), EPA then is required to set performance standards that reflect the BSER for categories of new sources, which includes modified and reconstructed sources. *See* 42 U.S.C § 7411(b)(1)(B).[20] These federal standards of performance must reflect the "degree of emission limitation" that EPA has determined is "achievable through" the BSER. 42 U.S.C. § 7411(a)(1). For *new* sources, including modified and reconstructed sources, EPA both determines the BSER *and* sets the emission limitation with which those sources must comply. EPA is required to review, and revise if appropriate, standards for new units at least every eight years. *See* 42 U.S.C § 7411(b)(1)(B).

[20] This paper does not focus on modified or reconstructed units, but the discussion applies to these units equally.

Once performance standards are set for new units, CAA section 111(d) requires EPA to address existing sources. The statute instructs that EPA must "prescribe regulations which shall establish a procedure…under which each state shall submit to the Administrator a plan which …establishes standards of performance for any existing source for any air pollutant." While these standards of performance must also reflect the BSER identified by EPA, it is the states that set them, and thus the states that translate the BSER into emission limitations for existing sources in the state. States have more flexibility to address existing units under section 111(d) than EPA has with respect to new units under section 111(b). For example, states can consider the remaining useful life of existing EGUs when setting emissions standards for those units.

In short, EPA defines BSER for both new and existing sources, but states have a significant role in translating that BSER into emissions limits for existing sources. And, EPA has a significant ability to provide both units and states substantial flexibility.

2. *Adequate demonstration of technology allows EPA to capture ongoing technological advancements on commercially deployed projects.*

In order for a section 111 standard of performance to be adequately demonstrated, EPA must determine that: (1) the system of emissions reduction upon which the emission limitation is based is "adequately demonstrated," and (2) the emission limitation is "achievable."[21] In general, courts have determined that, in order for a technology to be adequately demonstrated, EPA should show (1) the need for deployment of the relevant system in commercial-scale operations, as well as (2) the necessity for the emission limitation to be achievable throughout the industry.

Existing precedent consistently supports the fact that, in order to be adequately demonstrated under section 111, a system must at least be in commercial-scale use in the relevant source category or by a source of comparable design and function. In *Essex Chemical Corp. v. Ruckelshaus*,[22] the D.C. Circuit examined EPA's standards for sulfuric acid plants based on dual absorption systems. Such systems were in operational use in a U.S. elemental sulfur burning plant at the time that EPA conducted its testing for the standards,[23] and as such there was no dispute about EPA's conclusion

[21] In setting the requirement that a system be adequately demonstrated, Congress "stated three other key criteria – cost, non-air quality health and environmental impact, and energy requirements – as factors the EPA must take into account." *Am. Lung Ass'n v. EPA*, 985 F.3d 914, 952 (D.C. Cir. 2021) (citing 42 U.S.C. § 7411(a)(1)). The D.C. Circuit has further explained that "[a]n adequately demonstrated system is one which has been shown to be reasonably reliable, reasonably efficient, and which can reasonably be expected to serve the interests of pollution control without becoming exorbitantly costly in an economic or environmental way." *Essex Chem. Corp. v. Ruckelshaus*, 158 U.S. App. D.C. 360, 486 F.2d 427, 433 (1973). *See also Am. Lung*, 985 F.2d at 962; and *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973) (whether a system is adequately demonstrated "cannot be based on 'crystal ball' inquiry")(citation omitted).

[22] *Essex Chem. Corp. v. Ruckelshaus,* 486 F.2d 427 (D.C. Cir. 1973).

[23] *Id.* at 435-36.

that dual absorption systems were adequately demonstrated for elemental sulfur burning plants.[24] However, the court noted that "there is nothing in the record to indicate any basis for the conclusion that the dual absorption process can perform efficiently in a recycle, or spent acid, plant. As such, dual absorption simply has not been 'adequately demonstrated' within the meaning of § 111(a)(1) of the Clean Air Act . . . for use with *other than elemental sulfur feedstock plants*."[25]

The existing case law also supports the idea that, while an essential step along the road to adequately demonstrating a technology, pilot scale data alone is insufficient for adequate demonstration purposes. In *Sierra Club v. Costle,*[26] the D.C. Circuit considered emissions control technology for coal-based EGUs. While the discussion focused on the standards set employing wet scrubbing technology as the BSER, which was widely-used at the time and was considered BSER, the court clarified that it did "not hold that dry scrubbing is adequately demonstrated technology"[27] despite some extrapolated pilot scale data at the time in the record. In that instance, EPA itself had recognized that "'the major uncertainty which exists with dry SO_2 removal technology is the absence of experience at large-scale facilities.'"[28] and determined that "it would be premature to conclude that dry scrubbing is adequately demonstrated technology."[29] While today dry scrubbing technology is widely utilized across the industry, at the time of *Costle* in 1981, that was not the case.

In short, EPA's existing precedent supports EPA setting standards that are based on commercially deployed and deploying technologies that can be achieved throughout the industry, allowing EPA to stay abreast of and mirror existing and actively deploying technological trends in the power sector.

3. *Achievability throughout the industry is an essential part of technology being adequately demonstrated.*

Existing precedent also makes clear that Congress intended section 111 standards to apply as long as those standards were achievable "throughout the industry."[30] In effect, adequately demonstrating

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[24] *Id.*

[25] *Id.* at 435 n.19 (emphasis added).

[26] *Sierra Club v. Costle*, 657 F.2d 298 (D.C. Cir. 1981).

[27] *Id.* at 341 n.157.

[28] *Id.* (citation omitted).

[29] *Id.*

[30] *See, id.* at 341 n.157 ("We see no basis on this record which would justify extrapolating from the pilot scale data to the conclusion that dry scrubbing is adequately demonstrated for full scale plants throughout the industry." (emphasis added)).

a technology for a source category understandably involves that technology being available to the entire source category as an option. In *National Lime Association v. EPA*, the D.C. Circuit concluded that the section 111 standards were unsubstantiated because "the record d[id] not support the 'achievability' of the promulgated standards for the industry as a whole."[31] Likewise in *Portland Cement Association v. EPA*, [32] where the court rejected industry claims that EPA failed to consider the impact on Portland cement kilns of older design. the court found that "EPA demonstrated how all regulated kilns could meet [the] standards," since EPA based its limits "on control technologies that can be applied in any kiln type and achieve the same control levels that would be expected with a new kiln at similar costs."[33]

In summary—and sensibly—adequate demonstration means a technology must be commercially deployed/deployable across the industry such that the resulting standards are achievable throughout the industry. Demonstration projects are important to drive the development of critical carbon-free technologies, but their existence does not satisfy case law regarding adequate demonstration for CAA section 111 purposes.

4. *EPA has significant flexibility in setting and implementing new source standards including authority to use subcategories.*

In determining BSER and setting standards for new units under section 111(b), EPA has substantial discretion, particularly in how to define the units to which a particular BSER determination and standard applies. These sub-categories—discussed at length in chapter 3 *infra* for both new and existing sources—are a useful flexibility because they allow EPA to recognize different fuels, different operating parameters, and different control technologies options for units that otherwise could fall into the same broad source category. EPA also can differentiate between units based on type, class, or size. Several of these potential flexibilities are discussed below.

For example, EPA has distinguished between fossil fuel-fired boilers based on fuel types (*e.g.*, coal, oil, natural gas).[34] These differentiations were largely based on EPA's assessment of the cost and efficacy of post-combustion controls to remove air pollutants from different types of EGUs. While the most recent new source performance standards (NSPS) tightened limits for sulfur dioxide,

[31] *Nat'l Lime Ass'n v. EPA*, 627 F.2d 416, 431 (D.C. Cir. 1980) (emphasis added).

[32] *Portland Cement Ass'n v. EPA,* 665 F.3d 177 (D.C. Cir. 2011).

[33] *Id.* at 190.

[34] *See, e.g.*, 40 C.F.R. 60.43Da (establishing standards for sulfur dioxide where EPA set different requirements for solid or solid-derived fuel and liquid or gaseous fuels).

particulate matter, and nitrogen oxides mostly across the board,[35] a less stringent standard was established for units that burned coal refuse. [36]

EPA's ability to set standards for different kinds of units within a source category also can extend to providing different and more flexible compliance options for those units. For example, in the most recent NSPS for EGUs, discussed above, EPA provided an alternative to the NOx standard for units that elected to comply with a combined NOx/CO standard.[37]

In at least one instance, EPA also has created an "off ramp" for smaller facilities and allowed flexible compliance options. In the 1995 NSPS for Municipal Waste Combustors (MWC), the Agency allowed affected municipal waste combustors with a capacity of less than 35 megagrams/day to not comply with emission standards applicable to other sources.[38] This rule additionally allowed larger facilities to utilize emissions averaging to demonstrate compliance for two or more units.[39]

More recently, in establishing performance standards for petroleum refineries, EPA amended several existing provisions to extend the emission limit averaging time from 24 hours to 365 days. EPA additionally created three subcategories of sources and allowed these subcategories to meet "either the concentration-based NOx emissions limit or the heating value-based NOx-emission limit."[40] Sources within Southern California were also allowed a choice of whether to comply with federal NSPS limits for certain flares or local air quality district rules.[41]

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[35] *See National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units*, 77 *Fed. Reg.* 9,303 (Feb. 16, 2012).

[36] *Id.* at 9,423-424. It should also be noted that EPA can distinguish as between classes, types and sizes within source categories subject to an NSPS. This provides another level of discretion. In a concurring opinion in *ASARCO v. EPA*, 58 F.2d 319 (D.C. Cir. 1979), Judge Leventhal indicated that "the terms 'classes' and 'types' are broad enough to permit the Administrator to set different standards for modified facilities than for newly constructed facilities that perform the same function, if he determines that such a distinction is appropriate in a given case." *Id*. at 330.

[37] *See* EIA, *supra* note 1

[38] 60 *Fed. Reg.* 65,387, 65,391 (Dec. 19, 1995). Plants firing a small amount of municipal solid waste were also exempted. *Id.* at 65,387.

[39] *Id.* at 65,416-17.

[40] 77 *Fed. Reg.* at 56,428. (Sept. 12, 2012)

[41] *Id*. at 56,432.

5. *Existing source flexibilities are essential to EPA setting successful existing source guidelines under CAA section 111.*

Regarding existing sources, EPA has tremendous latitude to offer any number of subcategories as it defines BSER and for states to use in translating BSER into emissions standards. Existing precedent supports EPA's authority to differentiate, both for new and for existing sources, between different classes, types, and sizes of sources, or to allow states to do so when applying BSER to an existing source within its borders. This authority can be so broad as to exempt units from standards if appropriate. As noted above, EPA has done so for smaller new sources in some circumstances in the past. And, the Supreme Court has at least suggested that if an overall cap (as defined by BSER) is based on "the application of particular controls and sources could have complied by installing them,"[42] emission credit trading may be permissible as a compliance measure.

EPA has also, in previous rules, argued for significant compliance flexibility as a legal matter. The Agency's 1995 rule promulgating MWC emission guidelines[43] allowed state plans the *option* to average emissions from units within a large MWC plant and to trade emissions credits between MWC plants.[44] In doing so, however, EPA set emission limits for averaging that were about 10 percent lower than if these limits applied to an individual plant.

In 2005, EPA issued the Clean Air Mercury Rule (CAMR) under CAA section 111(d), capping mercury emissions from coal-fired power plants. There, EPA first determined that technological systems were available to control mercury, but that it would take multiple years to install such controls across the existing fleet. CAMR's cap-and-trade system (allowing at least some affected sources to avoid installing technological controls) was based on EPA's determinations that such a system would: (a) constitute a "standard"; (b) reflect the degree of emissions limitation achievable; and (c) for coal-based EGUs, constitute BSER.[45] Under CAMR, states had the option of adopting "substantially similar" regulations, but if they adopted other standards, EPA indicated that it would review the state plans pursuant to the 40 C.F.R. 60.24(h)(2)-(5).[46]

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[42] *West Virginia,* Slip Op. at 21-22.

[43] *See Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources; Municipal Waste Combustors*, 60 *Fed. Reg.* 65,387 (Dec. 19, 1995).

[44] *Id.* at 65,402.

[45] 70 *Fed. Reg.* at 28,616-17. EPA additionally justified its cap-and-trade system on the basis that it would have the effect of encouraging the deployment of Hg-specific control technology. 70 *Fed. Reg.* at 28,615.

[46] This criterion was subsequently deleted from the C.F.R. following vacatur of CAMR. The D.C. Circuit in *New Jersey v. EPA,* 517 F. 3d 574 (D.C. Cir. 2008), however, did not reach the merits of EPA's interpretation of its CAA section 111(d) authority; rather, the court determined that EPA had improperly "de-listed" the source category from CAA section 112, thus invalidating EPA's attempt to regulate under section 111.

Further, as part of the briefing surrounding both the Clean Power Plan (CPP) and the Affordable Clean Energy (ACE) Rule, the D.C. Circuit found in *American Lung Association and American Public Health Association v. EPA, et al* (D.C. Cir., 2021) that EPA's ACE Rule limitation on the compliance measures that sources could use to comply with the states' standards of performance was arbitrary. EPA had categorically excluded two specific measures from the states' consideration: averaging and trading, and biomass co-firing. The Agency's concern was that compliance measures that are not source-specific could result in "asymmetrical regulation[,]" meaning the stringency of standards could vary across sources.[47] But the court found these concerns unpersuasive.

Because the D.C. Circuit held that the EPA erred by concluding that CAA section 111(d) unambiguously required that BSER be source specific, the court noted that it must "necessarily reject the ACE Rule's exclusion … of compliance measures it characterizes as non-source-specific."[48] The court also noted that even if EPA might reasonably limit compliance measures in specific situations based on its determination of the best system for reducing particular types of emissions with localized consequences, the statute imposes no requirement that such limitations be uniform across the regulation of different pollutants—in effect, there is no requirement for "symmetry" in regulation between standard setting and compliance. "Regardless of any policy-based reasons the EPA offers for limiting compliance measures, then, its decision to exclude averaging and trading and biomass co-firing is foreclosed by its legally erroneous starting point."[49]

None of these provisions were addressed directly by the Supreme Court's *West Virginia* decision, which focused exclusively on the major questions doctrine and focused mostly on the authority underlying the BSER determination made by the agency in the CPP. As a result, that decision does not limit EPA's authority to offer states and affected sources broad compliance flexibility within an existing unit context.

