Reducing Pollution Without Sacrificing Reliability

A Breakdown of the Respective Roles that FERC, EPA, and State Regulators Play to Support a Cleaner & More Reliable Electric Grid

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Executive Summary

The power sector is in the midst a profound transition. Myriad climate policies at nearly all levels of government, including the landmark 2022 Inflation Reduction Act (IRA), have incentivized the accelerated adoption of low- and zero-emission energy resources.[1] These policies have sped along sectoral shifts already underway due to changing market conditions, plummeting renewables prices, and the replacement of aging coal-fired power plants with cheaper, more efficient resources.[2] Meanwhile, the electric grid faces increasing vulnerability from climate change impacts that have become unavoidable,[3] in addition to projected future increases in electricity demand.[4] Both the structure and operation of our electric grid must shift to meet these challenges. This transition creates opportunities for policymakers to focus on increasing grid resilience and ensuring the availability of adequate clean resources to meet demand under future conditions.

The Federal Energy Regulatory Commission (FERC), regional transmission operators (RTOs/ISOs), state regulators, and utilities can leverage a variety of existing tools to plan for grid reliability throughout the energy transition. With appropriate coordination, grid planners and regulators can maintain grid reliability during and after implementation of important pollution-control policies, such as the Environmental Protection Agency's (EPA) proposed greenhouse gas (GHG) limits for fossil fuel-fired power plants (Proposed 111 Rules).[5]

Concerns that EPA's Proposed 111 Rules, and other EPA pollution control rules, will significantly affect reliability appear grounded in assumptions that these rules function in a vacuum, but that is far from the case. A whole web of actors independently responsible for the electric grid are working to ensure the grid maintains (and increases) reliability given the myriad forces affecting it. Those entities' work to reduce wider reliability challenges will include mitigating any marginal effects from EPA's critically important rules. EPA has a long track record of reducing pollution without undermining the work of the entities for which reliability is their bread and butter.

Because multiple federal and state regulators must coordinate their efforts to ensure electric grid reliability, particularly during a period of major transition, it is important to understand what role each of them plays. This report reviews the respective roles of FERC, RTOs/ISOs, other transmission operators, state public utility commissions (PUCs), and state environmental regulators. EPA's duty to reduce GHG emissions that endanger public health and FERC's duty to steward grid reliability will require them to coordinate each other's respective expertise as they work with RTOs/ISOs, state regulators, and utilities to implement EPA rules.

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1 *See, e.g.,* John E T Bistline et al., *Power sector impacts of the Inflation Reduction Act of 2022*, 19 Environ. Res. Lett. 1 (2024) (projecting "that IRA incentives accelerate the deployment of low-emitting capacity, increasing average annual additions by up to 3.2 times current levels through 2035").

2 *See, e.g.,* Metin Celebi et al., Bulk System Reliability for Tomorrow's Grid, Brattle Group & Center for Applied Environmental Law and Policy 2 (Dec. 20, 2023), https://perma.cc/UHY2-D66X [herein after 2023 Brattle Report].

3 *See, e.g.,* U.S. Dept. of Energy, U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather, 10-12, 22-25, 33-35 (July 2013), https://perma.cc/7GBE-XRMC. More recent studies confirm climate change has and will continue to increase the prevalence and magnitude of extreme weather events that endanger grid reliability. *See also* Intergovernmental Panel on Climate Change, *Chapter 11: Weather and Climate Extreme Events in a Changing Climate, in* Climate Change 2021: The Physical Science Basis, Contribution of Working Group I to the IPCC Sixth Assessment Report, https://perma.cc/7FLG-D9UQ.

4 *See, e.g.,* John D. Wilson & Zach Zimmerman, *The Era of Flat Power Demand is Over*, Grid Strategies & Clean Grid Initiative (Dec. 2023), https://perma.cc/R4Z2-C9A7.

5 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, 88 Fed. Reg. 33,240 (proposed May 23, 2023) [hereinafter Proposed 111 Rules] (issued under Section 111 of the Clean Air Act (CAA)).

Specifically, our analysis clarifies several key points:

- FERC has the mandate and corresponding tools to ensure reliability of the bulk power system (BPS) and just and reasonable rates during the clean energy transition.[6] FERC coordinates with its governed reliability entities, utilities, PUCs, and other state actors to accomplish this goal. EPA has the mandate and corresponding tools to regulate air pollution, including greenhouse gas emissions from fossil fuel-fired power plants, to protect public health and the environment. Pollution control rules alter the costs of doing business and so by their nature affect the generation mix.
- EPA fulfils its responsibilities to analyze its proposed pollution-control rules' effects by considering their potential impacts on the generation mix. It properly does so by considering them against a baseline that accounts for broad forces driving power sector changes, such as recent market developments and the IRA. FERC, RTOs/ISOs, and state regulatory bodies are responsible for addressing the reliability effects caused by the broader sectoral transition, as well as by influencing generators' responses to pollution-reduction measures.
- EPA is responsible for coordinating with grid planners and regulators to learn whether, and under what circumstances, compliance exemptions or other implementation flexibilities may be needed to support wider efforts to ensure grid reliability without weakening pollution protections. EPA's Proposed 111 Rules and recent technical conference discussions with FERC demonstrate such an approach.
- FERC, RTOs/ISOs, state regulatory bodies, and vertically integrated utilities have developed some tools to address both extreme weather impacts and clean energy resource integration. These tools include mechanisms to enhance energy adequacy, grid capacity expansion, and reliable grid operations.
- FERC, RTOs/ISOs, and state regulators should continue to refine and supplement these tools in response to the energy transition, as they work to support grid reliability.

[6] The BPS is a statutorily defined term which encompasses the facilities and control systems necessary to operate the electric grid, as well as the electricity in the grid itself, but not local distribution systems. *Infra*, note 40.

I. Introduction

Numerous factors are driving the ongoing clean energy transition. Forces like federal financial incentives, state decarbonization policies (including clean energy/renewable portfolio standards), and federal and state pollution-reduction requirements affect the power sector, and regulators are working to ensure that the electric grid remains reliable during this transition.

In May 2023, EPA proposed rules under Section 111 of the Clean Air Act (CAA) to limit GHG emissions from both new and existing fossil fuel-fired power plants.[7] Following a FERC technical conference, EPA took comment on the reliability effects of the Proposed 111 Rules,[8] and some commenters raised concerns about existing electric grid strains and questions about whether the Proposed 111 Rules could make matters worse. Many of these stakeholders raise reliability concerns that exist independent of the rule that FERC, RTO's/ISO's, state regulators, and utilities must address.[9] It is not uncommon for commenters to voice reliability concerns when EPA proposes pollution-reduction regulations, and EPA and grid-related entities have a history of successfully working together to implement those rules without sacrificing reliability.[10]

For the Proposed 111 Rules, EPA[11] and other experts find that they will not jeopardize resource adequacy or prevent reliability entities from doing their jobs.[12] EPA and other experts show that the significant drivers of the clean energy transition stand apart from this rule,[13] including unprecedented financial incentives now being operationalized at all levels of government.[14] Because those forces behind the ongoing clean energy transition will have reliability consequences

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7 Proposed 111 Rules, *supra* note 5. Specifically, EPA proposed GHG limits for new natural gas-fired units and for existing coal-fired units as well as the largest and most heavily-used natural gas-fired units.

8 *See* Supplemental Notice of Proposed Rulemaking for 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, 88 Fed. Reg. 80,682 (proposed Nov. 20, 2023) [hereinafter Supplemental Rulemaking].

9 *See, e.g.*, North American Electric Reliability Corp., *2023 Summer Reliability Assessment* 5–6 (May 2023), https://perma.cc/T9Z5-XCVJ (noting that much of the grid is at risk of energy shortages during a heat wave); North American Electric Reliability Corp., *2023 State of Reliability Technical Assessment* 3 (June 2023), https://perma.cc/A5TS-LN7C (noting the difficulty of ensuring reliable generation given extreme weather, increased demand, and changing resources); *Hearing Before the S. Comm. on Energy and Nat. Res.,* 118th Cong. at 1(2023) (testimony of Manu Asthana, President and CEO, PJM Interconnection), https://perma.cc/PCZ7-C5CH (arguing that quick retirement of fossil-fuel generation, data center construction, and electrification are leading to increased risks of resource shortages).

10 Susan Tierney, Electric System Reliability and EPA Regulation of GHG Emissions from Power Plants: 2023, Analysis Group 15–23 (Nov. 7, 2023), https://perma.cc/XTQ8-ZFA6 [hereinafter 2023 Tierney Report].

11 *See* U.S. EPA, Resource Adequacy Analysis Technical Support Document 3 (April 2023), https://www.regulations.gov/document/EPA-HQ-OAR-2023-0072-0034 [hereinafter Proposed 111 Rules Resource Adequacy TSD].