6. *EPA should provide both flexibility and a technology forward approach.*

EPA's ability to provide a range of flexibilities in both the standard setting process and in defining compliance options is grounded in the text of CAA section 111, case law, and the Agency's experience implementing a variety of CAA programs. The statutory text of CAA section 111 itself supports a flexibility-centered approach to both standard setting and compliance, and EPA's existing precedent supports EPA setting standards that can be achieved throughout the industry. This allows EPA to stay abreast of and mirror existing and actively deploying technological trends in the power sector, while also providing states and sources significant flexibility in achieving emissions goals so that technology can ensure emissions reductions in a cost effective and reliable

[47] *See Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating units; Revisions to Emission Guidelines Implementing Regulations*, 84 *Fed. Reg.* at 32,520 (July 8, 2019) at 32,556.

[48] *Am. Lung Ass'n v. Env't Prot. Agency*, 985 F.3d 914, 957 (D.C. Cir. 2021).

[49] *Id.* It should also be noted that numerous state programs, discussed *infra* in Chapter 4 of this submission, exempt biomass from GHG requirements given the characteristics of biomass fuel sources.

manner. EPA should move forward with a flexibility-based, technology conscious approach to CAA section 111 rules meaning that: as new technologies are developed, deployed, and adequately demonstrated, the Agency should set standards based on those developments using the authority found in CAA section 111.[50]

[50] EPA must focus on the adequately demonstrated status of technology as it is proposing and finalizing these rulemakings, especially given that EPA's standards for new units are effective on proposal. A standard cannot both be based on expected technology developments and also be adequately demonstrated, as required by the CAA. That said, as technology advances, EPA can and should update those standards to reflect these new developments and can do so more quickly than the statutory eight-year review period for NSPS.

Chapter 2 – New Technologies Will be Essential to Achieving the Clean Energy Transformation, and EPA's Regulatory Structures Can Help Advance Those Technologies.

As EPA considers setting emissions standards for new sources, along with a review of the performance of current section 111(b) sources in the ongoing clean energy transition, there are several emerging technologies for the Agency to consider. Principal among these considerations for EPA is the role of natural gas-based turbines in integrating zero-carbon resources and maintaining broader system reliability. New and existing natural gas-based combustion turbines, including those in a combined cycle configuration, have played and will continue to play a significant role in reducing emissions from the power sector while helping to keep electricity reliable for customers. New standards should not make it difficult or expensive for these units to play this essential role.

Additional technical information regarding existing unit operation characteristics, developments in hydrogen and ammonia fuel use in turbines, and the status of CCS technology will be submitted as separate appendices.

1. *Current turbine performance supports tightening the existing new source standard.*

Currently, "base load" natural gas combined cycle (NGCC) units must meet a standard of 1,000 lbs. CO_2/MWh gross, calculated on a 12-operating month rolling average basis. Simple-cycle combustion turbines must meet 120 lbs. CO_2/MMBtu, calculated on a 120-operating month rolling average basis. These standards have been in place since their finalization in 2015.

A review of the existing performance of units permitted since these standards became effective reveals that EPA clearly has the record to lower the standards for NGCC units by approximately 20 percent, given that existing unit performances come in far below the 1,000 lbs. CO_2/MWh on a 12-month rolling average basis. Many units are operating near or below 800 lbs. CO_2/MWh across a variety of operating conditions, although units that report emissions below that threshold might not have been faced with the full variety of operating conditions and or be subject to the degradation that occurs with continued unit operations over longer periods of time.

Regarding simple-cycle turbines (CTs), the vast majority of turbines since 2015 have been built in areas with high renewables penetration: Texas, Oklahoma, and California. These resources have been built to address variability in of the production of wind and solar resources, which have been deployed in significant quantities in all three states, which also cross three separate transmission entities. EPA should consider the significant value these assets provide in integrating increasing amounts of renewable generation reliably and affordably on to the electric grid, especially in light of the significant new tax incentives for renewable generation passed by Congress in the Inflation Reduction Act.[51] Therefore, it may not be appropriate to continue to address emissions from these

[51] EPA should consider whether to revisit the de facto capacity factor limitation in the current standard given how essential these units are in renewables integration. As EEI has noted to EPA regarding the existing standard, the need for and importance of quick start units is only anticipated to increase as additional renewable generation comes online. Quick-start CTs are simple cycle

sources exclusively via a capacity factor limitations. A rate limitation may be more consistent with how these units are actually operated. As discussed *infra*, allowing some units to "opt in" to capacity factor limitations could be appropriate—the difference is allowing unit owner/operators to proactively determine how to best use those resources as opposed to creating a nationwide restriction.

2. Surmounting barriers to new technologies.

There are several emerging energy technologies that have the potential to support additional and significant EGU emissions reductions. A discussion of three such technologies is below. These are: hydrogen, ammonia, and carbon capture and storage (CCS). As set forth further below and in the more detailed documents attached, each of these technologies presents significant promise and efforts are underway to move each technology to commercial deployment.

However, each technology also faces several challenges that are significant and likely will not be overcome in the near future. This includes challenges related to elements of the system for each energy technology, including production, transportation, and storage. As noted above, fundamental to the decision to set a section 111 standard is the requirement that it be achievable throughout the industry. Consequently, any BSER discussion that does not address whether all elements of a technology system can be integrated at commercial scale with sources across the country is inherently lacking. The full operability of all elements of a technology system is particularly vital for EGUs given the power sector's obligation to be available and on call to provide power whenever it is needed. Pointedly, *no other source category* has this public service obligation to operate—or the penalties that come with failing to provide reliable electricity to customers. As a result, for example, a demonstration of the integration of hydrogen, including all system elements, with EGUs is critical in order to make a finding on adequate demonstration: the nation's electricity customers must be assured not only that the technology works, but also that it allows generators to meet their obligations at the same time.

These challenges to hydrogen, ammonia, and CCS need to be affirmatively surmounted prior to being part of any BSER for EGUs. Accordingly, at present these challenges represent serious barriers to considering hydrogen, ammonia, or CCS as part of the BSER determination today given the requirement that the BSER be adequately demonstrated under section 111 precedent. There may be significant benefits to EPA to wait on such a designation for any and each of the technologies as the BSER for EGUs now. Instead, EPA should start laying the groundwork so that each could be considered in a future BSER analysis when all necessary elements of each system

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natural gas-based turbines that are highly efficient, able to start up and shut down much faster than conventional turbines and handle rapid load changes more easily than industrial frame turbines. The use of efficient, fast-ramping generation sources allows for the integration of higher levels of variable renewable energy resources while maintaining system reliability, reducing costs for customers, and providing further environmental benefits by reducing the utilization of less-efficient sources of generation that would otherwise be called upon, resulting in overall lower mass emissions despite potentially having a higher emissions rate as expressed in lbs CO_2/MWh. EPA should also consider the potential need to operate combined-cycle facilities in simple cycle mode should variable resources require such operations in order to integrate those resources reliably.

are adequately demonstrated as an available, commercial-scale technology for EGUs nationwide. This would not prevent EPA from taking the actions under section 111 noted in other sections of this paper now, as EPA can invoke its section 111(b)(1) review-and-revise authority in the near future, once these technologies have been adequately demonstrated. It also would allow EPA to take advantage of these technological developments as they happen much more quickly than if the Agency had no existing record. EPA should open a docket along with any proposal; This docket could build on the work EPA began earlier this year when it released its white paper on greenhouse gas reduction options from combustion turbines.

3. *Hydrogen as a fuel shows significant promise for future use in reducing power sector emissions.*

Hydrogen is an emerging energy technology that holds tremendous promise as a tool to aid in reducing emissions across a variety of sectors and applications, including potential use in EGUs. Excitement around advancing towards hydrogen deployment at scale has been growing over the last several years and has been demonstrated not only by industry, but also through significant commitments to support hydrogen development by a number of governments across the world. In the United States, this includes the historic $9.5 billion dollar investment in hydrogen development in the Infrastructure Investment and Jobs Act (IIJA), as well as the hydrogen tax credits and other incentives in the Inflation Reduction Act.

Realizing the potential for hydrogen deployment at scale through the United States will require strategic vision, collaboration, and continued research, both to ensure reliability across the value chain and to allow hydrogen to become cost competitive. To this end, as required under the IIJA, the U.S. Department of Energy (DOE) released its National Clean Hydrogen Strategy and Roadmap in late September 2022. In this document, DOE recognizes the remaining challenges to hydrogen deployment at scale "includ[ing] lack of hydrogen infrastructure, lack of manufacturing at scale, cost, durability, reliability, and availability challenges in the supply base across the entire value chain."[52] DOE also sets forth strategies to overcome these challenges, including the Regional Clean Hydrogen Hubs initiative, an $8 billion federal cost share investment to demonstrate and develop "a network of clean hydrogen producers, potential clean hydrogen consumers, and connective infrastructure located in close proximity"[53] over the next several years. DOE issued the initial funding opportunity announcement for the Regional Clean Hydrogen Hubs program in late September 2022, concept papers are due in mid-November 2022 and full applications for the program are due in April 2023. This program has spurred significant interest, with multiple hub coalitions announced throughout the country that include partnerships among Industry, government bodies, and research institutions.

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[52] Hydrogen Roadmap at 35 (citing S. Satyapal, "Testimony of Dr. Sunita Satyapal Director for a Hearing on Hydrogen," U.S. Senate Energy and Natural Resources Committee, Feb. 2022, https://www.energy.senate.gov/services/files/FE1C53B0-3925-46E3-B1D3-B8E2C0DD92B6.)

[53] H2 Hubs FOA at 8 (citing Infrastructure Investment and Jobs Act, Public Law 117-58, sec. 813(a) (Nov. 15, 2021), https://www.congress.gov/bill/117th-congress/house-bill/3684.)

DOE's interest in developing a hydrogen economy and helping to enable the use of hydrogen in EGUs goes beyond IIJA. DOE is also highly focused on reducing the cost of hydrogen to assist in providing a foundation for development of hydrogen at scale. In 2021, DOE launched the Hydrogen Earthshot, aimed at reducing the cost of electrolytic hydrogen from $5/kg to $2/kg by 2025 and $1/kg by 2030. The IIJA includes a $1 billion investment in Clean Hydrogen Electrolysis Program. The purpose of this program is to establish a research, development, demonstration, commercialization, and deployment program for purposes of commercialization to improve the efficiency, increase the durability, enhance safety, and reduce the cost of producing clean hydrogen using electrolyzers. Further, DOE has provided multiple funding opportunities over several years to support hydrogen development. This includes its January 2021 $160 million funding opportunity announcement for *Fossil Energy Based Production, Storage, Transport and Utilization of Hydrogen Approaching Net-Zero or Net-Negative Carbon Emissions*.[54] The development of these hydrogen initiatives and a broader hydrogen economy will have benefits beyond the power sector as well, energizing and promoting development in the communities EEI's members serve as economic engines.

In addition to the challenges DOE notes, there also is a lack of operating projects at scale, both in the United States and abroad, as well as numerous open U.S. regulatory and legal questions. In sum, as DOE aptly explains in the National Clean Hydrogen Strategy and Roadmap, "[t]hough there are significant challenges, zero and low-carbon hydrogen can be a key part of a comprehensive portfolio of solutions to achieve a sustainable and equitable clean energy future. And the United States is stepping up to accelerate progress through unprecedented investments in clean energy."

4. *Ammonia could be another promising way of reducing power sector emissions.*

Ammonia also has recently received noteworthy attention for its potential use in electric power generation as a method to further reduce sector emissions. While IIJA did not include direct funding for ammonia, because ammonia is produced using hydrogen, federal investment and incentives to promote and grow the hydrogen economy have also been seen as a positive for the ammonia sector. This includes not only provisions specific to the hydrogen industry, but also those related to CCS.

Like hydrogen, ammonia, particularly "clean" ammonia, faces a number of challenges that will need to be overcome to enable commercial scale use throughout the industry. Government and

[54] DOE Announces $160 Million for Projects to Improve Fossil-Based Hydrogen Production, Transport, Storage, and Utilization, U.S. Dep't of Energy (Jan. 15, 2021), https://www.energy.gov/articles/doe-announces-160-million-projects-improve-fossil-based-hydrogen-production-transport. This included programs aiming to make significant advancements in net-zero or negative carbon hydrogen production from modular gasification and co-gasification of mixed wastes, biomass, and traditional feedstocks; solid oxide electrolysis cell technology; carbon capture; advanced turbines, which aimed to advance gas turbine combustion system performance for turbines fueled with high purity hydrogen, as well as hydrogen and natural gas mixtures; natural gas-based hydrogen production; hydrogen pipeline infrastructure; and hydrogen subsurface storage.

industry are investing in addressing these cost, technology, and infrastructure challenges. With that investment, there is reason to be optimistic that these challenges will be overcome.

5. *CCS continues to be an essential future technology.*

A third emerging energy technology that has significant potential to help reduce emissions across the energy economy, including in EGUs, is CCS. This technology, while still in the development stage, has the future potential to accelerate the rate of carbon emissions reduction, reduce the impact on customer costs, and help maintain reliability of the energy grid.

In its October 18, 2021, update to its *Carbon Capture and Sequestration (CCS) in the United States* report, the Congressional Research Service (CRS) explained that "[s]ome studies have suggested that development of a national CO_2 pipeline network that would address the broader issue of greenhouse gas reduction using CCS may require a concerted federal policy, in some cases including federal incentives for CO_2 pipeline development. In 2020, enacted legislation included provisions to facilitate the study and development of CO_2 pipelines that could be used for CCS."[55]

Recognizing the importance of this technology and the need for further development to reach deployment, Congress included multiple CCS-related programs in IIJA. This includes the Carbon Capture Technology Program,[56] the Carbon Capture Demonstration and Pilot Programs,[57] the Carbon Dioxide Transportation Infrastructure Finance and Innovation Program,[58] the Carbon Storage Validation and Testing Program,[59] and the Carbon Utilization Program.[60] Collectively, these programs represent over $8 billion in federal investments in the development of technology and infrastructure to support use of CCS in the future energy economy.

As with hydrogen and ammonia, CCS faces a number of significant, but surmountable challenges. These include likely insufficient CO_2 pipeline infrastructure,[61] no federal regime for CO_2 pipeline

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[55] *Carbon Capture and Sequestration (CCS) in the United States, Cong. Research Serv.,* p 8 (2021), https://sgp.fas.org/crs/misc/R44902.pdf (citations omitted).

[56] H.R. 3684 117th Cong, Sec. 40303 (2021).

[57] *Id*. at Sec. 41004.

[58] *Id*. at Sec. 40304.

[59] *Id*. at Sec. 40305.

[60] *Id*. at Sec. 40302.

[61] At present, there is a relatively small system of CO_2 pipeline in the United States, totaling about 5,000 miles. Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of Carbon Capture, Use, and Storage, Nat'l Petroleum Council, Chapter 2, p 2-1 (Mar. 12, 2021), https://dualchallenge.npc.org/files/CCUS-Chap_2-030521.pdf. However, these pipelines are mainly dedicated to enhanced oil recovery (EOR). Rail, truck, and vessel transport are technically

permitting and no eminent domain authority available for CO_2 pipelines,[62] various other challenges related to CO_2 transportation and storage including the long timeline for permitting CCS-related infrastructure,[63] liability concerns regarding the stored CO_2,[64] challenges around creating a significant market for carbon beyond enhanced oil recovery (EOR), and potential limitations geographically on available storage facilities.[65,66] Congressional funding and industry efforts likely

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feasible, but are only cost-efficient for short distances, would require special purpose tanks, or have not been demonstrated other than in isolated instances. *See id. at* p 2-6. Consequently, to support hydrogen production from natural gas with CCS, CO_2 pipeline infrastructure will need to scale up, which will require "significant investments, planning, and community engagement and analysis." Report to Congress on Carbon Capture, Utilization, and Sequestration, Council on Envt'l Quality, p 8 (2021), https://www.whitehouse.gov/wp-content/uploads/2021/06/CEQ-CCUS-Permitting-Report.pdf. The Council on Environmental Quality's (CEQ) June 2021 report to Congress on CCS recognized this reality, explaining that "if the United States is to achieve its climate goals, research suggests that CCUS deployment should increase tenfold over the next decade." *Id.* at p 7.

[62] As a result, project developers must obtain certificates of public convenience and necessity from each state through which their pipelines pass and, absent state eminent domain authority, must negotiate rights-of-way, which can be both time and cost intensive. In addition, land use requirements for new build pipelines may implicate non-air quality health and environmental concerns.

[63] For example, the Global CCS Institute has noted that "[a]ccessing pore space for geological storage of CO_2 [ ] is not yet routine." Blue Hydrogen, Global CCS Instit., pp 18, 20 (Apr. 2021), https://www.globalccsinstitute.com/wp-content/uploads/2021/04/Circular-Carbon-Economy-series-Blue-Hydrogen.pdf. CRS's October 18, 2021 report further noted that "the transport and storage steps still face challenges, including economic and regulatory issues, rights-of-way, questions regarding the permanence of CO_2 sequestration in deep geological reservoirs, and ownership and liability issues for the stored CO_2, among others." Carbon Capture and Sequestration (CCS) in the United States, Cong. Research Serv., p 4 (Oct. 18, 2021), https://sgp.fas.org/crs/misc/R44902.pdf.

[64] *See* Carbon Capture, Utilization, and Sequestration Guidance, 87 *Fed. Reg.* 8,808 (Feb 16, 2022).

[65] Currently, the majority of demand for carbon is for EOR. *See* Carbon Capture and Sequestration (CCS) in the United States, Cong. Research Serv., n.38 (Oct. 18, 2021), https://sgp.fas.org/crs/misc/R44902.pdf (citing Written testimony of Dr. S. Julio Friedmann, U.S. Congress, Senate Committee on Energy and Natural Resources, Full Committee Hearing to Examine Development and Deployment of Large-Scale Carbon Dioxide Management Technologies, 116th Cong., 2nd sess., July 28, 2020 ("For good reasons, many seek to find ways to use CO_2 to create economic value in a climate-positive way. Today, the primary use of CO_2 is for enhanced oil recovery. This is an important near-term pathway and provides opportunities to finance projects, scale-up technologies and reduce costs.").

[66] While there are multiple potential opportunities, "CO_2 use is the least mature component in the CCUS technology chain." Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of

will help overcome a number of these challenges, but, at present, CCS deployment remains in the nascent stages in the United States.

6. *EPA should set an improved new source standard that is hydrogen and ammonia ready.*

Given the focus on hydrogen and ammonia as fuel options in combustion turbines, EPA should focus on setting a new source standard that achieves two objectives simultaneously: first, improving the efficiency requirements for turbines being installed today; and second, ensuring that the next generation of installed turbines can take advantage of hydrogen and ammonia blending when those fuels are available and adequately demonstrated. Given the existing record, EPA has ample evidence to move to ensure increases in efficiency today—standards that reflect the current operational capabilities of combined cycle units will result in notable improvements in the CO_2-related performance of these units. This will also have the benefit of ensuring that states that permit units at EPA's BSER floor will permit units that utilize the most recent and commercially available natural gas turbine technologies, which will result in increased efficiency.

Second, and critically, setting a more rigorous efficiency standard today will have the effect of ensuring that the next generation of turbines built can take advantage of hydrogen and ammonia blending once those fuels are commercially available and deployed. As discussed above, newer, more efficient turbines are the ones being selected for initial efforts to blend hydrogen as part of unit operations given the capabilities of those newer turbines. By requiring new turbines built in this cycle of EPA's review of standards under CAA section 111(b) to be based on the latest in turbine technology, EPA can ensure that these units—along with any future new unit standards—are considered during this cycle of EPA's NSPS review. These units would then be able to take advantage of hydrogen or ammonia blending capabilities once those fuels are demonstrated as cost effective and available for use in the sector in coming years.[67] This synergy will be essential to continuing the sector's transition in future years, and EPA should pursue such an approach.

7. *Given the status of technology, EPA should seek to provide additional flexibility to new sources.*

EPA has several compliance flexibilities it can offer to new sources. EPA should prioritize those options that could allow units to choose among multiple paths to comply with EPA's BSER. This

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Carbon Capture, Use, and Storage, Nat'l Petroleum Council, Chapter 2, p 9-1 (Mar. 12, 2021), https://dualchallenge.npc.org/files/CCUS-Chap_2-030521.pdf. Critically, "there are significant challenges to overcome before CO_2 use technologies can be deployed at scale." *Id.* These include technology maturation, where "[e]fforts to bridge the gap from concept or laboratory scale to commercial-scale viability are required;" cost and energy efficiency challenges, particularly given the significant amount of energy needed to convert CO_2 into end-use products; and issues related to carbon's permanence and related indirect impacts. *Id.* at pp 9-1 and 9-2. As such, at present, "[i]ncreased investment in fundamental research and commercialization support is essential to expedite the pace at which CO_2 use technologies would be ready for commercial-scale deployment." *Id.*

[67] EPA should evaluate these units by size and potential ability to meet the standard once those fuels are determined to be adequately demonstrated.

will facilitate diverse unit owner/operator approaches to complying that also consider customer affordability and grid reliability. EPA should consider promulgating new standards with broad compliance averaging provisions that companies could opt to use. This includes utilizing facility-wide averaging to capture the entire impact of projects deploying new gas units or choosing to deploy cleaner generation on sites co-located with fossil-based generation. It also includes the ability of new facilities to choose single month, 12-month-rolling, annual, three-year, or five-year averaging provisions to comply with a new source standard in a way that accurately reflects the grid value and environmental benefits of the new unit.

EPA also should affirmatively allow for mass-based compliance options for new units. NSPS are traditionally set on an efficiency rate basis; for GHG standards for EGUs, these are expressed in pounds of carbon dioxide per hour. Allowing companies to translate the rate-based standard into a mass-based tonnage limitation would provide significant operational flexibility for units that cycle frequently—e.g., that ramp "up and down," operate at various loads, or have frequent startups and shutdowns to meet grid demands—which are becoming more essential and more common as greater amounts of variable renewable resources interconnect to the grid. Further, cycling degrades individual unit efficiency since units operate more efficiently at higher load profiles when compared to continued cycling. Instead of having units meet a continuously applicable rate, which limits their ability to integrate newer and cleaner resources, allowing companies to translate the BSER rate into a mass-based tonnage limit would provide for environmental integrity, offer more straightforward compliance options, and support utility planning based on known unit constraints via carbon dioxide tonnage limits. While such approaches would provide less environmental protection in the context of traditional air pollutants, such concerns are not relevant for GHGs, which are well mixed in the atmosphere once emitted, minimizing localized pollution concerns.

EPA should also consider that operating efficiency is also correlated to a combined cycle CTs ambient conditions. Highly efficient operations are not available under all ambient conditions and vary based on the location of a CT. EPA should also consider degradation of efficiency over time. An additional benefit would be ease of incorporating these units into state-based trading schemes, as discussed below, to the extent states would like to utilize such an approach.

Chapter 3 – Subcategories Are An Effective Tool For Both New And Existing Sources, And EPA Should Utilize Them As Part Of Its Holistic, Integrated Approach.

As discussed above, EPA has the ability to design compliance flexibilities so that the implementation of new section 111 standards reenforces existing technology development trends within industry, focusing on those technologies and activities that are adequately demonstrated while taking costs and energy impacts into account. One significant additional tool in EPA's belt for both new and existing sources that can further facilitate the sector's ongoing clean energy transition is the potential creation of tailored subcategories. Creation of more tailored subcategories, especially those that units can opt into, would recognize units that can operate at lower capacity thresholds, commitments to retire, or other units with unique characteristics that could be beneficial to the energy grid, as well as the broader benefits that those provide, including broader environmental benefits. EPA should use these types of subcategories—and more, as needed or warranted—to continue to enable the industry's development and deployment of new clean energy generation while also helping to transition older, higher emitting assets into retirement in an orderly fashion consistent with environmental progress and reliable system operations.

EPA has used subcategories across its rulemakings—including in the CAA section 111 context as discussed above—in ways that can be instructive for the Agency as it undertakes rulemakings here. Using these approaches from other programs will be consistent with the Administrator's integrated, holistic approach to the power sector. A discussion of several of the other types of subcategories EPA has used in other programs follows:

1. *Utilization limitation opt-in subcategories for new sources may be appropriate.*

As with mass-based compliance options discussed above, allowing units to choose a utilization limitation, similar to an operating hours limitation or a capacity-factor limitation, would provide additional flexibility for new natural gas-based units. For example, companies and states could elect to translate the BSER rate into a utilization limit, expressed as a percentage of nameplate generating capacity, that would provide for environmental integrity, offer more straightforward compliance options, and support utility planning based on known unit constraints via utilization limitations.[68] This approach could be attractive to companies operating in ISO/RTOs with significant renewables penetration by providing easily implemented unit limitations when bidding into organized markets.

EPA has adopted an approach of this sort in its existing new source regulations, with new combustion turbines being limited to what amounts to a 33 percent capacity factor based on implementation of EPA's 120 lbs. CO_2/MMBtu standard, as discussed above. Creating a specific utilization-based limitation source category that units could opt-in to—for both turbines and combined cycle units—could allow companies and unit operators more certainty in terms of

[68] This could be especially important during this time in the clean energy transition when the pace of new unit additions is not completely aligned with ongoing reliability considerations, discussed *infra*.

building new units to provide for specific, reliability-based capacity challenges in the next decade and beyond as increasing amounts of renewable energy gets integrated into the grid.

2. Unit closure subcategories will facilitate significant emissions progress for existing units.

Many EEI members are in the process of decommissioning or repowering existing coal-based EGUs, which will result in significant pollution reductions through avoided future emissions. EPA has created targeted subcategories for unit closures in other contexts, most notably the cessation of coal subcategory in the 2020 Clean Water Act (CWA) steam electric effluent guidelines (ELG Rule) that allows for decommissioning/repowering by December 31, 2028. This subcategory allows those facilities that have already filed closure commitments to continue on a path to decommission/repower these assets without installing additional control equipment that could extend the lives of these units to support cost recovery. EPA has recognized that control installations that extend the lives of these EGUs is counterproductive. EPA should provide a subcategory pathway for units to decommission/repower into the early 2030s, which would include enforceable shutdown obligations, as part of an approach to existing unit guidelines—especially to the extent that EPA also proposes new and expanded retirement options in the upcoming proposed ELG rulemaking.

The Agency is also on firm legal footing by establishing a subcategory for units that are planning to retire in coming years. EPA has taken such an approach under the CWA, specifically in its 2014 final rule titled *National Pollutant Discharge Elimination System—Final Regulations To Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities*. 79 *Fed. Reg.* 48,300 (Aug. 15, 2014) (Final 316(b) Rule). EPA explicitly noted that it considered that "[u]nit closures provide clear reductions in flow … EPA expects flow reductions due to unit closures could be reasonably included as part of a facility's impingement mortality and entrainment reductions strategy." 79 *Fed. Reg.* at 48,332. The regulations for cooling water intake structures under CWA section 316(b) contain exemptions for units that are scheduled to retire before the expiration of the current permit—permittees that planned to retire their facilities before their then-current permit expired did not need to comply with substantive portions of the rule. *See* 40 C.F.R. § 122.21(r)(ii)(F). Units that are scheduled to retire within one permit cycle would not be subject to the substantive portions of the rule so long as they signed a certified statement specifying the facility's last operating date. *Id*. at § 122.21(r)(ii)(G).

Establishment of a subcategory for retiring units to avoid extending the life of a plant and unnecessary costs is not unique to the CWA. EPA has also used a similar approach in other CAA programs, most notably in both the Regional Haze rule context and in designations for the sulfur dioxide (SO_2) National Ambient Air Quality Standards (NAAQS). In both of those CAA programs, EPA acknowledged that retiring or repowering units would suffice for compliance with those federal environmental requirements as long as the retirements were federally enforceable by a date certain.