12 *See* Energy Innovation Policy & Technology LLC, Maintaining A Reliable Grid Under EPA's Proposed 111 Rules Restricting Power Plant Emissions (Nov. 7, 2023), https://perma.cc/V5N7-5LVZ.

13 *See* U.S. EPA, Power Sector Trends Technical Support Document (April 2023), https://perma.cc/QC8K-7E5R; 2023 Brattle Report, *supra* note 2; 2023 Tierney Report, *supra* note 10; ICF Resources, L.L.C., Review of Expected Resource Adequacy in PJM under Stress Conditions during Summer and Winter Peak Periods (Nov. 9, 2023), https://perma.cc/TV5N-4PKL [hereinafter ICF Analysis].

14 *See, e.g.*, Bistline et al., *supra* note 1; John Larsen et al., *A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act*, Rhodium Group (Aug. 12, 2022), https://perma.cc/9L99-RWVP (predicting "Clean generation as a share of total electric generation rises from roughly 40% in 2021 to 60-81% in 2030 due to the IRA, compared to 46–72% without it (Figure 5)."). *See also* U.S. Dep't of Energy, *Biden-Harris Administration Announces $13 Billion To Modernize And Expand America's Power Grid* (Nov. 18, 2022), https://perma.cc/7LHQ-6A5W; *Joint Federal-State Task Force on Electric Transmission*, 175 FERC ¶ 61,224 (2021); U.S. Dep't of Energy, *Biden-Harris Administration Announces $3.5 Billion for Largest Ever Investment in America's Electric Grid, Deploying More Clean Energy, Lowering Costs, and Creating Union Jobs* (Oct. 18, 2023), https://perma.cc/KV7K-U96Z; Fred Krupp, *The Biggest Thing Con-*

if regulators and policymakers fail to adequately manage the transition's pace and orderliness, FERC and other entities are already acting to address these concerns—and will have to continue to expand these efforts regardless of the details of a final EPA rule.

For example, regulators and advocates are engaged in multiple rulemakings and proceedings to ensure that the electric grid can provide reliable, cost-effective energy and is resilient in the face of climate change impacts.[15] These actions are an important start; further efforts are needed. Congress could expedite further action through steps identified in recent legislative proposals. These include providing siting and condemnation authority for building interregional transmission lines and issuing statutory mandates to improve interregional transmission planning, requiring consideration of grid-enhancing technologies, and increasing coordination between FERC and DOE, among others.[16] With economic, technological, climate change, and legislative forces driving significant power sector shifts that can pose reliability risks, policymakers will need to respond with commensurate urgency. But there is no reason to wait for legislative amendments or mandates. Together, FERC, RTOs/ISOs, other transmission operators, state PUCs, and state environmental regulators have the authority and tools to ensure energy adequacy and manage the pace of high-emitting generation retirements while low- or zero-emitting resources enter the grid.

Against this backdrop, EPA coordinates with FERC to understand how pollution reduction rules interact with FERC's wider reliability work. This coordination provides EPA with the insight it will need to identify whether to provide additional regulatory design elements in its final rules that can trigger compliance exemptions or enforcement flexibilities if needed, without unnecessarily sacrificing pollution-reduction benefits. On November 9, 2023, FERC held its annual technical conference on reliability with an afternoon dedicated to assessing whether the Proposed 111 Rules would impact grid reliability.[17] This conference provided a key foundation for continued coordination between EPA and reliability-related entities as they work together to implement a final EPA rule.

With appropriate coordination, grid planners and regulators can maintain grid reliability during and after implementation of important pollution-control policies, such as the EPA's Proposed 111 Rules. This report reviews the important, but distinct roles of the many different entities involved in power sector regulation. Part II of this report examines EPA's and FERC's respective roles in regulating the power sector. Part III explains how EPA navigates its responsibilities to reduce pollution from fossil fuel-fired power plants with appropriate coordination, and discusses safeguards the agency can use to allow for compliance exemptions if there is no other way of timely addressing a specific reliability concern. While this report explores these dynamics specifically in the context of EPA's Proposed 111 Rules, many observations are more broadly applicable to EPA's other rules that affect the power sector. Part IV explores the tools FERC, reliability entities, and state regulatory bodies can use to address the wider reliability challenges of the clean energy transition. It also briefly notes how planners could use some of those tools in a more efficient and efficacious way to ensure reliable grid operations.

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gress Has Ever Done to Address Climate, Env't Def. Fund (Aug. 12, 2022), https://perma.cc/LV3K-R9RH.

[15] *See, e.g.*, U.S. Dep't of Energy, National Transmission Needs Study ix–x (2023); *National Transmission Planning Study*, U.S. Dep't of Energy, https://perma.cc/N2GQ-6X8X; *Notice of Intent and Request for Information: Designation of National Interest Electric Transmission Corridors*, 88 Fed. Reg. 30956 (Apr. 15, 2023); *Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection*, 179 FERC ¶ 61,028, at P 185 (2022); PJM Interconnection, Long-Term Regional Transmission Planning (LTRTP) Update (2023), https://perma.cc/GU7D-7L6P.

[16] *See, e.g.*, Clean Electricity and Transmission Acceleration Act of 2023, H.R. 6747, 118th Cong. (2023).

[17] Reliability Technical Conference; Notice Inviting Post-Technical Conference Comments, 88 Fed. Reg. 81,074 (Nov. 21, 2023) (inviting post-conference comments for its "annual Commissioner-led Reliability Technical Conference to discuss policy issues related to the reliability of the Bulk-Power System, and the impact of the Environmental Protection Agency's proposed rule under section 111 of the Clean Air Act on electric reliability"); Supplemental Notice of Proposed Rulemaking, 88 Fed. Reg. 80,682 (Nov. 20, 2023).

II. EPA's and FERC's Respective Roles in Power Sector Governance

Understanding the grid reliability regulatory puzzle requires beginning with two distinct but related concepts: resource adequacy and operational reliability. Resource adequacy generally involves assessing whether there are enough energy resources to meet projected load and reserve requirements.[18] Relevant resources include "electricity generating and transmission facilities that produce and deliver electricity, and demand-response programs that reduce customer demand for electricity."[19] The second key component of grid reliability is operational reliability, which refers to the grid's ability to deliver electric supply to meet demand.[20] Each component is critical.

Resource owners routinely respond to federal and state emission-reduction policies and changes in electric demand by ramping up and down power production or even making choices to retire certain units. In turn, grid operators and utilities must plan to accommodate those choices at a pace and in a way that ensures both energy adequacy and operational reliability. As energy resources shift from conventional fossil fuel-fired generation to a broader mix, planners and policymakers must account for their differing capacities, operational characteristics, and reliability services so that they maintain a reliable grid as load increases.[21]

Advancing the clean energy transition will require both decarbonizing energy resources[22] and ensuring an operational grid with sufficient resources and reliability. Neither EPA nor FERC can wield its respective legal authority to support

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[18] *See* EPA, Proposed 111 Rules Resource Adequacy TSD, *supra* note 11, at 2 ("[T]he term resource adequacy is defined as the provision of adequate generating resources to meet projected load and generating reserve requirements in each power region, while reliability includes the ability to deliver the resources to the loads, such that the overall power grid remains stable.") NERC defines "adequacy" as "having sufficient resources to provide customers with a continuous supply of electricity at the proper voltage and frequency, virtually all of the time. Resources refer to a combination of electricity generating and transmission facilities that produce and deliver electricity, and demand-response programs that reduce customer demand for electricity. Maintaining adequacy requires system operators and planners to take into account scheduled and reasonably expected unscheduled outages of equipment, while maintaining a constant balance between supply and demand." N. Am. Elec. Reliability Corp., Understanding the Grid 2 (2023), https://perma.cc/W69D-U5JU [hereinafter Nerc Grid Factsheet].

[19] Nerc Grid Factsheet, *supra* note 18, at 2.

[20] *See id*. NERC's definition of reliability has evolved over time as electric grid operations have changed: "For decades, NERC and the electric industry defined system security as the ability of the BPS to withstand sudden, unexpected disturbances, such as short circuits or unanticipated loss of system elements due to natural causes. In today's world, the security focus of NERC and the industry has expanded to include BPS must be planned, designed, built, and operated in a manner that takes into account these modern threats, as well as more traditional risks to reliability." *Id.*; *see also* Inst. for Pol'y Integrity, Comments to FERC on the Technical Conference on Climate Change, Extreme Weather, and Electric System Reliability, Docket No. AD21-13-000 (Sept. 27, 2021), https://policyintegrity.org/documents/CORRECTED_Post-Tech_Conference_Comments.pdf.

[21] Decarbonization policies will increase electric demand in various ways. For example, as residential and commercial buildings and transportation end-uses electrify, they will increase demand. And policies designed to increase U.S. clean-energy related manufacturing capabilities will increase industrial demand. Other electricity-intensive uses, like artificial intelligence, data centers and crypto-mining facilities will also increase demand and lead to highly concentrated load-pockets, potentially located far from clean grid resources. *See* International Energy Agency, Electricity 2024 – Analysis and Forecast to 2026 at 31, https://perma.cc/7DB8-6299 (finding that global electricity demand could double by 2026 from data centers, cryptocurrency trends, and artificial intelligence and that for the U.S., "[f]rom 2024 to 2026, we expect a return to growth in electricity demand of 1.5% on average, fuelled by increased manufacturing activity and electrification in the transportation and building sectors. Around one-third of the additional demand out to 2026 is expected to come from the rapidly growing data centre sector alone.).

[22] Exec. Order No. 14008 § 205, 86 Fed. Reg. 7619, 7624 (Jan. 27, 2021). *See also* U.S. Of Am., Nationally Determined Contribution: Reducing Greenhouse Gases in the United States: a 2030 Emissions Target 1 (2021), https://perma.cc/7X3N-8Q89 (articulating the United States' pledge under the Paris Agreement to "reduc[e] its net greenhouse gas emissions by 50–52 percent below 2005 levels in 2030").

this transition independently. Each agency's role is vital, and the clean energy transition will make it ever more important that these agencies continue to coordinate, as they have for many years, and accommodate each other's distinct statutory aims and missions.

In this section, we briefly review EPA's and FERC's distinct regulatory roles, and the relationship between those differing authorities and electric grid reliability. First, we summarize EPA's role in regulating air pollution. Second, we discuss FERC's (and other entities') role in supporting energy adequacy and ensuring grid reliability. Consistent with these responsibilities, each regulatory body should continue to coordinate and "accommodate the other's distinct statutory aims and missions"[23] as the clean energy transition continues.

A. EPA has the responsibility to reduce pollution from fossil fuel-fired power plants

Congress issued the 1970 CAA Amendments to require comprehensive air pollution abatement. Recognizing that the "air pollution problem [was] more severe, more pervasive, and growing at a more rapid rate than was generally believed," Congress enacted the 1970 Amendments to "provide a much more intensive and comprehensive attack on air pollution" than the previous iterations of the Act.[24] Congress aimed to "broaden[]" "the requirements for State action," "greatly increase[]" "the obligation on polluters," and create a program "truly national in scope."[25] The 1970 Amendments served as "a drastic remedy to what was perceived as a serious and otherwise uncheckable problem of air pollution."[26] To accomplish these goals, Congress designed the CAA with the broad purpose "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare."[27]

Even during the energy crisis of the 1970s, Congress empowered EPA to issue air pollution rules that lawmakers understood would affect decisions to operate electric generation units (EGUs). Furthermore, Congress "crafted emergency provisions to override that authority only temporarily and under limited circumstances," highlighting that "energy and environmental regulators should work to accommodate the other's distinct statutory aims and missions."[28]

In keeping with the CAA's broad mandate, Section 111 requires EPA to regulate pollution from stationary source categories that "may reasonably be anticipated to endanger public health or welfare."[29] In 2007, the Supreme Court held that EPA's obligation to reduce pollution includes GHG emissions if EPA finds that such emissions endanger the public.[30] Two years later, EPA issued such a finding.[31] Then in 2011, the Court further clarified that EPA has the authority under Section 111 to reduce GHG emissions specifically from fossil fuel-fired power plants.[32] In its 2022 *West Virginia v. EPA* decision, the Court reaffirmed EPA's authority under Section 111 to reduce GHG emissions from power plants, but held that EPA could not set emission limits that defined the "best system of emission reductions" (BSER) to include generation shifting from sources that emitted GHGs more intensively, like coal-fired power plants, to lower- or zero-emitting sources like renewables.[33]

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[23] Brief for *Amicus Curiae* Former Commissioners of the Federal Regulatory Commission at 12, West Virginia v. EPA, 142 S. Ct. 2587 (2022), https://perma.cc/CJF9-U8N7 [hereinafter Former FERC Comm'rs Amicus Br.].
[24] S. Rep. No. 91-1196, at 4 (1970).
[25] *Id.* at 2.
[26] Union Elec. Co. v. EPA, 427 U.S. 246, 256 (1976).
[27] Pub. L. No. 91-604 § 101(b)(1), 42 U.S.C. § 1857 (1970).
[28] Former FERC Comm'rs Amicus Br., *supra* note 23, at 12.
[29] 42 U.S.C. § 7411(b)(1)(A).
[30] Massachusetts v. EPA, 549 U.S. 497, 501 (2007).
[31] Endangerment and Cause or Contribute Findings for Greenhouse Gases, 74 Fed. Reg. 66,496 (Dec. 15, 2009).
[32] American Electric Power Co. v. Connecticut, 564 U.S. 410, 424 (2011).
[33] West Virginia v. EPA, 597 U.S. 697, 734–735 (2022).

The *West Virginia* decision's focus on EPA tools other than generation shifting[34] reinforces earlier court holdings that "grid reliability is not a subject of the Clean Air Act and is not the province of EPA."[35] EPA neither has the mandate nor the proper tools to ensure grid reliability, but that does not curtail its ability to reduce air pollution in a manner that ultimately affects electric generation. In fact, all EPA power sector regulations incidentally shift generation because they change generation costs. In *West Virginia,* the Supreme Court itself distinguished between indirectly causing a shift of generation and setting a BSER based on generation shifting.[36] Former FERC chairs and commissioners also recognized in briefing for *West Virginia*, "[t]he plain text of the Clean Air Act and the FPA makes clear that each reaches different aspects of electric generation—air pollution for the former and wholesale rates for the latter,"[37] and while "[c]ompliance with the regulation of air pollution from EGUs may affect the cost of certain generators and therefore generator choice . . . [,] this impact is indirect and tangential to EPA's proper aim and target of reducing carbon emissions."[38] These former FERC commissioners clarify, "the [Federal Power Act] does not give the Commission a license to prevent other agencies from using their own authorities simply because their regulations may affect wholesale rates."[39]

While EPA should work with FERC to coordinate effective implementation of pollution reduction rules that do not undermine grid reliability, FERC, FERC-governed entities, and state regulators have the jurisdiction and tools to ensure reliability.

B. FERC and other entities together share grid reliability responsibilities

FERC has both the mandate, and greatest share of the corresponding tools, to ensure reliability of the bulk power system (BPS)—a statutorily defined term which encompasses the facilities and control systems necessary to operate the electric grid, as well as the electricity in the grid itself, but not local distribution systems.[40] FERC cannot ensure grid reliability by itself. It must coordinate with other federal and state entities that influence different aspects of grid reliability. In this section, we explain the complementary roles of FERC and other entities to solve the reliability puzzle.

FERC has primary authority to mandate the development of, and to approve, BPS reliability standards, as well as to ensure that transmission and wholesale electric rates are just and reasonable. Congress passed the Federal Power Act (FPA) in 1935, declaring "that the business of transmitting and selling electric energy for ultimate distribution to the public is affected with a public interest,"[41] and mandating that FERC[42] ensure just and reasonable rates for wholesale electricity sales and interstate transmission.[43] But, prior to 2005, electric grid operational reliability largely rested on industry-led, voluntary compliance.[44] Recognizing the critical need for robust and enforceable reliability standards for electric power,

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[34] *See id*. at 727–729.

[35] Del. Dep't of Nat. Res. & Env't Control v. EPA, 785 F.3d 1, 18 (D.C. Cir. 2015).

[36] *West Virginia*, 597 U.S. at 731 n.4 ("But there is an obvious difference between (1) issuing a rule that may end up causing an incidental loss of coal's market share, and (2) simply announcing what the market share of coal, natural gas, wind, and solar must be, and then requiring plants to reduce operations or subsidize their competitors to get there.").

[37] Former FERC Comm'rs Amicus Br., *supra* note 23, at 5.

[38] *Id*. at 9.

[39] *Id*. at 5–6.

[40] The bulk power system (BPS) consists of "facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof)" and "electric energy from generation facilities needed to maintain transmission system reliability," but it "does not include facilities used in the local distribution of electric energy." 16 U.S.C. § 824o(a)(1).

[41] 16 U.S.C. § 824(a).

[42] At the time Congress enacted the FPA, it was FERC's predecessor, the Federal Power Commission, that carried out this mandate. *See* New York v. FERC, 535 U.S. 1, 6 (2002).

[43] 16 U.S.C. § 824(b); 16 U.S.C. § 824d(a).