Specific to the NAAQS program, when promulgating air quality designations under CAA section 107(d) for the SO_2 NAAQS, EPA acted pursuant to a consent decree with environmental petitioners to designate areas in several different groups. Crucially, the Agency stated that areas that had electric generating units that had announced an upcoming retirement and cessation of operations

date did *not* need to be classified as not attaining the NAAQS, since their pending retirement obviated the need for further regulatory actions an implementation of nonattainment provisions.[69] In essence, the Agency crafted a regulatory category that took into account unit retirements and should do so again.

Unit retirements provide long-term environmental benefits, which EPA has recognized. Accordingly, these unit closures should be recognized under the CAA section 111 rules as part of EPA's compliance and implementation flexibilities. The Agency should also strive to ensure that the compliance timelines in any CAA section 111 rule aligns with the other regulations—particularly the steam electric ELG rulemaking—in order to achieve the aims of the Administrator's holistic approach to regulating the power sector.

3. Recognizing the remaining useful life of units and other factors.

CAA section 111(d) mandates that EPA allow states to consider the remaining useful life and other factors when setting standards for existing facilities. In the Regional Haze program, EPA has utilized its discretion to allow retiring units that would otherwise be required to install control technology under an analysis of Best Available Retrofit Technology (BART) to not install those controls. The CAA requires each regional haze plan to "contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress" toward the statutory goal of eliminating manmade visibility impairment in Class I Federal areas. *See* 42 U.S.C. § 7491(b)(2). Similar to the factors required for EPA to review in the CWA for promulgating ELGs, when determining what measures amount to "reasonable progress," a state must consider four criteria: (1) the costs of compliance; (2) the time necessary for compliance; (3) the energy and non-air quality environmental impacts of compliance; and (4) the remaining useful life of any existing source subject to such requirements. *Id.* at § 7491(g)(1).[70]

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[69] The Agency's second round of designations focused on areas that "contain any stationary sources that had not been announced as of March 2, 2015, for retirement and that according to the EPA's Air Markets Database emitted in 2012 either (i) more than 16,000 tons of SO_2, or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2/mmBTU." Response to Significant Comments on the Designation Recommendations for the 2010 Sulfur Dioxide Primary NAAQS, Docket No. EPA-HQ-OAR-2014-0464, (June 30, 2016).

[70] To ensure States achieve "reasonable progress," every plan must require certain large-scale, stationary sources of air pollutants to implement controls known as BART or adopt a BART alternative. *Id*. at § 7491(b)(2)(A); 40 C.F.R. § 51.308. The CAA defines BART as being based on a source-specific evaluation of five factors. *See Oklahoma v. EPA*, 723 F.3d 1201, 1208 (10th Cir. 2013). These "BART factors" are

(1) The costs of compliance;
(2) The energy and non-air quality environmental impacts of compliance;
(3) Any existing pollution control technology in use at the source;
(4) The remaining useful life of the source; and,
(5) The degree of visibility improvement which may reasonably be anticipated from the use of BART.

42 U.S.C. § 7491(g)(2).

While the Regional Haze program has had a focus on source-specific evaluations of the BART factors, important for this analysis is that EPA and states have concluded in numerous different contexts that an evaluation of all of the above factors may lead to the imposition of no further controls given the pending retirement of the source in question. This has primarily been the result of an analysis of the remaining useful life of the source when weighed against the other four BART factors; specifically, that the installation of pollution control technology can impose significant costs for some environmental gains, but that those costs and environmental benefits do not outweigh the environmental and economic benefits of retiring the source.[71]

In the context of new CAA section 111 guidelines for existing sources, allowing states to recognize facilities that have installed control technology for other rules that have not yet fully depreciated those balances—but that have plans to decommission/repower into the early 2030s—would support a holistic approach to power sector regulations, as well as help manage customer affordability concerns. EPA should consider using the CAA's mandate that the Agency consider the remaining useful life of units as the basis for creating various subcategories for existing sources. Analyzing the remaining useful life of sources could underpin several types of retirement-based subcategories and also can incorporate reliability considerations through combining retirement dates with unit utilization limitations to allow companies and states to keep capacity available to deal with significant system events such as extreme heat or deep freezes, especially while we work to build and interconnect newer, cleaner generating resources. The Agency should take an expansive approach to the statutory requirement to consider the remaining useful life of existing EGUs such that these considerations serve as the underpinning of important subcategories, at a minimum.

[71] Most recently, EPA has endorsed such an approach in its approval of Arkansas' Regional Haze State Implementation Plan and withdrawal of a Federal Implementation Plan wherein the Agency determined that there was no need to install pollution control technology on BART eligible units given that those units had an enforceable order to switch the type of coal used and then to cease use off coal by the end of 2028. *See Approval and Promulgation of Implementation Plans; Arkansas; Approval of Regional Haze State Implementation Plan Revision for Electric Generating Units in Arkansas*, 84 *Fed. Reg.* 51,033 (Sept. 27, 2019). Specifically, EPA concluded that Arkansas satisfied the requirements of the CAA by "fully considering the five statutory factors…Taking into account the remaining useful life of White Bluff Units 1 and 2 (based on Entergy's enforceable Administrative Order to cease coal combustion by December 31, 2028), and the resulting cost-effectiveness of controls, as well as the anticipated visibility improvement of the SO_2 control options and the other BART factors." *Id.* at 51,036.

Chapter 4 – Existing Source Compliance Flexibilities Are Crucial To EPA Promulgating Successful Existing Source Guidelines To The States.

As discussed above, EPA has broad flexibility it can offer states and existing sources under section 111(d). EPA should prioritize approaches that allow states and units to choose among multiple potential paths to comply with EPA's standards for existing units based on EPA's determination of BSER. This will promote compliance while supporting affordability and reliability in a wide variety of potential grid circumstances. This chapter focuses on five specific flexibilities EPA should include as part of any existing source guidelines.

1. *EPA should encourage the use of broad averaging provisions and allow mass-based compliance options to provide for additional planning certainty.*

As with new sources, EPA should provide broad and varied averaging provisions that companies could use to address multiple separate unit operation scenarios. Specifically, EPA should allow for existing sources to utilize a wide array of averaging provisions: 12 month rolling averages, single year averaging, three-year averaging, five-year averaging or averaging across the entire compliance period that EPA might define. Outside of the previously discussed facility and timescale averaging, EPA also should consider fleet-wide and state-wide averaging to capture a broad range of operating scenarios that result in reduced emissions as the grid continues to transform and existing assets play different roles. Allowing a variety of averaging provisions will allow for compliance to provide lower costs and also continued environmental integrity across the entire life of any existing source guideline implementation.

As with new sources, EPA should allow companies and states to translate the rate-based standard into a mass-based tonnage limitation. Instead of having units meet a continuously applicable rate, which limits their ability to integrate newer and cleaner resources, mass-based tonnage limitations provide for environmental integrity, offer straightforward compliance, and support utility planning based on known limitations. EPA has offered these options before—notably in proposed implementation of the CPP and also CAMR, not to mention the variety of mass-based approaches under Title IV and CAA section 110—and should do so again.[72] An additional benefit would be ease of incorporating these units into state-based trading schemes, as discussed below, to the extent states would like to utilize such an approach. Allowing mass-based approaches also are well understood in the power sector, as trading programs for interstate ozone transport are mass-based and several states already do mass-based carbon trading as part of their approach to regulating the sector.

EPA should put forward specific guidance on converting any proposed emissions rate into a mass-based compliance option on numerous fronts including unit-specific, fleet-wide and state-wide mass-based approaches. Ensuring broad applicability of any mass-based approach will provide the power sector with tremendous flexibility.

[72] Several states provide the ability to convert rate-based limits into mass-based tonnage caps as part of the PSD program, with those specific tonnage limits incorporated directly into their CAA Title V permits.

2. *EPA should note its acceptance of state-based programs for compliance with existing source guidelines.*

Mass-based compliance options also would provide for easier recognition of state-based trading programs, should States want to move forward with existing or new trading regimes to address GHG emissions for the power sector. Notably, several states and regions, including California and the Northeast, have existing trading regimes. Oregon and Washington will begin new trading regimes in 2023 and other states could develop their own as a compliance method. The sector has successfully implemented trading programs related to other pollutants for decades in ways that allow electric companies to deliver both least cost outcomes and significant emissions reductions. Indeed, the power sector has been the most successful implementer of these types of programs.

At a minimum, EPA should consider approval pathways for state trading programs for existing sources. Examples of existing state programs that EPA could consider as complying with existing source guidelines would be the Regional Greenhouse Gas Initiative (RGGI) covering numerous states in the Northeastern U.S., and Western states' cap and trade program, which covers existing fossil-based sources, among others. This could provide simple, straightforward compliance for numerous state and units, and should also be easily implemented by affected sources. EPA should work on guidance or regulatory language that would allow for streamlined state plan approval for state-based trading programs utilizing mass-based approaches.

EPA also should consider options to approve both existing and future state laws that directly address the sector's ongoing transition to clean energy through state authorities. Several states—including Virginia's Clean Economy Act, the Carolinas Carbon Plan in North Carolina, Washington's Clean Energy Transformation Act, and New York's Reforming the Energy Vision Strategy—have directly enacted far-reaching plans to reduce GHG emissions—taking into account state-specific circumstances. EPA should work towards finding approval pathways in any existing source guidelines for these state specific laws and programs.[73]

3. *EPA should ensure States take reliability considerations into account during the state plan process.*

Maintaining system reliability is a critical mission for electric companies—one that requires significant coordination and planning as older fossil assets retire and are replaced by cleaner generating assets over the next decade. As noted, more than 50 EEI companies have announced forward-looking carbon reduction goals, three-quarters of which include a net-zero by 2050 or earlier equivalent goal. To achieve these goals, EEI members are deploying more zero-emitting resources, closing older fossil-based generation, and investing in the research, development, demonstration, and deployment of new, 24/7 clean technologies.

[73] EPA should also consider amending its implementing regulations to provide states with additional time beyond the existing 9 months to develop and submit plans, so states can finalize programs and submit them to the Agency.

The power sector is in a particularly challenging time for reliability as retirements have not been replaced by new generation sources across the U.S. due to a variety of factors. This has created resource and capacity adequacy concerns.[74] Providing additional regulatory flexibility—including the flexibilities identified in this submission—will help address reliability concerns by allowing electric companies and unit owner/operators to plan their unit operations in a manner that will provide environmental integrity and reliable, affordable electricity. Flexibility in compliance will allow the power sector to continue its clean energy transition by retiring existing fossil assets in an orderly fashion while bringing on substantial new clean energy assets in a manner consistent with companies' clean energy commitments and reliability obligations. While EPA cannot regulate exclusively on reliability grounds—and has rightly indicated no interest in doing so—the imperative of providing reliable and affordable power is a factor for EPA to consider in choosing to provide the maximum amount of compliance flexibility to the sector to effectuate this transition successfully.

This requires coordination with RTO/ISOs and other stakeholders, including reliability regulators. A holistic approach that recognizes the imperative to maintain system reliability while transitioning to a clean energy future is essential to making this a success. Negative reliability impacts due to pressures from the ongoing transition could ultimately slowdown that transition, resulting in fewer environmental and economic benefits. EPA should work directly with EEI's members and the RTO/ISOs and other reliability organizations to develop factors for any reliability considerations that allow for the industry to continue to meet its reliability obligations while continuing the fleet transition.

4. EPA should start to create pathways to provide appropriate credit for electrification.

As the power sector moves toward a low- or no-emissions future, electrification is a tool that increasingly will be relied upon to address and reduce emissions from other sectors. Modeling that examines pathways for a net-zero economy by 2050 determine that significant electrification will be essential.[75] Electrifying other sectors, which serves to reduce emissions from those sectors, is

[74] Federal Energy Regulatory Commission, Office of Energy, Policy and Innovation, Office of Electric Reliability, *Winter Energy Market and Reliability Assessment 2022-2023*, A Staff Report to the Commission (Oct. 20, 2022) at 18-21 ("[A]lthough all regions are expected to maintain adequate reserve margins through the winter, reserve margins do not guarantee reliable operations, especially during winter…energy risks remain in several regions, especially as the resource mix continues to evolve."). *See also* North American Electric Reliability Council, *2022 Summer Reliability Assessment* (May 2022).

[75] *See, e.g.*, Eric Larson, et al., *Net-Zero America: Potential Pathways, Infrastructure, and Impacts*, Final report (Princeton University, Oct. 2021) at 38, https://netzeroamerica.princeton.edu/the-report ("End-use efficiency improvements and electrification across all sectors are critical for reducing: the required build out of the energy-supply system to deliver the energy needed to meet the given level of energy service demands; and the demand for liquid or gaseous fuels, which are generally more difficult/costly to decarbonize than electricity, as suggested by the significantly increasing marginal prices for fuels across the different scenarios. Electrification itself provides large reductions in final energy needed for transportation and space and water heating because

critical to overall economy-wide decarbonization goals. Because the benefits of electrification are not dependent on the power sector achieving total decarbonization, it is possible that electrification could increase emissions from the power sector, even while total economy-wide emissions are reduced. This scenario is not likely in the near-term, but significant, accelerated transportation electrification could have this result. Having reliable and dispatchable generation capacity is critical to meeting future energy needs. Forecasted electricity demand has increased and will continue to become more pronounced with population growth, economic expansion, the utilization of electric vehicles, along with other energy intense industries such as data centers.

EPA should consider recognizing this potential challenge in any proposals under CAA section 111(b) or (d). At minimum, EPA should engage with states and unit owners/operators to start to develop frameworks for recognizing and crediting any increased emissions related to electrification. While this might not be imperative for this decade, because of the time period likely to be covered by these new GHG standards for fossil-based EGUs, EPA should signal its interest in fair crediting of reductions from other sectors.

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electric drive trains for vehicles and electric heat pumps for heating are intrinsically more efficient than using fuels for these purposes.").

Chapter 5 – Additional Considerations as EPA Moves Forward

As EPA considers CAA section 111 regulations for new and existing sources, the Agency has multiple other considerations as it moves forward including stakeholder engagement, ensuring coordination amongst governmental groups, addressing environmental justice communities, ensuring a just transition for impacted fossil fuel communities, working with states, the power sector, and also the public.