[44] *Keeping the Lights On—Are We Doing Enough to Ensure the Reliability and Security of the U.S. Electric Grid?: Hearing Before the S. Comm. on Energy and Nat. Res.*, 113th Cong. 8, 2 (2014) (Statement of Former FERC Comm'r Cheryl LaFleur) https://perma.cc/9H93-NLRK

Congress amended the FPA to require mandatory and enforceable FERC-approved electric reliability standards for the BPS, enacting Section 215.[45]

FERC carries out these responsibilities in conjunction with other entities within a complex regulatory landscape. Specifically, Congress required FERC to certify one organization as the Electric Reliability Organization (ERO) to submit BPS reliability standards for Commission approval, and mandated that all users, owners, and operators of the BPS adhere to these enforceable standards.[46] Congress also empowered FERC to affirmatively direct the ERO to develop and submit reliability standards that FERC finds necessary for ensuring reliable BPS operations,[47] but made clear that it did not authorize FERC or the ERO "to order the construction of additional generation or transmission capacity."[48] FERC operationalized and established procedures to implement Section 215's requirements in Order 672.[49] In 2006, FERC certified the North American Electric Reliability Corporation (NERC) as the ERO with authority to submit electric reliability standards for FERC's approval.[50] In turn, NERC works cooperatively with six Regional Entities that have delegated authority to "develop and enforce Reliability Standards within the geographic boundaries described"[51] in their delegation agreements, as FPA Section 215 contemplates.[52]

While FERC-approved and -enforced reliability standards are essential for reliable electric grid operations, FERC must coordinate with other entities to ensure adequate resources for grid reliability. Grid operators[53] must have access to adequate energy resources capable of providing power and essential reliability attributes to the grid and sufficient transmission capacity[54] to ensure power moves from where it is generated or stored to where it is consumed. Yet, as noted above, Congress precluded FERC from ordering utilities or merchants from building generation or transmission, and Congress

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(detailing how FPA Section 215 "marked the end of a system under which a group of reliability councils loosely structured under [the North American Electric Reliability Corporation] developed reliability standards, with which the industry complied on a voluntary basis").

45 16 U.S.C. § 824o. Despite having just and reasonable rates authority and reliability authority over transmission, FERC has limited siting authority for transmission lines. *See* 16 U.S.C. §824p. It has no jurisdiction over the choice or construction of transmission or generation.

46 16 U.S.C. § 824o(b)(1).

47 *Id.* §§ 824o(a)(3), (b)(1).

48 *Id.* § 824o(i)(2).

49 *Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards*, Order No. 672, 114 FERC ¶ 61,104, *order on reh'g*, Order No. 672-A, 114 FERC ¶ 61,328 (2006) (interpreting Section 215 and setting out implementation methodology).

50 *North American Electric Reliability Corp.*, 116 FERC ¶ 61,062, *order on reh'g and compliance*, 117 FERC ¶ 61,126 (2006) (affirmed by Alcoa, Inc. v. FERC, 564 F.3d 1342 (D.C. Cir. 2009)).

51 N. Am. Elec. Reliability Corp., Amended and Restated Pro Forma Regional Delegation Agreement at 1, https://www.nerc.com/About-NERC/RDAs/Pro%20Forma_RDA_2021_FERC_Revisions(CLEAN).pdf (last visited Dec. 19, 2023); N. Am. Elec. Reliability Corp., Frequently Asked Questions 4 (2023), https://perma.cc/NH53-SEU6.

52 16 U.S.C. § 824o(e)(4). The states retain authority to ensure in-state electric reliability so long as their rules are not inconsistent with FERC-governed system reliability standards. *Id.* § 824o(i)(3) (although New York may impose more stringent standards for in-state reliability if they do not decrease out-of-state reliability). States are responsible for ensuring that in-state retail transmission and sale of electricity yield safe and adequate service for retail customers at just and reasonable rates. *See, e.g.*, N.J. Stat. Ann. § 48-2:21 (West 2023) (power to set just and reasonable rates); *id.* § 48-2:23 (power to ensure safe and adequate service in a manner conserving and protecting the environment).

53 Grid operators ensure that electricity flows from energy resources to load, and dispatch resources to make sure that supply always matches demand, while maintaining proper frequency, reactive power supply and spinning reserves, among other grid stability measures. In some regions, RTOs/ISOs is the balancing authority that manages regional grid operations, and in regions without RTOs/ISOs, there are several balancing authorities that jointly fulfill this role. *See, e.g.*, U.S. Dep't of Energy, How it Works: The Role of a Balancing Authority, https://perma.cc/9PZ6-V4UF.

54 Congress recently bolstered FERC's limited "backstop" authority to site interstate transmission lines that satisfy pertinent statutory criteria if states, which have primary siting authority, fail to approve essential lines. 16 U.S.C. § 824p(b) (setting out contours of FERC's backstop siting authority). These comments will not further address the pressing needs for additional transmission infrastructure to interconnect queues of renewable and other energy resources to the grid, for modeling guidance to support long-term regional transmission planning, or for interregional transmission.

also specifically excluded electric generation facilities from FERC's jurisdiction.[55] This means that many entities must work together to ensure grid reliability. FERC, FERC-governed entities, grid operators,[56] and state public utility commissions use a wide array of other tools to support resource adequacy,[57] depending on jurisdictional availability and the entities' role within the grid.[58]

Adequate energy resources must also be connected to the grid through transmission lines with openly accessible capacity capable of carrying electricity to load centers. In large portions of the country, as encouraged by FERC Orders 888, 889 and 2000,[59] transmission owners placed their transmission facilities under operating agreements with regional transmission operators (RTOs) and independent system operators (ISOs), who then assumed responsibility for reliably operating regional electric grids.[60] FERC's Order 2000 was motivated in part by the need to reduce transmission inefficiencies from increased competition in wholesale generation.[61] In addition to dispatching resources and operating transmission, RTOs and ISOs also administer wholesale markets providing critical mechanisms for ensuring adequacy and reliability; these can include energy markets, capacity markets,[62] and regionally-varying ancillary services markets, which have products that help balance the transmission of electricity from generation to end use.[63] FERC reviews and approves market rules for these markets to ensure they result in just and reasonable wholesale electric rates, in accordance with its Congressional mandate.

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[55] 16 U.S.C. § 824(b)(1); *see also* FERC, *Reliability Explainer* (Aug. 16, 2023), https://perma.cc/R84Y-SXFC (noting that "long-term resource planning, which includes deciding on what is a sufficient resource mix for a reliable electric system - not just for today but for the future - is not under FERC's authority") [hereinafter FERC Reliability Explainer].

[56] Besides ERCOT, the regional transmission operator for Texas' electric grid, other RTOs and ISOs are FERC-jurisdictional. (Not all interstate transmission is operated by RTOs or ISOs, however.)

[57] Sylwia Bialek Et Al., Inst. For Pol'y Integrity, Resource Adequacy in a Decarbonized Future 1 (2018), https://perma.cc/LXL2-AB9B (citing *Planning Resource Adequacy Assessment Reliability Standard*, 134 FERC ¶ 61,212, P 6 (2011) ("'Resource Adequacy,' [] is defined as the ability of supply-side and demand-side resources to meet the aggregate electrical demand (including losses)."")). As renewable or energy-limited resources increasingly penetrate the grid, and as end uses electrify, resource adequacy measures and metrics are changing accordingly. *See, e.g.*, Energy Sys. Integration Grp., Redefining Resource Adequacy for Modern Power Systems 2 (2022), https://perma.cc/2QWD-QFHF ("These new resources are being utilized not only for energy, but also for the grid services required to maintain grid reliability. The increased role of wind, solar, storage, and load flexibility requires the industry to rethink reliability planning and resource adequacy methods and to reconsider analytical approaches."); *see also infra* Section IV.A.

[58] These tools can include short- and long-term transmission planning mandates, creating and operating well-designed energy, capacity, and ancillary services markets, resource procurement oversight, long-term resource adequacy planning, and many others. *See infra* Section IV.A; Comments of Susan F. Tierney to FERC at attach. 1, *Annual Reliability Technical Conference – Fall 2023*, Docket No. AD23-9 (Dec. 15, 2023) (Accession No. 20231205-5105) (presenting tables summarizing reliability entities, processes and tools); Nat'l Association of Regulatory Utility Commissioners, Resource adequacy for State Utility Regulators: Current Practices and Emerging Reforms 7–13 (2023), https://perma.cc/N82F-JM5T (detailing the entities sharing responsibility for operational reliability and resource adequacy).

[59] *See Regional Transmission Organizations*, Order 2000, 89 FERC ¶ 61,285 (1999) (discussing Orders 888, 889, and the history of industry restructuring for open access transmission and the formation of competitive wholesale markets).

[60] *See, e.g., Governing Documents*, PJM Interconnection LLC, https://www.pjm.com/library/governing-documents (last visited Dec. 20, 2023) (collecting PJM's Open Access Transmission Tariff, Operating Agreement, and Reliability Assurance Agreement).