1. *EPA should continue to work proactively and holistically across the set of EGU rulemakings with the power sector, federal and state regulators, and reliability organizations.*

EPA should continue its policy of consistent outreach to all interested stakeholders in the power sector, the states and in the reliability organizations as it moves forward. Ensuring that these groups of stakeholders that are essential to the reliable, affordable, and increasingly clean operation of the electric system are engaged will allow these important stakeholders to clearly analyze and respond to EPA's holistic and integrated approach in a way that can make certain the ongoing provision of reliable and affordable power.

As discussed above, EPA should work directly with EEI's members, the RTO/ISOs and other reliability organizations to develop factors for any reliability considerations that allow for the industry to continue to meet its reliability obligations while continuing the fleet transition. EPA should also work to incorporate state environmental and economic regulators into these efforts as well, since both of those groups will have significant impact on the path EEI's members take in their states to achieve both their individual company goals and comply with EPA's CAA section 111 regulations. EPA should also consider convening discussions with select groups of states that may have joint interests in coordinating state plan submission. EPA should consider holding listening sessions and roundtables with a combinations of these groups of stakeholders in order to elicit numerous views simultaneously, building on the Agency's individual listening session approaches to date.

2. *Stakeholder outreach to environmental justice and fossil transition communities will be essential.*

The Administration has "committed to delivering 40 percent of the overall benefits of Federal climate, clean energy, affordable and sustainable housing, clean water, and other investments to disadvantaged communities that have been historically marginalized, underserved, and overburdened by pollution."[76] In addition to this investment, the Administration has mobilized nearly every Federal agency to transform hundreds of programs to "meet the Justice40 goal and ensure that disadvantaged communities are receiving the benefits of new and existing investments"[77] and given the directive that every Agency "shall make achieving environmental

[76] https://www.whitehouse.gov/ceq/news-updates/2021/12/02/delivering-on-justice40/.

[77] *Id.*

justice part of their missions."[78] Of the efforts to accelerate the implementation of the Justice40 Initiative, existing federal EPA programs serve as pilot programs for Justice40.[79] Further, agencies, including EPA, have launched new or strengthened equity and justice offices, strategies, and policies to pursue environmental justice and support on-the-ground change in communities.[80]

EPA should strive to continue to improve the coordination and communication between internal and external stakeholders relating to environmental justice and equitable development to foster the successful integration of environmental justice principles into their work. This is especially true of any CAA section 111 rulemaking, where the Agency has the ability to ensure transparency in regulatory development, provide active information sharing with impacted stakeholders, and build-in community-level and community-specific engagement into the regulatory process. Community engagement is critical for overburdened, environmental justice communities.[81] And, effective participation of the entire stakeholder community promotes equity and justice and works to ensure that the regulatory process is durable, providing certainty and regulatory frameworks that can be well understood and successful for electric companies and the local communities they serve.

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[78] Exec. Order No. 14,008, "Tackling the Climate Crisis at Home and Abroad," 86 *Fed. Reg.* 7,619 (Feb. 1, 2021).

[79] https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf.

[80] https://www.epa.gov/sites/default/files/2021-04/documents/regan-messageoncommitmenttoenvironmentaljustice-april072021.pdf.

[81] Overburdened Community - Minority, low-income, tribal, or indigenous populations or geographic locations in the United States that potentially experience disproportionate environmental harms and risks. This disproportionality can be as a result of greater vulnerability to environmental hazards, lack of opportunity for public participation, or other factors. Increased vulnerability may be attributable to an accumulation of negative or lack of positive environmental, health, economic, or social conditions within these populations or places. The term describes situations where multiple factors, including both environmental and socio-economic stressors, may act cumulatively to affect health and the environment and contribute to persistent environmental health disparities. https://www.epa.gov/environmentaljustice/ej-2020-glossary#:~:text=Overburdened%20Community%20%2D%20Minority%2C%20low%2D,disproportionate%20environmental%20harms%20and%20risks.

APPENDIX B

Additional Considerations for Clean Air Act Section 111 Compliance Flexibility for Both New and Existing Units

The U.S. Environmental Protection Agency (Agency or EPA) is moving forward with regulations under Clean Air Act (CAA) section 111 to address greenhouse gas (GHG) emissions (primarily carbon dioxide (CO_2) emissions) from fossil-based electric generating units (EGUs or units). The existing regulatory framework and recent court decisions provide some limitations, but also some latitude, to EPA regarding how to set standards to address EGU emissions. Significantly, EPA has a notable amount of flexibility in how standards are set and how the options for compliance are designed. This flexibility is essential to achieving emissions reductions from new and existing EGUs, both now and in the future, while also supporting the delivery of affordable and reliable electricity to customers.

The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. EEI members provide electricity for more than 235 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than seven million jobs in communities across the United States. EEI member companies invest more than $130 billion annually to make the energy grid smarter, cleaner, more dynamic, more flexible, and more secure in order to provide affordable and reliable electricity to customers. EEI's members are committed to getting the energy they provide as clean as they can as fast as they can, keeping affordability and reliability front and center.

EEI members are in the middle of a profound, long-term transformation in how electricity is generated, transmitted, and used. This transformation is being driven by a wide range of factors, including relatively lower prices for natural gas, particularly as compared to historic high prices, and renewable energy resources, energy efficiency and demand-side management, technological improvements, changing customer, investor and owner expectations, federal and state regulations and policies, and the increasing use of distributed energy resources. EEI members are well-positioned to continue to lead the nation's clean energy transformation. Across the industry, companies are investing in a broad range of affordable, carbon-free technologies and approaches with the goal of finding the most cost-effective ways to deliver resilient clean energy.

EPA has multiple options available to it in determining what flexibilities should be offered to states and units. EPA's approach to these in the context of these new rulemakings should be expansive: flexibility should be considered concurrently and holistically, with the goal of providing maximum flexibility for both new and existing units to successfully capture and aid the industry's ongoing clean energy transformation, as well as to aid states in the development of approvable compliance plans. This white paper focuses on providing that flexibility through the creation of "opt-in" approaches to compliance with CAA section 111.

EPA traditionally sets emissions rates requirements under CAA section 111, expressed as pounds of CO_2 per megawatt hour (lbs. CO_2/MWh). These limitations have typically functioned to ensure that new units are operating as efficiently as possible, thus minimizing emissions. At present there

are limited options for reducing emissions other than efficiency. In the near future, however, new gas units may blend hydrogen or use carbon capture technology to reduce emissions in addition to or instead of efficiency measures. When adequately demonstrated, EPA could support adoption of these technologies in multiple ways: including setting a hydrogen *or* carbon capture "capable" standard in conjunction with this traditional emissions rate-based efficiency approach or offering a mass-based compliance option for new units in conjunction with or as an alternative to a rate-based efficiency approach. These approaches could ensure that any new generation not only would use the most efficient technologies available—as regulated by the lbs. CO_2/MWh emissions limitation or the mass-based compliance option in terms of tons of CO_2—but also could enable future emissions reductions once hydrogen or carbon capture technologies[82] are demonstrated and cost effective for the power sector, while supporting reduced outage times associated with retrofits.[83]

One key flexibility available to EPA is the creation and use of various subcategories that would provide additional compliance approaches for owners and operators of units that "opt-in" to these compliance regimes. These subcategories would be grounded in EPA's discretion under the CAA to distinguish among classes, types, and sizes of affected units within categories of sources. Indeed,

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[82] As discussed at length in EEI's November submission to EPA, hydrogen co-firing is an emerging energy technology that holds tremendous promise as a tool to aid in reducing emissions across a variety of sectors and applications, including potential use in EGUs. CCS technology, while still in the development stage, has the future potential to accelerate the rate of carbon emissions reductions, and help maintain reliability of the energy grid. Costs remain an issue for both options at present. In addition, both hydrogen co-firing and CCS technology face a number of other challenges that will need to be overcome to enable commercial scale use throughout the industry. Government and industry are investing in addressing these cost, technology, and infrastructure challenges. With that investment, there is reason to be optimistic that these challenges will be overcome in this decade.

[83] "Capable" standards—sometimes referred to as "ready" or "capable-to-ready" standards—are not self-executing. Any future emissions limitations for then-existing units based on hydrogen co-firing or CCS technology would have to be the result of a future rulemaking under CAA section 111(d) in which EPA would analyze whether such technologies had been adequately demonstrated considering all the statutory factors. The statutory text of CAA section 111 itself supports a flexibility-centered approach to both standard setting and compliance, but not automatic increases in the stringency of standards.

The CAA requires EPA to determine the Best System of Emission Reduction (BSER) as a first step in setting standards to limit emissions from new or existing sources in a source category. These standards are required to reflect the level of emission limitation that is achievable using that BSER by sources within that category. While EPA has often expressed these limitations as emissions rates, the only statutory requirement is that the standards of performance must reflect the "degree of emission limitation" that EPA has determined is "achievable through" the BSER. EPA has latitude to express standards through non-rate means as long as those stay within the statutory bounds of being adequately demonstrated and achievable, taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements.

EPA has used this type of approach for the sector before—for the steam electric effluent limitation guidelines (ELGs) under the Clean Water Act, the mercury and air toxics standards under CAA section 112, and others—providing broad flexibility that support the sector's continuing clean energy transformation. This paper highlights several potential subcategories that EPA could consider adopting in its upcoming rulemakings. This paper also discusses the ability to convert rate-based standards into mass-based compliance options, which provides both flexibility and more assured emissions reductions when paired with some of these opt-in subcategories. This paper discusses each flexibility—multiple approaches to setting standards for new units; mass-based compliance subcategories for new and existing units—in turn, below.

Approaches for New Gas-Based Units, Including Hydrogen and CCS Capable Standards

EPA can provide an alternative compliance option for new gas units by defining an optional "capable" requirement for new units. Such an approach would ensure that, in addition to any new generation using the most efficient technologies available—as regulated by the lbs. CO_2/MWh emissions limitation—these new units would enable future emissions reductions at lower costs, once hydrogen co-firing or carbon capture technologies are demonstrated and cost effective for the power sector.

Given differences in the availability of resources and infrastructure necessary to support the use of hydrogen co-firing and carbon capture at EGUs at this time, it is possible that there will be areas of the United States where either hydrogen co-firing or carbon capture are a feasible technology, but likely not both. Consequently, any such "capable" requirement for new EGUs should be set in the alternative—allowing EGUs to opt to meet either the hydrogen ready or the carbon capture ready standard instead of requiring EGUs to meet both.[84]

EPA also should allow mass-based compliance by developing a methodology to translate from rate-to-mass compliance for new gas units that could be used in conjunction with or in lieu of traditional rate-based efficiency or technology "capable" approaches.

1. Hydrogen or CCS "Capable" Requirements

EPA should consider specifying the requirements for hydrogen co-firing or carbon capture "capable" standards. In practice, compliance with these specifications would be best done via a certification made by the unit owner/operator that would be incorporated into and filed along with the new unit's air permit. This certification could consist of a narrative description outlining the research that the company has undertaken regarding actions necessary for any successful future retrofit, including technology options, estimated costs, access to fuel and/or pore space, among other factors.

As hydrogen co-firing and CCS technologies develop, plant requirements may change. The requirements discussed below are based on the current state of technology and may not be

[84] The below discussion focuses on "at the unit" elements of a "capable" standard; it does not address the availability of hydrogen fuel or other infrastructure barriers for both hydrogen and CCS pipelines that exist. As discussed in EEI's November submission to EPA, these challenges are substantial and remain unresolved despite significant work and investment to address these concerns.

applicable in the future as technology advances. EPA should provide flexibility in defining the "capable" standards by acknowledging that these certifications may evolve over time and may not all be necessary to deploy the technology. EPA not only should provide a pathway for plant owners to demonstrate "capable" through an alternative engineering assessment compliance option but should address these issues on a unit-specific basis via the permitting process.

In addition to the narrative, a new facility could demonstrate that is "capable" through other concrete actions. The elements of a hydrogen co-firing capable and a CCS-capable unit are discussed below.

Elements of a Hydrogen Co-Firing "Capable" Standard

- *Consideration of additional space for future hydrogen pipes in laying the foundation for the turbine*. Some new turbines that could be capable of high hydrogen blending levels in the future will need additional space around the turbine to accommodate larger fuel piping. The installation of this larger piping would be more costly once the facility is constructed and in operation. Owner/operators could certify, if the turbine manufacturer anticipates needing additional space below the turbine for high levels of hydrogen blending in the future, that they have taken appropriate design steps to pour and construct foundations to accommodate these needs.

- *The consideration of additional space inside the Heat Recovery Steam Generator (HRSG) design for additional or future emission control systems*. Blending higher levels of hydrogen in turbines for power production decreases the overall CO_2 emissions from the unit, but also creates the potential for higher emissions of nitrogen oxides (NOx). In order to address the potential increased NOx emissions through the installation of additional, larger, or more advanced emissions control systems, owner/operators could certify that they have taken appropriate design steps to include necessary space in the power island to install these additional systems in the future to accommodate various hydrogen blend ratios.

- *Additional steps consistent with manufacturer needs and the generator's technology plan*. Owner/operators also could receive a certification from the original engine manufacturer (OEM) regarding the appropriate design steps—or provide their own explanation—for "at the unit" modifications that are foreseeable for successfully blending hydrogen in future years.

Elements of a Post-Combustion[85] Carbon Capture "Capable" Standard

[85] This paper discusses post-combustion "capable" requirements. There are emerging technologies that, if demonstrated, would limit CO_2 through a pre-combustion removal process. Because pre-combustion CO_2 removal would require significant design changes throughout the entire power island and facility, those are not addressed here as they would not lend themselves to a "capable" standard.

- *Consideration of additional space for future CO_2 pipes from the facility*. Turbines appropriate for the installation of carbon capture systems in future years may need additional space surrounding the turbine in order to accommodate additional CO_2 piping/pipelines to transport the captured CO_2 for storage or utilization. CO_2 piping will need to have space at the effluent of the capture unit, which may require that building foundations, piping, and duct banks be routed to preserve this space for future use. Owner/operators could state, if the turbine manufacturer anticipates additional space for CO_2 piping will be needed in the future, that the owner/operator has taken appropriate design steps to accommodate these needs.

- *The consideration of additional space in turbine design for the future installation of carbon capture systems*. Installation of carbon capture systems will require additional space behind, in front of, or near the turbine island in order to accommodate installation of this control technology. Owner/operators could state that they have taken appropriate design steps to include space in or near the turbine island to install these additional systems in the future.

- *Consideration of land use needs directly adjacent to the facility.* The equipment required to divert the exhaust gas and remove, cool, and compress the CO_2 requires nearly the same amount of space and same capital requirements as the gas-based unit itself. Currently, several different technologies are being pursued to be able to commercially achieve CCS, all of which would require significant additional space for installation. Owner/operators could state that they have taken appropriate design steps to include space in or near the facility to install these additional systems in the future.

- *Additional steps consistent with manufacturer needs*. Owner/operators also state what "at the unit" modifications that are foreseeable for successfully incorporating carbon capture systems in the future, including any additional power needs to operate the carbon capture.

It is worth noting that both hydrogen co-firing and CCS technologies are evolving and hold significant promise. However, overly prescriptive requirements could hinder the best available technology from being installed once it is commercially available given the potential array of future developments for these technologies. Accordingly, it is important that EPA strike a balance between "capable" requirements and ensuring that critical maximum flexibility is available to recognize and harness technology innovation.[86]

2. *Mass-Based Compliance for New Natural Gas Units*

[86] Since these technologies are still under development, EPA should work to provide flexibility and ongoing guidance as new information becomes available. Similar to EPA's Reasonably Available Control Technology, Best Achievable Control Technology, Lowest Achievable Emission Rate (RACT, BACT, and LAER, respectively) Clearinghouse, EPA should maintain a central database of this technology information to aid permitting agencies and future case-by-case permitting determinations.

As discussed in more detail below, there are several advantages to be gained from converting rate-based emissions limitations into mass-based tonnage budgets for regulated units. Since decreases in (or limits of) a unit's capacity factor have a direct impact on its CO_2 emissions profile, states, EPA, and units can employ a mass-based approach to leverage the emissions reductions benefits of a decrease in capacity factors, while preserving maximum operational flexibility to support overall system reliability by preserving the availability of units for resource adequacy, particularly during extreme weather events or other emergency conditions. For new natural gas-based units, this could be realized by agreeing to reduced utilization via capacity factor limits that are set below a "full" operations baseline in order to develop an operating tonnage budget on a unit-specific basis, for both for combined cycle and combustion turbine operation. Some unit owners/operates might want to pursue such an approach. This type of approach also could ameliorate local reliability concerns.

Mass-based tonnage budgets also provide flexibility for phasing in new technologies to reduce carbon emissions, such as CCUS or hydrogen co-firing. In these examples, a unit can initially comply with a massed-based tonnage budget through reduced operation. But, the option to retrofit and transition to compliance through hydrogen co-firing or CCUS provides an inherent incentive because the unit would be able to return to operations at a higher utilization rate. The advantage of this pathway is that it would provide flexibility in the compliance timeline and choice of technology adoption, while also avoiding the need to set a prescriptive "capable" standard for a technology that is still in early development stages.

Mass-Based Compliance Options

As noted above, mass-based compliance options provide significant and important operational and compliance flexibility. The Agency can and should authorize mass-based compliance. EPA has long used mass-based compliance for a wide array of CAA programs. For existing coal-based EGUs, these mass-based approaches work in conjunction with EPA's ability to create subcategories to facilitate compliance with CAA section 111(d) guidelines for existing sources or can be used on their own as part of a unit-specific approach included in a state plan. For purposes of this paper, a few representative examples show how mass-based calculations and approaches can work.[87] An illustrative unit and two separate scenarios based on an entirely hypothetical ten percent reduction in the emissions rate through the application of an unspecified "best system of emission reduction" demonstrates how to convert a rate-based emissions limitation into a mass-based tonnage budget:

Hypothetical Unit – Baseline Case

[87] For purposes of these hypotheticals, certain assumptions (e.g., capacity factors and emissions rates) have been kept constant for illustrative purposes. Real world operations—with their attendant capacity factor variations and resulting changes in emissions rates—will be more variable and more complex. Any application of these principles as part of a state plan must be the result of a unit-specific inquiry. That said, simplicity in assumptions in this paper is intended to showcase how rate-to-mass conversions can work and be paired with other flexibilities while preserving the significant emissions reductions and environmental certainty that can be associated with mass-based approaches. These examples also focus on existing coal-based units but could be applicable to all fossil-based units should EPA move forward with CAA section 111(d) guidelines for existing gas units at a future date.

Unit Size (nameplate capacity):	650 MW
CO_2 Emissions Rate:	2,075 lbs. CO_2/MWh
2020 Capacity Factor:	57%
2020 Generation (MWh):	3,250,000
2020 CO_2 Emissions (tons):	3,370,000

Unit Assumption Scenario 1

Unit Size (nameplate capacity):	650MW
BSER Application:	10% Reduction in Emissions Rate (1,875 lbs. CO_2/MWh)
Annual Capacity Factor:	57%
Annual Generation (MWh):	3,250,000
CO_2 Emissions (tons):	3,046,875
Difference (tons):	323,125

Unit Assumption Scenario 2

Unit Size (nameplate capacity)	650MW
BSER Application:	N/A (2,075 lbs. CO_2/MWh)
Annual Capacity Factor:	25%
Annual Generation MWh:	1,424,000
CO_2 Emissions (tons):	1,477,000
Difference (tons):	1,893,000

Retirement Subcategory

EPA should proactively include a subcategory that allows for units to opt-in to a federally enforceable retirement commitment as part of compliance with regulations for existing sources under CAA section 111(d). EPA has adopted a similar approach recently in the context of the Clean Water Act. EPA included a subcategory for the cessation of coal in the 2020 Steam Electric ELG Reconsideration Rule (2020 ELG Rule) to allow certain units the ability to forego compliance with new effluent limitations if the unit ceased combustion of coal by December 31, 2028. For units seeking to qualify as an electric generating unit that would achieve permanent cessation of coal combustion by December 31, 2028, those units filed a Notice of Planned Participation (NOPP) no later than October 13, 2021 (one year after the rule went into effect) to opt-in to the cessation of coal subcategory. Each NOPP includes enforceable retirement dates, timelines, and interim milestones, among other requirements.[88] EPA could adopt the framework of this approach

[88] The requirements include the expected date that each EGU is projected to achieve permanent cessation of coal combustion; whether each date represents a retirement or a fuel conversion; whether each retirement or fuel conversion has been approved by a regulatory body; what the relevant regulatory body is; a copy of the most recent integrated resource plan for which the applicable state agency approved the retirement or repowering of the unit subject to the ELG; certification of EGU cessation or other documentation supporting that the electric generating unit will permanently cease the combustion of coal by December 31, 2028, and; a timeline to achieve

incorporating the ability to retire units in both 2028 and in years beyond that as part of any CAA section 111(d) implementation plan.

Using this as a model, EPA should craft a retirement subcategory under CAA section 111(d) by including similar requirements for retiring units. Critically, a retirement subcategory would result in significant avoided future emissions, which would result in greater overall reductions than those that could be expected from any existing source guidelines and/or state plans that only provide emissions limits for these units. EPA should consider applying this subcategory to units retiring in both 2028 and in years beyond consistent with the timeframes in any existing source guideline and the ongoing clean energy transition plans companies are executing.

Using Unit Assumption Scenario 1, and assuming constant operations outlined, EPA could expect that, over a hypothetical eight-year program running from 2024-2032, total CO_2 emissions reductions of approximately 2,700,000 tons through the application of the BSER. However, should the same unit opt-in to the retirement subcategory and cease operations in 2028 instead of operating through 2032, the total avoided emissions over the same time period would instead be approximately 13,500,000 total tons. Moreover, as the unit would have ceased operations, these emissions reductions would be permanent.

Given this magnitude of reduced and avoided emissions, at minimum, EPA should both allow those units that already have opted into the coal cessation subcategory in the 2020 ELG Rule to provide the NOPP to the relevant state as it designs any CAA section 111(d) implementation plan—which would enable the state to determine that no additional requirements apply to the units slated for closure—consistent with the statutory authority to consider the remaining useful life of a unit, and also submit other enforceable shutdown commitments by and beyond 2028 given the prevalence of other commitments made by companies into the early 2030s. This would be consistent with EPA's goal of providing a holistic approach to regulations across environmental media for the power sector. This could be accomplished by "deeming compliant" commitments to reduce utilization or retire units pursuant to other rulemakings—e.g., the 2020 ELG Rule or any reconsideration rulemaking, retirements consistent with consent decrees, or other rules impacting the power sector as identified by EPA—as satisfying the requirements under CAA section 111(d). Recently, EPA proposed an approach to acknowledge and account for these other requirements in the Good Neighbor Rule, and it should adopt such an approach to any future existing source guidelines.[89]

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the permanent cessation of coal combustion with interim milestones and the projected dates of completion. Units under this subcategory must also submit annual progress reports detailing the completion of any interim milestones listed in the NOPP since the previous progress report, provide a narrative discussion of any completed, missed, or delayed milestones, and provide updated milestones. It is worth noting that compliance with the 2020 ELG Rule is December 31, 2025.

[89] As technology develops, existing coal-based EGUs may be replaced with low or zero-emitting resources such as advanced nuclear, CCS, and hydrogen-fueled EGUs. Given the novel nature of these technologies, delays in permitting and construction might occur. EPA and States should work with plant owners to grant as much flexibility as possible around enforceable retirement

Reduced Utilization

EPA also could allow unit owners/operators to opt-in to a subcategory that tracks future reduced utilization of affected units as part of compliance with regulations for existing sources under CAA section 111(d). This could include limitations on unit capacity factors in future years, which would be represented by permit-specific limits on unit operations similar to those currently used in other contexts (e.g., synthetic minor limitations, 4x16 operating hours limitations, etc.). Capacity factor and operating hours limits, and their equivalents, would reduce emissions relative to operational baselines while also allowing these units to be available to address potential grid reliability events, particularly maximum generating events to respond to extreme weather or unexpected unit outages. While EPA proposed a backwards-looking capacity limitation subcategory in the 2020 ELG Rule, a more effective approach (and one that better responds to the changing needs of the electric grid as its transitions to greater integration of renewable generation) under CAA section 111(d) would be to impose such limitations on a forward-looking basis consistent with state Integrated Resource Plans—including forecasted load growth from beneficial and reliability considerations in order to appropriately target reduced utilization limitations consistent with both needs.[90]

Decreases in the capacity factor will have a direct impact on the CO_2 emissions profile of each unit. States, EPA, and units can also utilize a mass-based approach to leverage the potential benefits of a decrease in capacity factors. In short, EPA and states could use reduced utilization and lower capacity factors to set an operating tonnage budget on a unit-specific basis.[91] Drawing on the Unit Assumption Scenario 1, above, and assuming constant operations under the first scenario discussed, EPA could expect over an eight-year program running from 2024-2032 total emissions reductions based on the application of BSER to be approximately 2,700,000 tons of CO_2. However, under a reduced utilization approach, were a unit to take a purely hypothetical reduced utilization limitation of a 25% capacity factor (Unit Assumption Scenario 2) for the entire program period and translate that limitation into a tonnage budget, the total avoided emissions from this approach would instead be approximately 15,144,000 tons of CO_2 while also providing each unit a significant amount of operational flexibility within that compliance tonnage budget to ensure grid reliability, particularly during extreme weather events and other emergencies.

Instead of expressing these limits in terms of capacity factor, however, EPA, states, and unit owners/operations could also opt to create a total tonnage budget for a unit for some period of time.

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commitments if retirement dates of existing EGUs are extended to accommodate in-service date delays for low or zero-emitting resources.

[90] Consistent with this type of approach, EPA also could consider crafting a limited-use subcategory that utilizes a capacity factor limitation paired with a long averaging period in order to preserve plants that provide important reliability services as needed. This is similar to approaches EPA has taken under CAA section 112 in the past.

[91] It also is worth noting that there are a variety of other factors to contemplate in a reduced utilization scenario, including rate structures and operations & maintenance requirements that must be addressed as facilities operate differently moving forward. These should be discussed and addressed during the state plan process on a unit-specific basis.

These tonnage budgets would be linked to reduced utilization limitations and would include enforceable budget caps with regular reporting regarding the size of the remaining budget, retirement dates (as applicable), and timelines for implementation and interim milestones, among other requirements. Once a unit had utilized the entirety of its tonnage budget, should it choose such an approach, then the unit would retire. This would allow for enforceability and guarantee environmental performance over the term of the budget and the program.

Combination Subcategory

EPA also could create a subcategory that combines the retirement and reduced utilization subcategories, creating one that includes both a future federally enforceable retirement limitation—likely in years beyond any existing or newly created retirement subcategory—with reduced utilization on the path to retirement. By way of example, if EPA had a retirement subcategory with a final retirement date of 2028, a combination subcategory could have an end date for retirement of 2032 with reduced utilization "stair steps" for every year beyond the retirement subcategory's 2028 date—e.g., 25%, 20%, 15%, 10%, retirement. This would provide environmental assurance in terms of the retirement, resulting in permanently avoided future emissions, and reduced emissions in the years leading up to retirement while allowing units to be available as critical capacity consistent with state plans and reliability concerns. The details of any such subcategory, which could be specific to a particular unit, ultimately should be determined by the state in the development of its implementation plan and approved by EPA.

Using the example from above, and assuming constant operations under Unit Assumption Scenario 1, again EPA could expect over an eight-year program running from 2024-2032 total emissions reductions based on the application of BSER to be approximately 2,700,000 tons of CO_2. For the final four years of that period, EPA could expect a reduction of 1,350,000 tons of CO_2. However, should the same unit utilize the combination subcategory and cease operations in 2032 with reduced utilization stairsteps as described above, the total avoided emissions from this approach and ultimate reductions would instead be approximately 7,572,000 tons of CO_2.

APPENDIX C

Considerations for Clean Air Act Section 111 Regulation of Existing Natural Gas Units

The U.S. Environmental Protection Agency (Agency or EPA) is moving forward with regulations under Clean Air Act (CAA) section 111 to address greenhouse gas (GHG) emissions (primarily carbon dioxide (CO_2) emissions) from fossil-based electric generating units (EGUs or units). The existing regulatory framework and recent court decisions provide some limitations, but also some latitude, to EPA regarding how to set standards to address EGU emissions. As EPA moves forward with setting the Best System of Emissions Reductions (BSER), it also has several potential technical and data challenges to consider, particularly with respect to existing gas-based units.