[61] Kenneth W. Costello & Robert E. Burns, Nat'l Regul. Rsch. Inst., Regional Transmission Organizations and the Coordination of Regional Electricity Markets: a Review of FERC Order 2000 v (2000), https://pubs.naruc.org/pub/FA860A98-9F87-51CE-66CB-99061504D141#:~:text=General%20Order%202000%20represents%20the,regional%20transmission%20organizations%20(RTOs).

[62] Specifically, four of the RTOs operate centralized capacity markets: ISO-NE, ISO-NY, MISO, and PJM. *An Introductory Guide to Electricity Markets regulated by the Federal Energy Regulatory Commission*, FERC (Nov. 29, 2023), https://perma.cc/64NQ-D8N6; *see also* U.S. Gov. Accountability Off., Gao-18-131, Electricity Markets: Four Regions Use Capacity Markets to Help Ensure Adequate Resources, but FERC Has Not Fully Assessed Their Performance (2017), https://perma.cc/985L-WMYN (summarizing FERC's ability to approve and oversee capacity markets before detailing differences between regional capacity markets at the time). These capacity markets can provide a significant portion of generators' revenue, by compensating them for being available to generate electricity, in addition to other compensation they receive for generating energy. *See* Chen Guo et al., *Incentivizing Investment and Reliability: A Study on Electricity Capacity Markets* (2023), https://perma.cc/6PZ6-WZDB.

[63] *See* Y. Sun et al., U.S. Dep't of Energy, Research Priorities and Opportunities in United States Competitive Wholesale Electricity Markets 2.2–2.4 (2021), https://perma.cc/T5BQ-D7KC.

This web of entities working collaboratively to support grid reliability have long done their job against a backdrop of federal and state laws and policies designed to ensure air pollution reduction.[64] Federal and state environmental regulators, as well as state energy and utility regulators, have put many rules and policies in place that affect EGUs' investment and operational decisions.[65] EPA's Proposed 111 Rules are no exception to this well-established framework. As noted above, "Congress recognized that air pollution rules would affect decisions to operate EGUs and signaled that, absent an emergency, energy and environmental regulators should work to accommodate the other's distinct statutory aims and missions."[66]

FERC, FERC-jurisdictional entities, and other regulatory bodies have long coordinated with EPA on environmental regulations as part of their role in ensuring grid reliability. They should continue to coordinate on implementing the Proposed 111 Rules, drawing upon processes and procedures created to navigate past regulatory and technology-driven changes.

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[64] Jennifer Danis et al., Transmission Planning for the Energy Transition: Rethinking Modeling Approaches (2023), https://perma.cc/MJ58-HCK8 (discussing how transmission planning modeling principles must be updated to reflect the clean energy transition, so they can support grid reliability).

[65] These comments focus on EGU operations; siting restrictions may also impact EGUs' ability to provide grid resources at a particular location, and are also generally within state jurisdiction. FERC staffers recently pushed back on Congressional efforts to give FERC more oversight over other agencies' regulations. Recently proposed legislation, the Guaranteeing Reliable Infrastructure Development Act, would mandate FERC reviews of federal agency actions to ensure grid reliability is not impacted. H.R. 6185, 118th Cong. (2023). Testifying before Congress, the Director of FERC's Office of Electric Reliability noted that FERC does not currently have the resources to properly analyze potential impacts of agency actions on grid reliability and that such a role would be better handled by RTOs or DOE's national labs. Nico Portuondo, *FERC official rejects Republican bill targeting Biden rules*, E&E News, (Sept. 14, 2023), https://subscriber.politicopro.com/article/eenews/2023/09/14/ferc-official-rejects-republican-bill-targeting-biden-rules-00115695.

[66] Former FERC Comm'rs Amicus Br., *supra* note 23, at 12.

III. EPA Has Limited Coordination-Related Responsibilities with Reliability-Related Entities to Support Implementation of GHG Limits for Fossil Fuel-Fired Power Plants

As explained in Section II, supporting grid reliability is the interlocking responsibility of FERC, ISOs/RTOs, state PUCs, state environmental/energy regulators, and utilities. CAA Section 111 contains no explicit requirement to address grid reliability effects, but it does obligate EPA to more generally consider energy requirements when it sets air emissions limits that reflect "the *best system of emission reduction* [(BSER)]" that "the Administrator determines has been adequately demonstrated."[67] As summarized in the following section, EPA has appropriately considered "energy requirements" in the Proposed 111 Rules, including through its resource adequacy assessment and use of design elements that provide flexibility for reliability-related entities to plan for and sustain reliable grid operations.

Independent of its BSER obligations, EPA has a role in coordinating with the entities responsible for grid reliability while implementing stringent GHG standards. But EPA is justified in promulgating and implementing GHG standards at the proposed stringency level, consistent with its obligation to protect the public against harmful pollution. Should it find that reliability-related entities have raised legitimate reliability issues stemming from the Proposed 111 Rules that cannot be otherwise addressed, EPA can adopt additional reliability safety mechanisms in its final rule or through implementation of compliance flexibilities.

A. EPA considered resource adequacy and designed the Proposed 111 Rules with flexibilities to support reliability-related entities' work during implementation

Consistent with its responsibility to select a BSER that achieves maximum emissions reductions after considering energy requirements, EPA conducted a resource adequacy analysis for the Proposed 111 Rules. This resource adequacy analysis predicts minimal impacts from the Proposed 111 Rules on total operational capacity.[68] Furthermore, it shows no expected decrease in target reserve-margin levels.[69] EPA looks into general regional impacts by estimating net transfers between regions and concludes that "the percentage changes in the [Proposed 111 Rules] are below 2%, highlighting that reserve transfers under the proposal scenario are very similar to baseline levels."[70] Given these limited effects on resource adequacy, the incremental reliability effects of the Proposed 111 Rules appear quite small relative to the wider transformation of the power sector. EPA's choice to conduct a resource adequacy assessment is consistent with its past practice under other pollution control rules affecting the power sector.[71] Other analyses agree that the Proposed 111

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[67] 42 U.S.C. § 7411(a)(1) (emphasis added).

[68] Proposed Rule Resource Adequacy TSD, *supra* note 11, at 4 ("Total operation capacity remains similar between the base and policy scenarios.").

[69] *Id.* at 6 ("Projected reserve margins remain at or above target reserve margins under the baseline and proposal modeling for all years within the forecast period."). As discussed in Section IV, resource planners have many available tools to incent additional resource entry or blunt retirement impacts if these projections change.

[70] *Id.* at 6–7.

[71] EPA, Technical Support Document (TSD) for the Final Federal Good Neighbor Plan for the 2015 Ozone National Am-

Rules will not pose a problem for reliability[72] and describe compliance flexibilities and efforts of reliability-related entities that will help ensure this result.[73]

Some commenters on the Proposed 111 Rules voiced concerns that EPA's analysis inadequately addressed reliability concerns,[74] but they overlook that "grid reliability is not a subject of the Clean Air Act" nor "the province of EPA."[75] That is not to say that EPA should not care about reliability effects of the rule, but rather that it should understand that any incremental reliability effects of the Proposed 111 Rules will depend on state implementation of the Proposed 111 Rules and the work of the entities tasked with more broadly ensuring reliability as discussed in Sections II.B and IV. Modeling such grid reliability effects is technical and better suited to grid operators with expertise in conducting supporting analyses and access to the relevant data. State regulators governing specific generating resources also have an important role to assist planners and modelers. As discussed below, EPA's role is to continue working with these entities during the implementation phase of the rule in response to their modeling.

Consistent with EPA's role of coordinating with entities responsible for grid reliability, EPA designed the rule with flexibilities intended to "[p]reserv[e] the ability of power companies and grid operators to maintain system reliability."[76] EPA noted that such design elements include: "subcategories of new natural gas-fired combustion turbines that allow for the stringency of standards of performance to vary by capacity factor; subcategories for existing steam EGUs that are based on operating horizons and fuel reflecting the request of industry stakeholders; compliance deadlines for both new and existing EGUs that provide ample lead time to plan; and proposed State plan flexibilities."[77] EPA further noted its "intention to exercise its enforcement discretion where needed to address any potential instances in which individual EGUs may need to temporarily operate for reliability reasons."[78]

In sum, EPA lacks the mandate or tools to directly ensure grid reliability, but it has appropriately played its central role of reducing pollution in a way that supports grid reliability entities and laid a basis for successful cooperation with them on implementation.

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bient Air Quality Standards (2023), https://perma.cc/4VJV-FH8G; EPA, Technical Support Document: Resource Adequacy and Reliability Analysis (2015), https://perma.cc/4297-SZZY; EPA, Resource Adequacy and Reliability in the IPM Projections for the MATS Rule (2011), https://perma.cc/3LWJ-64AW; EPA, Resource Adequacy and Reliability in the IPM Projections for the Transport Rule TSD (2011), https://perma.cc/K3AM-VD38.