The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. EEI members provide electricity for more than 235 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than seven million jobs in communities across the United States. EEI member companies invest more than $130 billion annually to make the energy grid smarter, cleaner, more dynamic, more flexible, and more secure in order to provide affordable and reliable electricity to customers. EEI's members are committed to getting the energy they provide as clean as they can as fast as they can, keeping affordability and reliability front and center. This paper, in addition to the two others that EEI has filed in EPA's nonregulatory docket[1] related to forthcoming regulations for fossil-based EGUs under CAA 111, is intended to highlight key issues—and offer potential options and solutions—identified by electric companies regarding the development of GHG emissions standards for existing natural gas-based EGUs.

As noted in our previous papers, EPA has a considerable amount of flexibility in how standards are set and how the options for compliance are designed. This flexibility is essential to achieving emissions reductions from new and existing EGUs, both now and in the future, while supporting the delivery of affordable and reliable electricity to customers. EPA has multiple options available to it in determining what flexibilities should be offered to states and EGUs. In addition, those papers noted that EPA's approach to these rulemakings should be expansive: flexibility should be considered concurrently and holistically, with the goal of providing maximum flexibility for both new and existing units to successfully capture and aid the industry's ongoing clean energy transformation, as well as to aid states in the development of approvable compliance plans. Many of the flexibilities discussed in those papers—utilizing mass-based approaches, targeted and opt-in subcategories based on coordination with other rulemakings and utilization capabilities, and others—are also applicable to any existing source rulemaking for natural gas-based units.

However, the challenges EPA would face in the context of a section 111(d) rule for existing natural gas units are different and are the focus of this paper: the number of technical and data issues related to setting potential standards in a way that is technically and legally defensible. To the extent that EPA moves forward with regulations for existing natural gas units, such a move should support and facilitate the emissions reductions and clean energy progress already being

[1] EEI's November 2022 and February 2023 submissions are attached to this paper as well.

made by electric companies and their fleet transition plans. Any standards for the existing natural gas fleet should therefore work in concert with regulations for new units and the existing coal fleet—and these standards should be considered holistically.

Data Challenges in Setting BSER for Existing Gas-Based Units

EPA faces several challenges it must resolve before moving forward with any proposal for existing natural gas-based units under CAA section 111.[2] Chief among those issues is the sheer diversity of the types of units and the range of operating characteristics of the existing turbine fleet.

A brief description of natural gas-based turbines and the role they play in the power sector is warranted. Natural gas can be utilized in boilers, but is predominantly utilized in combustion turbines, which can either be designed as a simple cycle turbine or a combined cycle unit. A simple cycle combustion turbine (CT) combusts natural gas in a turbine that directly produces power. (This process is known as the Brayton cycle.) The combined cycle (CC) configuration combines the power produced from the simple cycle CT with a heat recovery steam generator (HRSG) which utilizes the exhaust heat of the CT to generate steam and then, via a steam turbine, produces additional power. The steam cycle is known as the Rankine cycle, and by combining it with the CT (Brayton cycle), the overall unit efficiency is increased. The power sector utilizes both for a variety of purposes—as discussed more below—but it is worth noting that while simple cycle turbines are less efficient from an emissions rate perspective than combined cycle units, they are able to reach full operating load more quickly given they do not utilize additional engineering components and processes that produce the Rankine cycle.

As the fleet continues to transition, natural gas-based turbines will continue to play a critical and evolving role in integrating increasing amounts of renewable generation and providing essential reliability services to allow for the ongoing retirement of the coal-based generation fleet while preserving customer affordability. Natural gas-based turbines are significantly more flexible than coal-based units given their ability to ramp quickly, especially as compared to other dispatchable units, including nuclear units and coal-based EGUs—e.g., they are able to come online quickly and provide power to the grid much faster while also being able to ramp down as needed. This fast-ramping ability both minimizes emissions related to start up and shut down and also helps to avoid emissions by supporting the integration of variable renewable generating resources.

Further, some units may operate at significant capacity factors—above 80 percent—for long periods of time to respond to system considerations, resulting in highly efficient generation from an emissions rate perspective.[3] Other units might instead respond to intermittent system needs, operating at capacity factors below 15 percent while still providing essential reliability services

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[2] This paper focuses specifically on combustion turbines; there are also units that utilize natural gas in boilers. Those units are subject to regulation under Subpart Ba, and face challenges more specific to boilers that utilize coal.

[3] In general, the emissions rate of an individual unit is more efficient (resultingly, lower) when it run at higher capacity factors. Units that operate at lower capacity factors have concomitantly higher, less efficient emissions rates despite having fewer mass emissions of CO_2.

and helping to reduce overall system emissions. In addition, units that operate at high or low (or even in between) capacity factors for long stretches are not guaranteed to remain in that mode as system needs continue to change. Units are obligated to respond when called upon based on those system needs, which will change further in coming years as the generation mix of the grid evolves and will require these units to operate differently. These changes will have a significant impact on the emissions and emissions rates associated with these units. This includes the potential for: units needing to switch between operation modes (e.g., simple v. combined cycle) to respond to voltage demands; units in specific locations running more or less often to respond to generation intermittency, transmission congestion, or new transmission that changes the dynamics of the operating grid; and the aging of the existing natural gas fleet. Each of these scenarios will result in a significant impact on the efficiency rates and the CO_2 profile of existing natural gas-based units and the associated efficiency rates for those units.

An additional consideration for EPA is the limited number of technical options to upgrade the performance of existing turbines. While there have been significant ongoing technological advances in turbine technology for both simple and combined cycle operations, the basics of turbine operation has not changed substantially. That is to say, while some of the materials and internal design components have been updated, the fundamental processes powering a turbine are essentially the same, the fuel has the same effective characteristics, and the additional technologies added for unit operations (heat recovery steam generator, selective catalytic reduction system) are all substantially similar. Further, operating efficiency also is correlated to the ambient conditions of gas turbines, including those operating in a combined cycle mode; several highly efficient operations are not available under all ambient conditions and vary based on the location of a CT.[4]

In essence, there are significantly fewer levers for technical and technological improvement for natural gas-based units when compared to coal-based units, which can gain efficiencies through upgrades to the steam boiler or several of the associated pollution control devices required with coal-based units, all of which result in a significantly less efficient combustion process when compared to producing electricity from a steam turbine. While there might be some technological improvements available through targeted upgrades to blade turbines or through maintenance optimization, these are not necessarily widely available, nor will those upgrades necessarily realize efficiency gains and environmental improvements from those units. It is also worth noting that efficiency projects both degrade over time and may not result in significant improvements—particularly if the unit is dispatched differently to respond to evolving grid needs and requirements.

All of these factors can impact a unit's emissions performance, but not all will impact every unit or result in the same potential emissions reductions. In short, it is difficult to define standard

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[4] Retrofitting CCS for existing natural gas-based facilities will be difficult, as noted in EEI's prior submissions, given the likely space constraints and other technical challenges associated with retrofitting existing units with CCS technology. Many of these challenges—especially space constraints—also are likely a challenge to be overcome to increase hydrogen co-firing in natural gas-based units once hydrogen becomes available for the existing fleet.

levels that can capture the range of complex and variable operating conditions that impact unit performance. This includes the changing and widely different capacity factors; the evolving grid needs requiring different operations of gas-based turbines, including switching between operation modes; the impacts of ambient conditions on unit performance; and, the age of the existing fleet.

Further, it is not clear whether there are easily identifiable categories for efficiency improvements applicable across the existing natural gas-based fleet or whether, as noted, potential strategies to improve efficiency would yield emissions reductions. EPA should consider these challenges before moving forward with existing source guidelines for gas-based units under CAA section 111(d).

The Statutory Background of Section 111 Means Standards Must Be Demonstrated and Should Be Flexible

A brief discussion of the applicable statutory requirements and related caselaw is important for context as EPA considers setting standards for existing natural gas-based EGUs under CAA section 111(d). The CAA requires EPA to determine the BSER as a first step in setting standards to limit emissions from new or existing sources in a source category. These standards are required to reflect the level of emission limitation that is achievable using that BSER by sources within that category.

CAA section 111(a) reads:

> The term "standard of performance" means a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.

In making its BSER determinations, EPA must engage in two separate inquiries. First, EPA must establish that the proposed system of emission reduction is "adequately demonstrated." Second, EPA must determine that the proposed emission limitation is "achievable" using that system. *See Nat'l Asphalt Pavement Ass'n* v. *Train,* 539 F2.d 775, 785 (D.C. Cir. 1976) ("[I]t is the system which must be adequately demonstrated and the standard which must be achievable.") Under section CAA 111(b), EPA then is required to set performance standards that reflect the BSER for categories of new sources, which includes modified and reconstructed sources. *See* 42 U.S.C § 7411(b)(1)(B).[5] These federal standards of performance must reflect the "degree of emission limitation" that EPA has determined is "achievable through" the BSER. 42 U.S.C. § 7411(a)(1). For *new* sources, including modified and reconstructed sources, EPA both determines the BSER *and* sets the emission limitation with which those sources must comply.

[5] This paper does not focus on modified or reconstructed units, but the discussion applies to these units equally.

EPA is required to review, and revise if appropriate, standards for new units at least every eight years. *See* 42 U.S.C § 7411(b)(1)(B).

Once performance standards are set for new units, CAA section 111(d) requires EPA to address existing sources. The statute instructs that EPA must "prescribe regulations which shall establish a procedure…under which each state shall submit to the Administrator a plan which …establishes standards of performance for any existing source for any air pollutant." While these standards of performance must also reflect the BSER identified by EPA, it is the states that set them, and thus the states that translate the BSER into emission limitations for existing sources in the state. States have more flexibility to address existing units under section 111(d) than EPA has with respect to new units under section 111(b). For example, states can consider the remaining useful life of existing EGUs and other factors when setting emissions standards for those units.[6]

In short, EPA defines BSER for both new and existing sources, but states have a significant role in translating that BSER into emissions limits for existing sources.

EPA Should Collect Additional Information About the Existing Gas-Based Fleet and Seek to Leverage Hydrogen as a Future Compliance Solution

Given the limited technological options available for reducing emissions and increasing efficiency at existing gas-based units—as discussed above—exploring the potential to reduce emissions by using a lower-carbon fuel in turbines is a potential future path for EPA and the sector. Hydrogen is an emerging energy technology that holds tremendous promise as a tool to aid in reducing emissions across a variety of sectors and applications, including potential use in turbines. However, as further detailed in EEI's November submission, currently there is a lack of operating projects at scale, both in the United States and abroad, as well as critical open U.S. regulatory, legal, and commercial questions.

As EEI noted in a previous submission to EPA, ensuring turbines have hydrogen co-firing capability will be significantly more straightforward for new units since certain design elements require additional space and engineering considerations. This includes the need to construct hydrogen piping or provide for additional space in the power island for necessary hydrogen blending systems, which can be designed prior to construction. For existing units, retrofit capabilities may be limited by space, design, age and other factors. While some existing gas- based unit designs may accommodate a greater ability to utilize hydrogen as a co-firing

[6] As discussed at length in EEI's November submission to EPA, existing legal precedent supports EPA setting standards that are based on commercially deployed and deploying technologies that can be achieved throughout the industry, allowing EPA to stay abreast of and mirror existing and actively deploying technological trends in the power sector. Under current case law, the "adequate demonstration" requirement means a technology must be commercially deployed/deployable across the industry such that the resulting standards are achievable throughout the industry. Demonstration projects are important to drive the development of critical carbon-free technologies, but their existence does not satisfy case law regarding adequate demonstration for CAA section 111 purposes.

alternative once that fuel becomes available, the information that the Agency would need to analyze prior to moving towards utilizing hydrogen as part of determining BSER for existing gas-based units is not readily available today. EPA should focus on building an additional record regarding additional hydrogen co-firing capabilities of the existing fleet, through solicitation of comment an open docket to judge the potential for future emissions reductions once hydrogen is available as a fuel.

Should EPA Solve Challenges on Existing Source BSER For Natural Gas-Based Units, It Should Provide Significant Flexibility in Order to Provide for Continued Emissions Reductions and Reliable, Affordable Power

As discussed in EEI's previous submissions, should EPA move forward with existing source guidelines for natural gas-based units, it should provide significant compliance flexibility to capture the wide variability discussed above regarding the performance characteristics of the fleet. This includes using subcategories to target types and categories of units, the ability to convert rate-based standards into mass-based compliance options, multiple different averaging forms, and the ability to leverage existing state programs, among many other approaches. EPA should adopt options that could allow units to choose among multiple paths to comply with EPA's BSER, helping to facilitate diverse unit owner/operator approaches to complying that also consider customer affordability and grid reliability.

APPENDIX D

From: Emma Hopkins, Campaign Representative, Sierra Club

SIERRA CLUB

RE: Louisiana Class VI Primacy Application - Docket ID No. EPA-HQ-OW-2023-0073, 07/02/2023

Dear EPA,

I am writing to urge you not to approve Louisiana's application for primacy in the permitting of Class VI injection wells.

The Sierra Club has numerous concerns about the Environmental Protection Agency (EPA) granting the Louisiana Department of Natural Resource (LADNR) Class VI Primacy. Some of our concerns will be raised with these comments, while others will be submitted to the Docket ID No. EPA-HQ-OW-2023-0073 by the comment deadline. With the passage of Louisiana House Bill 571 signed by Governor Edwards on 14 June 2023, now Act 378,[1] should re-notice the application and Louisiana's proposed program given the fact that the current application with EPA is now incomplete, it does not contain all the current LA laws governing Class VI wells.

If EPA does not re-notice the Louisiana application we ask for a 60-day extension of the comment period due to the complex nature of the proposed action and the environmental damages to be caused in Louisiana.