[72] *See* Energy Innovation Report, *supra* note 12, at 10–24; *see also* ICF Analysis, *supra* note 13, at 1.

[73] *See* 2023 Brattle Report, *supra* note 2, at 75–87; 2023 Tierney Report, *supra* note 10, at 6.

[74] *See, e.g.*, Electric Reliability Council of Texas, Inc. et al., Comments to EPA on the Proposed 111 Rules (Aug. 8, 2023), https://www.regulations.gov/comment/EPA-HQ-OAR-2023-0072-0673.

[75] *Del. Dep't of Nat. Res. & Env't Control*, 785 F.3d at 18.

[76] Proposed 111 Rules, 88 Fed. Reg. at 33,415; *see also* Comments of U.S. EPA Off. of Air & Radiation to FERC, *Annual Reliability Technical Conference – Fall 2023*, Docket No. AD23-9 (Nov. 29, 2023) (Accession No. 20231205-4000), https://perma.cc/NT97-VR97 ("The proposed rule was constructed with reliability considerations in mind by incorporating timeframes and design features that promote planning and flexibility.") [hereinafter EPA OAR Comments on 2023 FERC Technical Conference].

[77] Proposed 111 Rules, 88 Fed. Reg. at 33,415.

[78] *Id.*

B. EPA's responsibility is to respond to comments and continue to coordinate with reliability-related entities

While EPA does not have an independent responsibility to address grid reliability, it still has a responsibility under the Administrative Procedure Act to consider comments on reliability before issuing a final rule. In a ruling concerning EPA's 2013 action updating emission requirements for backup generators (specifically Reciprocating Internal Combustion Engines),[79] the D.C. Circuit found that EPA's responsibility to respond to "relevant and significant" comments on grid reliability existed independent of a responsibility to address grid reliability.[80]

EPA's responsibility to respond to comments does not necessarily confer a responsibility to institute further reliability measures. Stakeholders have routinely raised concerns about reliability in EPA proceedings and every time the entities responsible for reliability were able to do their job with their existing tools.[81] EPA is required to weigh which comments actually signal a need for compliance flexibility or other accommodation and which inappropriately attribute facility retirements or costs to the Proposed 111 Rules that are due to other forces.[82] As EPA already noted in its Resource Adequacy TSD, there are processes in place to ensure that facility retirements do not jeopardize grid reliability.[83] Furthermore, PUCs in states with vertically integrated utilities can deny a request for retirement if the facility is deemed to be reliability-critical.[84] Any remaining reliability challenges may be mitigated through a variety of CAA-related and other implementation instruments (discussed further below).[85]

EPA should also continue to coordinate with DOE, FERC, and other stakeholders that contribute to grid reliability as it finalizes and later implements the rule. When designing the Clean Power Plan, much of this coordination occurred after EPA's June 2014 proposal. For example, in early 2015, FERC held a series of technical conferences related to the Clean Power Plan (CPP),[86] following which EPA and FERC corresponded regarding how to ensure reliability.[87] In August

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[79] Such generators are those used in "industrial, commercial, and institutional facilities for power generation and CHP [combined heat and power]." EPA, Catalog of CHP Technologies: Section 2. Technology Characterization—Reciprocating Internal Combustion Engines 2-2 (2015), https://perma.cc/2VYG-Q7LT.

[80] *See Del. Dep't of Nat. Res. & Env't Control*, 785 F.3d at 15.

[81] 2023 Tierney Report, *supra* note 10, at 15–22.

[82] In previous power sector regulations, EPA has grappled with this situation. For example, in the Mercury & Air Toxics Standards, EPA explained how industry and NERC studies referenced by commenters relied on flawed estimates of costs and inappropriately attributed some power plant retirements to the rule for sources that were already scheduled to retire. *See* National Emission Standards for Hazardous Air Pollutant Emissions 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. 9304, 9408 (Feb. 16, 2012) ("[M]ost of these studies make assumptions about the requirements of the EPA rules that are inconsistent with, and dramatically more expensive than, the EPA's actual proposals or final rules . . . [I]n reporting the number of retirements, many analyses fail to differentiate between plant retirements attributable to the EPA rules and retirements of older, smaller, and less efficient plants that are already scheduled for retirement."). Notably, none of these reliability concerns were borne out in implementation of EPA's previous power sector actions.

[83] *See* Proposed Rule Resource Adequacy TSD, *supra* note 11, at 2–3.

[84] *See, e.g.*, KY. Rev. Stat. Ann. § 278.264 (West 2023). EPA can reference these processes to explain its choices, but the agency may wish to acknowledge that there may not be the same processes in place for deregulated states, and explain what other financial tools are available to encourage specific generators identified as essential for locational reliability concerns to stay in service. These include tools like system support resource designations, and reliability must run agreements. *See, e.g.*, Filing of Midcontinent Independent System Operator, Inc., *Midcontinent Independent System Operator, Inc. submits tariff filing per 35.13(a)(2)(iii)*, Docket No. ER23-630 (Dec. 14, 2022) (Accession No. 20221214-5131), https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20221214-5131; David Egan, PJM Interconnection LLC, Generation Deactivation Informational Item Identifying RMR Units, https://perma.cc/ZXF9-Q597.

[85] *See infra* Section III.C.

[86] EPA, U.S. Dep't of Energy, & FERC, EPA-DOE-FERC Coordination on Implementation of the Clean Power Plan (Aug. 3, 2015) at 2, https://perma.cc/67QF-58D5 [hereinafter EPA-DOE-FERC MOU for CPP].

[87] *See, e.g.*, Letter from Janet McCabe, EPA Acting Assistant Administrator to Norman Bay, FERC Chairman (May 6, 2015), https://perma.cc/

2015, EPA, DOE, and FERC signed a MOU describing how they would "coordinate efforts to help ensure continued reliable electricity generation and transmission during the implementation of the [CPP]."[88] EPA is on track to continue similar coordination following its MOU with DOE specifically focused on reliability[89] and its participation in the initial FERC technical conference on November 9, 2023. EPA has committed to continue working with FERC and other grid reliability stakeholders[90] and can continue to build on this foundation in planning coordination for rule implementation.

C. EPA has additional tools to mitigate reliability concerns if needed during rule implementation

Consistent with its pollution reduction mandate, EPA must select a BSER reflecting the *maximum* emission reductions achievable after accounting for the relevant factors. To this end, even if it believes there are legitimate reliability challenges facing the grid, EPA's first step should be to consider whether existing compliance flexibilities or efforts of reliability-related entities can sufficiently address the concern. If those appear inadequate, EPA's next step should be to consider whether it could extend additional compliance flexibilities or add reliability safety mechanisms to the rule before considering reducing the stringency of its emissions limits or delaying its already extended implementation timeline. As noted above, EPA's Proposed 111 Rules are expected to have only an incremental effect on the much larger reliability challenge. EPA does not need to regulate less stringently simply because the oldest and highest-emitting coal plants already have plans to retire or particularly tight economic margins.[91] EPA lacks the appropriate tools and jurisdiction to tackle the broader reliability challenge, but it can use its tools to grant flexibility to address specific reliability concerns during rule implementation, should they be necessary.

There are several compelling reasons that EPA may not need to add any additional reliability safety mechanisms to the Proposed 111 Rule.[92] First, reliability-related entities have done their job under past rules with their existing tools and continue to update their reliability assessments. Second, these entities and other state and federal officials have efforts underway to grapple with many of the confounding circumstances facing the electric grid today. Third, EPA's Proposed 111 Rules contain a number of elements that provide flexibility to face reliability challenges including the creation of certain subcategories with no emissions limits, long lead times for compliance, and the option to exercise a number of implementation tools to increase flexibility.

The toolbox to increase flexibility at the implementation stage includes the "Remaining Useful Life and Other Factors" (RULOF) provision of CAA Section 111(d)(1) and enforcement discretion through CAA Section 113(a) administrative orders. As EPA has highlighted under the RULOF provision of CAA Section 111(d)(1), states retain discretion to apply performance standards to individual sources that are less stringent under select circumstances.[93] This gives the states flexibility to reduce the stringency of a standard applicable to a particular existing source needed for reliability. EPA could alternatively or additionally issue a policy statement clarifying its intended use of Section 113(a) administrative

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C6E6-BMKQ; Letter from Norman Bay, FERC Chairman to Janet McCabe, EPA Acting Assistant Administrator (May 15, 2015), https://perma.cc/X73D-DJ32 (discussing "how the Commission can continue to fulfill its responsibility on Bulk-Power System reliability after EPA releases any final rule").

88 EPA-DOE-FERC MOU for CPP, *supra* note 86, at 1.

89 U.S. Dep't of Energy & EPA, Joint Memorandum on Interagency Communication and Consultation on Electric Reliability (Mar. 9, 2023) https://www.epa.gov/system/files/documents/2023-03/DOE-EPA%20Electric%20Reliability%20MOU.pdf.

90 *See, e.g.*, EPA OAR Comments on 2023 FERC Technical Conference, *supra* note 76, at 2 ("As we move towards a final rule, I look forward to staying in closer, more regular contact with each of you. Similarly, my technical staff will seek to work in a coordinated fashion with FERC technical staff moving forward, just as they have done during prior rulemaking efforts impacting the power sector.").

91 *See* Inst. for Pol'y Integrity, Comments on the Proposed 111 Rules 8–10 (Aug. 8, 2023), https://perma.cc/KUL8-HLZH.

92 2023 Tierney Report, *supra* note 10, at 6.

93 Proposed 111 Rules, 88 Fed. Reg. at 33,276. Section 111(d) flexibilities are applicable to existing sources.

orders in relation to electric reliability, as it previously did for the Mercury & Air Toxics Standards (MATS). For example, in the MATS regulatory regime, EPA issued an enforcement response policy for use of CAA 113(a) administrative orders (AOs) to allow for a limited period of noncompliance for sources that must run to address a documented reliability need,[94] and FERC released a policy statement explaining how it would advise EPA on how to rule on requests for these AOs.[95] Additionally, EPA has an existing system emergency exclusion for reliability[96] and operators can separately seek permission from DOE under the FPA to run in noncompliance temporarily under emergency circumstances.[97] EPA may find that these existing tools are sufficient to equip operators with the needed flexibility to address reliability concerns in conjunction with the grid reliability work of other entities discussed in Sections II.B and IV.

If, after reviewing the full record, EPA is concerned that further flexibility is needed, it can consider adding additional reliability safety mechanisms to the final rule. For example, a "reliability safety valve" that could be triggered during unexpected events, allowing reliability-critical EGUs to operate without adhering to the standard and without counting the associated emissions towards the state's overall compliance.[98] This type of mechanism provides the flexibility necessary for reliability in emergencies and unforeseen conditions without unnecessarily sacrificing emissions reductions when reliability does not require doing so. It could also add a requirement that states verify that they "considered electric system reliability in developing their state plans,"[99] effectively ensuring coordination between state environmental regulators and state PUCs. Here again, EPA can support reliability goals at the implementation stage by ensuring continued assessment during state planning when states will have better opportunities to identify particular reliability challenges.

But as noted above, because of EPA's responsibility to reduce pollution, it should only add reliability safety mechanisms if necessary to address a reliability concern that cannot be otherwise mitigated. History suggests that such mechanisms may not always be needed even when stakeholders express initial reliability concerns.[100] For example, in the case of the Clean Power Plan (CPP), EPA's prior effort to reduce GHG emissions from fossil fuel-fired power plants that was never implemented, the power sector exceeded the CPP's emissions reduction targets ahead of schedule and without needing any additional reliability safety mechanisms or causing a reliability problem (despite some commenters initially expressing concerns about reliability).[101]

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[94] EPA Off. of Enf't & Compliance Assurance, *The Environmental Protection Agency's Enforcement Response Policy For Use Of Clean Air Act Section 113(a) Administrative Orders In Relation To Electric Reliability And The Mercury and Air Toxics Standard* (Dec. 16, 2011), https://www.epa.gov/sites/default/files/documents/mats-erp.pdf (describing EPA's plan to use administrative orders under CAA Section 113(a) to allows sources that must operate in noncompliance for up to a year to address a specific and documented reliability concern); *see also* 42 U.S.C. § 7413.

[95] Statement of Policy, *The Commission's Role Regarding the Environmental Protection Agency's Mercury and Air Toxics Standards*, 139 FERC ¶ 61,131 (2012), https://perma.cc/MDJ2-FJRJ.

[96] 40 C.F.R. Pt. 60 Subpart TTTT.

[97] *See* 16 U.S.C. § 824a(c); 42 U.S.C. § 7151(b). DOE granted such a request during Winter Storm Elliot in December 2022. *See Federal Power Act Section 202(c): PJM December 2022*, U.S. Dep't of Energy, https://www.energy.gov/ceser/federal-power-act-section-202c-pjm-december-2022 (last visited Dec. 20, 2023).

[98] EPA proposed a mechanism like this in the Clean Power Plan, its prior attempt to regulate greenhouse gas emissions from fossil fuel-fired power plants. *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,877–79 (Oct. 23, 2015).

[99] EPA added this requirement to the Clean Power Plan as well. *See id.* at 64,676.

[100] *See* 2023 Tierney Report, *supra* note 10, at 15–22.

[101] *See, e.g.*, Energy Innovation Pol'y & Tech., LLC, Maintaining a Reliable Grid Under EPA's Proposed 111 Rules Restricting Power Plant Emissions 9 (2023), https://perma.cc/8CZZ-G9EX ("The last time the EPA issued a rule meaningfully limiting GHG emissions from existing power plants—the Clean Power Plan—numerous stakeholders protested on reliability grounds. The same can be said for many other rules addressing conventional air pollution from power plants. However, the power sector achieved the Clean Power Plan's 2030 goal by 2020 without risking reliability as states collaborated in unprecedented ways to propose regional compliance strategies, even though the rule never entered force.").

IV. FERC, Other Reliability-Related Entities, and States Have the Tools to Support Grid Reliability, and Should Continue to Use and Improve Them

FERC and other reliability-related entities are responsible for addressing reliability challenges resulting from policies supporting the clean energy transition.[102] With the Proposed 111 Rule, as with other prior pollution reduction rules impacting the power sector, EPA has fulfilled its responsibility to design a rule that allows the reliability-related entities to do their jobs. FERC, DOE, states, and other reliability-related entities will have to continue to coordinate to provide grid reliability as economy-wide decarbonization[103] increases electricity demand, and worsening extreme weather events, exacerbated by climate change, both increase demand and add new challenges. These efforts include: (1) supporting energy adequacy through tools like wholesale electricity market redesigns and other updated energy resource procurement mechanisms to blunt generator retirement impacts and ensure adequate energy resource entry; (2) updating reliability standards; (3) supporting transmission buildout and grid efficiency; (4) updating generator exit rules; and (5) prioritizing gas-electric harmonization. FERC and other reliability-related entities must work with EPA and the states to implement essential emissions-reduction protections without compromising reliability. By taking these wider actions to address reliability, the entities with the appropriate responsibility and tools to address grid reliability can make progress.

A. FERC and other reliability-related entities can support resource adequacy by updating wholesale markets and procurement mechanisms, and modernizing measures and metrics

As discussed in Sections II & III, EPA is not charged with maintaining resource adequacy. FERC, RTOs/ISOs, PUCs, state environmental/energy commissions,[104] and vertically integrated utilities all play complementary roles in supporting resource adequacy. In this subsection, we first discuss market tools and other procurement mechanisms that entities may use to support resource adequacy. Then we review other state tools supporting resource adequacy. Finally, we explain how metrics and measures of resource adequacy that are used to guide both market and other resource procurement mechanisms are being rethought to support energy sufficiency in the face of modern grid challenges. By using, and further innovating, this set of resource adequacy tools, FERC, RTOs/ISOs, state PUCs, and utilities can help mitigate challenges to grid reliability.

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[102] FERC has both the jurisdiction and the mandate to ensure that its jurisdictional markets are designed to procure adequate energy to meet demand.

[103] *See, e.g.*, U.S. Dep't of State and the U.S. Exec. Off. Of the President, the Long-term Strategy of the United States: Pathways to Net-zero Greenhouse Gas Emissions by 2050 (2021) https://perma.cc/2F9A-KKUS.

[104] National Council on Electric Policy Mini Guide, Engagement between State Public Utilities Commissions and State Energy Offices, 2–3, https://perma.cc/R2Y9-4HK6 (describing the widely varying legal structure of relationships between state energy offices and state public utilities commissions).