Before EPA grants Primacy to Louisiana safeguard and standard of public transparent must be in place:

Public Engagement

1. EPA should require LDNR to open a process to consult landowners, tenants, and other community members on revising rules that determine who receives notice of proposed facilities, when they receive notice, how they receive notice, and how long they have to respond. This should include a clear grievance process for individuals to voice their concerns when state monitoring and enforcement activities are in question.
2. EPA should require States to include all drinking water utilities, and drinking water well owners in the category of "communities" for the purposes of "community engagement
3. EPA should require states conduct community engagement that include notice, meetings, and comment periods before decisions have been made. This public engagement should include
    a. Meetings that are accessible to individuals who work day and night shifts.
    b. Meetings in both in-person and online settings to ensure that opportunities for feedback are accessible to individuals who do not have internet access or cannot travel.
    c. The provision of free or low-cost transportation, and free childcare during meetings.
    d. Information about public meetings in Spanish and language accessibility instructions for people who speak other languages.

[1] https://legis.la.gov/legis/ViewDocument.aspx?d=1332572EPA

e. Language interpreters and translators who are familiar with jargon and key terms relevant to the permitting application and approval process.

Data Monitoring/Oversight

1. EPA should require that liability for wells should stay with the entity drilling the well and not be transferred to any other entity, including the state, for the lifetime of the well.
2. EPA should require that state governments increase staffing and financial security requirements to adequately meet the oversight and monitoring demands of expanded CCS operations.
3. EPA should require that states have comprehensive inspection, monitoring, and enforcement procedures for active, inactive, and plugged wells before granting primacy or additional authorities to states for CCUS activities and facilities.
4. EPA should require that states carry out post-injection site closure monitoring of 1000 years, and must keep these monitoring records in a clear, publicly accessible, and uniform manner.
5. EPA should require states to maintain up-to-date and publicly available databases with complete and accurate coordinates for all CCS wells, orphaned wells, and inactive plugged wells, to ensure that robust area of review (AOR) assessments for Class VI wells are able to be carried out.
6. EPA should require states to require operators to share real-time data with state regulatory agencies from the required continuous recording devices that will monitor CO2 streams, and require operators to quickly notify community members in the event of an incident.
7. EPA should require that states require operators of Class VI wells to have a certification or license with the state.
8. EPA should require states to enforce the halting of operations at facilities whose permits have been revoked until a new final permit is issued. It is not acceptable to allow facilities to continue.

Re-Permitting Wells Between Classes

1. EPA should require states to implement compliance and enforcement mechanisms to prevent Class II wells from being improperly operated as Class VI wells and vice versa.

Seismicity

1. EPA should consider not granting Class VI UIC primacy to states that have a history of failing to prevent induced seismicity from oil and gas activities that has affected or may affect a drinking water source.

Environmental Impact

1. EPA should require states to consider the impacts to both quality and quantity of drinking water sources in areas where CCUS infrastructure will be constructed and used. 2. EPA should require states to provide robust details on the baseline geochemical data that applicants are required to submit with Class VI well applications – what mediums must

be tested, what chemicals and attributes must be tested for, and other considerations related to seasonality and topography.

Carbon capture and sequestration is not a step in the direction of a clean energy economy. It is an unproven technology, a false solution, and far too expensive. Carbon capture does nothing to address the CO2 released into the atmosphere before the point source pollution from extraction and transport of fossil fuels. It is energy intensive, meaning that it needs to be offset by burning more fossil fuels. It endangers Louisiana's water, using exorbitant amounts to run the facility. A proposed CCS project on Cleco's Madison 3 power plant is projected to cost more than $900 million.[2] Carbon injection also introduces the likelihood of CO2 leaks, both endangering the health of Louisiana residents and defeating the whole purpose of carbon capture in the first place.

Carbon dioxide (CO2) is hazardous to human health. The National Institute of Health (NIH) reports that CO2 is an asphyxiant and a toxicant: within one minute of CO2 poisoning,
a person can pass out and suffer respiratory arrest. On February 22, 2020, in Satartia, Mississippi, people were not able to escape a major CO2 release from a pipeline rupture because their cars stalled out due to the clouds of carbon dioxide that displaced oxygen.

Carbon dioxide waste injection is far from a safe solution. More CO2 injection wells would increase health and environmental risks in Louisiana. CO2 corrosion can break down the metals in pipelines and containers, causing leaks that can contaminate the environment and sources of drinking water.[3] Injection of carbon dioxide can also cause rocks underground to break down, causing above ground shifts and increasing the potential for earthquakes.[4] Due to the prevalence of abandoned oil and unplugged gas wells in LA, injection wells also increase the risks of CO2 leaks into the atmosphere, defeating the entire purpose for CCS.

If we continue to invest in and prop up the fossil fuel industry, we risk digging ourselves into a hole we can't escape from. What is the annual cost of damages to private property every year due to extreme weather events and the other consequences of climate change? Hurricanes, extreme heat, tornados, sea level rise, the list is endless, the costs incalculable. Let us not wave the flag of economic growth without considering the full range of external costs. Louisiana cannot afford a future dictated by fossil fuels.

The damages that can be caused by carbon dioxide waste injection wells are known to oil and gas companies, which is why they lobbied for a bill that shifts liability to the people of
Louisiana to pay for the costs. This new law is in conflict with the EPA's federal requirements. If the EPA gives Louisiana the power to approve injection wells, the external costs will be passed onto Louisiana residents.

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[2] https://lailluminator.com/2022/10/15/louisiana-project-highlights-unknowns-of-carbon-capture/
[3] https://www.comsol.com/model/carbon-dioxide-corrosion-in-steel-pipes-17255
[4] https://www.sciencenews.org/article/pumping-carbon-dioxide-deep-underground-may-trigger-earthquakes

The Louisiana Department of Natural Resources (DNR) has a record of failure to properly monitor and regulate the oil and gas industry. In the mid-90's, DNR's failure to protect the Grand Bois community from oil waste led to severe health injuries, including those suffered by children. DNR's failure to monitor and regulate also resulted in the catastrophe of the ground giving way under the Bayou Corne community in 2012. Given their history, we cannot blindly trust DNR
to protect the well-being of LA residents.

In its application to the EPA, the DNR states that it will outsource the management of carbon dioxide waste injection wells to unnamed and unknown companies. In addition to these unknowns, permanent underground storage of carbon dioxide has never been done before. We should not accelerate the permitting process for an unproven and potentially catastrophic technology.

Carbon dioxide waste injection involves significant risks for our communities and environment. The EPA should not approve Louisiana's Class VI UIC primacy application.

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APPENDIX E



June 29, 2023

Michael S. Regan, Administrator
Radhika Fox, Assistant Administrator
Environmental Protection Agency
1101A EPA Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, NW
Washington, D.C. 20004

Re: Public Comment on Docket No. EPA-HQ-OW-2023-0073

Submitted via regulations.gov

Dear Administrator Regan and Assistant Administrator Fox:

We are writing to oppose the U.S. Environmental Protection Agency's (EPA) proposed rulemaking to approve of Louisiana's Application for primary enforcement authority over the Class VI Underground Injection Control (UIC) Well Program.

As a foundational matter, we reject the premise that CCS is a necessary—or even appropriate—approach to addressing the climate crisis and pollution burdens borne by frontline and fenceline communities. After billions of dollars of investment and decades of development, deployment of CCS has consistently proven to be ineffective, uneconomic, and unwise.[1]

We oppose primacy for Louisiana for numerous reasons, many of which are already being shared with EPA by the residents of Louisiana who will be directly impacted by the State assuming responsibility for permitting the many proposed dangerous and unnecessary carbon capture and storage (CCS) projects . This comment seconds the residents' concerns, and specifically highlights safety problems with CO_2 pipelines and EPA's weak CCS guidance.

CO_2 Pipelines: First, the industry push for obtaining Class VI permits at an increasingly rapid rate comes at a time when agencies such as the Pipeline and Hazardous Materials Administration (PHMSA) have yet to even begin developing rules that adequately respond to the extreme risks posed by CO_2 pipelines.[2] To this point, the Pipeline Safety Trust analyzed current

[1] *See* Gov't Accountability Office, *Carbon Capture and Storage: Actions Needed to Improve DOE Management of Demonstration Projects* (Dec. 2021), https://www.gao.gov/assets/gao-22-105111.pdf (warning against the Department of Energy "expending significant funds on CCS demonstration projects that have little likelihood of success").
[2] *See* Unified Regulatory Agenda, *PHMSA RIN: 2137-AF60* (last accessed June 28, 2023) https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202210&RIN=2137-AF60 (noting that the proposed rulemaking for draft CO2 pipeline safety regulations is not planned for issuance until October of 2024).

CO_2 pipeline regulation under PHMSA and concluded that "existing federal regulations do not allow for the safe transportation of CO_2 via pipelines."[3] Consequently, there should be a moratorium on all CO_2 pipelines and associated infrastructure, including Class VI wells, until PHMSA completes its rulemaking.[4] We recognize that a pipeline moratorium is outside of EPA's jurisdiction, but we urge EPA to halt primacy applications over Class VI wells until PHMSA completes its CO_2 pipeline safety regulations to avoid public safety disasters like what happened in Satartia, Mississippi.[5]

Environmental Justice Guidance: Second, we urge EPA to halt its issuance of primacy over Class VI wells to states—including the process underway for Louisiana—until EPA and the White House Council on Environmental Quality (CEQ) release updated environmental justice guidance on Class VI wells. EPA produced environmental justice guidance for Class VI wells in 2011.[6] This guidance is outdated and too weak to meaningfully protect disadvantaged communities. For example, EPA's 2011 guidance suggests that "UIC Program Directors and permit writers *may* choose to examine the information provided to determine if any minority or low-income communities might be impacted by the proposed well."[7] This is not enough. While EPA's Memorandum of Agreement with Louisiana contains stronger language: "The state agrees to examine the potential risks of a proposed Class VI well within its jurisdiction to identify and address any particular impacts on minority and low-income populations,"[8] as advocates are pointing out in their comments, Louisiana expressed that it does not see itself as having the authority to do this. And even this stronger language requires only minimum analysis of environmental justice impacts, and more robust review (and the authority to deny Class VI permits upon a finding of adverse impacts and risks to communities) should be required.

EPA must therefore update its 2011 environmental justice guidance on Class VI wells—incorporating meaningful input from impacted communities—and enshrine the minimum requirement to review Class VI permits for environmental justice concerns in regulation.

Similarly concerning, EPA cited to the *draft* CEQ guidance on CCS in its press release announcing Louisiana's primacy application, saying: "EPA's proposal also follows

[3] Pipeline Safety Trust, "CO_2 Pipelines – Dangerous and Under-Regulated" Backgrounder, https://pstrust.org/wp-content/uploads/2022/03/CO2-Pipeline-Backgrounder-Final.pdf.
[4] *See* Food and Water Watch, Press Release: "Over 150 Groups Push White House to Enact Carbon Pipeline Moratorium" (May 30, 2023), https://www.foodandwaterwatch.org/2023/05/30/over-150-groups-push-white-house-to-enact-carbon-pipeline-moratorium/.
[5] Pipeline and Hazardous Materials Safety Administration, "PHMSA Announces New Safety measures to Protect Americans From Carbon Dioxide Pipeline Failures After Satartia, MS Leak" (2022), https://www.phmsa.dot.gov/news/phmsa-announces-new-safety-measures-protect-americans-carbon-dioxide-pipeline-failures; *see also* Dan Zegert, *The Gassing of Satartia*, Huffington Post (August 26, 2021), https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f.
[6] EPA, Additional Tools for UIC Program Directors Incorporating Environmental Justice Considerations into the Class VI Injection Well Permitting Process (June 2011), https://www.epa.gov/sites/default/files/2015-07/documents/epa816r11002.pdf (emphasis added).
[7] *Id.* at 3 (emphasis added).
[8] MEMORANDUM OF AGREEMENT ADDENDUM Between the State of Louisiana and the United States Environmental Protection Agency Region 6 For the Class VI UIC Program (2023).

guidance from the Council on Environmental Quality to ensure that the advancement of carbon capture, utilization, and sequestration technologies are done in a responsible manner that incorporates the input of communities and reflects the best available science."[9] What EPA seemingly fails to recognize here is that CEQ's guidance only exists in draft form, and that dozens of concerned public commenters had submitted requests to CEQ during the public comment period on the draft to strengthen that guidance to better consider and protect communities. CEQ failed to respond to those comments or to finalize its draft,[10] making EPA's reliance on it not only alarming, but also wholly unsupportive of its contention that Louisiana's primacy application follows principles of environmental justice.

Fast-tracking Permits: Finally, primacy will enable fast-tracking of Class VI permits. In EPA's own words to Congress, "[Geologic storage] is a complex process that is highly dependent on site-specific conditions; therefore, *a robust and comprehensive permit application and permit review process is fundamental* to preventing endangerment of [underground sources of drinking water] from these activities."[11] Yet examples from other states demonstrate that often state review of such permits is truncated. For example, North Dakota, which has obtained primacy over Class VI wells from EPA, permitted its first Class VI well in October 2021—*less than five months* after receiving the project application.[12] With fewer resources and less-trained staff than EPA, Louisiana is likely to follow suit and fail to provide as robust a review of forthcoming Class VI permit applications as EPA has historically done.

In light of these public safety and environmental justice concerns, we urge you to reject Louisiana's application for primacy over Class VI UIC well permitting. Thank you for considering these comments.

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[9] EPA, "EPA Opens Public Comment on Proposal Granting Louisiana Primacy for Carbon Sequestration and Protection of Drinking Water Sources" (April 28, 2023), https://www.epa.gov/newsreleases/epa-opens-public- comment-proposal-granting-louisiana-primacy-carbon-sequestration-and.
[10] *See* Docket CEQ-2022-0001, https://www.regulations.gov/document/CEQ-2022-0001-0034 (containing 103 public comments).
[11] Envtl. Protection Agency, "Report to Congress Regarding Recommendations to Improve Class VI Permitting Procedures for Commercial and Research Carbon Sequestration Projects" (Oct. 28, 2022) at 19 (emphasis added) (hereinafter, EPA Report to Congress).
[12] Ethanol Producer Magazine, "Red Trail Energy begins carbon capture and storage" (July 18, 2022), https://ethanolproducer.com/articles/19447/red-trail-energy-begins-carbon-capture-and-storage/; *see also* North Dakota: Class VI wells, Order 31453, https://www.dmr.nd.gov/oilgas/or31453.pdf.