Market and other procurement mechanisms to support resource adequacy

While FERC does not have jurisdiction over long-term resource planning, "which includes deciding on what is a sufficient resource mix for a reliable electric system,"[105] it does have a wide arsenal of tools it uses to support resource or energy adequacy, including overseeing RTO/ISO-administered electricity markets. Electricity markets play a critical role in supporting resource adequacy and creating economic incentives for resource entry and exit.[106] RTO/ISO-administered electricity markets, such as energy and capacity markets (and other market mechanisms), help ensure that the necessary resources are developed on appropriate time horizons. Capacity markets are one tool that can help prevent and address reliability challenges by appropriately valuing energy resources and compensating them for their availability to provide energy in times of need.[107] To the extent that the Proposed 111 Rules will further incentivize any particular generators to retire earlier than they had otherwise planned, the scarcity of future capacity would lead to higher prices in the capacity market for those jurisdictions relying on them to ensure resource adequacy. Thus, there would be an incentive for the entry of new generation.[108]

For jurisdictions that do not have capacity markets, but administer energy-only markets (like the non-FERC jurisdictional RTO, ERCOT), if the generation resource retirement leads to energy scarcity, it will result in higher energy prices that will incentivize new generation resources. Finally, for other regions not part of RTOs or ISOs, after forecasting need, "vertically integrated utilities, cooperatives and municipal electric companies add needed capacity by proposing and building their own project and/or through soliciting offers from other competitive suppliers," and "some combination of regulated and/or market process brings forth proposals to satisfy the need."[109]

State work to support resource adequacy

Against this varied resource adequacy procurement backdrop, states' decarbonization and clean energy laws are already affecting the generation mix, and state regulators will need to continue working with state PUCs to help ensure resource adequacy as certain existing generators retire and others need to be appropriately sited. State PUCs, often in conjunction with RTO/ISO support, may require retail electric utilities to conduct integrated resource planning to ensure they meet all reliability standards.[110] One thing is uniformly true for understanding who has "control" over energy resource entry

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[105] FERC Reliability Explainer, *supra* note 55.

[106] *See, e.g., PJM Files Changes to Capacity Market To Promote Reliability: Federal Energy Regulatory Commission Proposal Responds to Resource Adequacy Needs of Evolving Grid*, PJM Interconnection LLC (Oct. 13, 2023), https://perma.cc/5EXM-9YXV (describing PJM capacity market reform filings with FERC that "will help PJM do what we do best—operating markets that attract critical investment in the resources we need to keep the lights on," as "[m]aintaining enough resources that can support reliability are [sic] crucial to PJM's ability to serve demand through the transition to a less carbon-intensive grid"); Sylwia Bialek Et Al., Inst. For Pol'y Integrity, Resource Adequacy in a Decarbonized Future, *supra* note 57 (examining jurisdictions that use wholesale market mechanisms to incentivize sufficient generation capacity to see which ones may tilt the playing field against renewables).

[107] Sylwia Bialek & Burçin Ünel, Inst. For Pol'y Integrity, Capacity Markets & Externalities: Avoiding Problematic and Unnecessary Reforms 5 (2018), https://perma.cc/LG83-ZQ89 ("Capacity auctions choose the generators with the lowest offers to meet the necessary level of capacity to ensure resource adequacy—capacity amounts that are close to the predicted maximum demand plus a reference reserve margin. All of the cleared generators receive the same per-MW price, equal to the bid of the last-clearing generator.").

[108] *See* Letter from Alison Clements, Comm'r, Fed. Energy Reg. Comm'n, to Cathy McMorris Rodgers, Chair, Comm. on Energy and Commerce, U.S. House of Representatives, and Jeff Duncan, Chair, Subcomm. on Energy, Climate, and Grid Security, U.S. House of Representatives 1 (Jan. 19, 2024), FERC Docket AD23-9, Accession No. 20240122-4013 stating that a number of market mechanisms, including what generator costs to include in capacity markets, need evaluation).

[109] Comments of Susan F. Tierney to FERC at attach. 1, *Annual Reliability Technical Conference – Fall 2023*, Docket No. AD23-9 (Dec. 15, 2023) (Accession No. 20231205-5105) (presenting tables summarizing reliability entities, processes and tools).

[110] *See, e.g.*, Sandia Nat'l Lab'ys, Issue Brief: Energy Storage & Resource Adequacy (2020), https://perma.cc/HG4P-K2NJ (discussing lack of uniformity in resource adequacy markets and responsibility across the U.S.); *CPUC Continues Efforts to Ensure Grid Reliability*, CA. Pub. Utils. Comm'n (Oct. 12, 2023), https://perma.cc/9ZFJ-6WBK (announcing a California Public Utilities Commission Resource

or exit in electric grid services: There is no uniform answer. There is significant variation between states' levels of retail utility deregulation, and there can even be tensions between similarly regulated utilities across states within RTO/ISO regions when those states have wide-ranging energy policies.[111] Coordinated planning efforts are key.

Updated thinking for measuring resource adequacy

For whatever prevailing resource sufficiency processes govern a particular region, there are ongoing technical and rule-making proceedings designed to update resource adequacy principles for the energy transition. These focus on ensuring that resource need forecasting is accurate and robust to meet increasing demand. The ongoing transition (from grids heavily reliant on fossil fuel-fired resources to grids relying on high levels of variable energy resources and storage) requires thinking about not only the amount of energy resources provide, but also their differing operational characteristics and reliability contributions.[112] In short, as the kinds of energy resources shift from conventional, emitting fossil capacity to variable energy resources, the grid services that those resources provide change as well.[113] Planners are shifting their approaches to measuring resource adequacy accordingly, from tools designed to meet single peak load periods occurring during one season, to resource adequacy tools that account for weather-induced correlated risks of failure, with the highest system risks becoming decoupled from peak load.[114] Grid planners and other policymakers are already thinking about these needed resource adequacy updates in wholesale markets and energy procurement proceedings, and the Proposed 111 Rules' marginal impact on fossil fuel-fired generation resources can also be addressed through continued engagement in these energy/resource adequacy assessment reforms.[115]

Because there is no national, one-size-fits-all plan for measuring or ensuring resource adequacy, EPA's Resource Adequacy TSD reasonably forecasted the Proposed Rule's impacts on Resource adequacy by accounting for the many factors influencing generators' decisions to enter or exit the market.[116] As NERC's 2023 Long Term Reliability Assessment recently noted:

> [T]o reliably grow the BPS, generator retirements over the 10-year assessment period of this *2023 LTRA* need to be carefully evaluated. State and provincial resource adequacy stakeholders and policymakers need to ensure that resource plans account for growing electricity demand and load profiles as well as the future resource portfolio's capabilities to provide essential grid reliability services. They must have

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Adequacy proceeding to ensure CAISO has adequate energy supplies).

[111] *See* Kathryne Cleary & Karen Palmer, Res. For the Future, US Electricity Markets 101 (2022) https://perma.cc/T8PR-JZP7 (reviewing the many iterations of energy adequacy oversight across the country, and detailing how states with either deregulated electric utilities or vertically integrated electric utilities interact with grid operators, including RTO/ISO participation). RTO-member states are already working to more efficiently synchronize their state procurement goals with RTO-run markets, or to supplement those markets, where conflicts have previously arisen. *See, e.g.*, N.J. Bd. Of Pub. Utils., 2022 Progress Report on New Jersey's Resource Adequacy Alternatives: Update Regarding Staff's Investigation of Resource Adequacy Alternatives, Docket #EO20030203 (2022), https://perma.cc/79BB-Z8GX (examining how PJM supports or is at odds with New Jersey's resource adequacy efforts); *see also* Nat'l Ass'n of Regul. Util. Comm'rs, Resource Adequacy Primer for State Regulators 61–62 (2021), https://perma.cc/54LT-74RP (discussing the tension and interplay between state and regional planning for resource adequacy).

[112] *See, e.g.*, Nat'l Ass'n of Regul. Util. Comm'rs, *supra* note 111, at 60 ("These changes have caused consideration, and in some cases, adoption of additional approaches for assessing resource adequacy to capture the characteristics of more variable resources (wind and solar generation) on the system, increased participation of demand-side resources, and more extreme events (weather, supply interruptions, etc.)").

[113] *See* Energy Sys. Integration Group, Redefining Resource Adequacy for Modern Power Systems 4-8 (2022), https://perma.cc/RAK8-7C59.

[114] *Id.*

[115] *See, e.g.*, Notice of Technical Conference on Resource Adequacy in the Evolving Electricity Sector, FERC Docket No. AD21-10-000 (Feb. 18, 2021) (Accession No. 20210218-3091).

[116] *See* Proposed 111 Rules Resource Adequacy TSD, *supra* note 11.

> effective measures that can be implemented to prevent loss of resources that are needed for resource and energy adequacy, grid reliability, and system restoration.[117]

EPA has designed the Proposed 111 Rules to provide significant implementation flexibility that helps ensure that resource adequacy entities can carry out this job.[118]

B. Regulators (and relevant entities) are updating reliability standards and planning processes, including for extreme weather events

By ensuring that proper reliability standards are in place, FERC, NERC, and EROs can further support grid reliability.[119] FERC has emphasized the importance of its role in updating reliability standards to support the energy transition:

> FERC can advance reliability improvements by directing NERC to develop new or modified reliability standards to address emerging grid issues such as certain power plant retirements and integration of renewable energy resources. FERC has also taken action to assure that the electric grid is prepared to reliably operate during more frequent and more extreme weather events.[120]

In particular, NERC has been working on updating reliability standards and planning practices to ensure that grid operators can plan for reliable grid operations in the face of extreme weather events.[121] These endeavors are, in part, based on analyses revealing that fossil fuel-fired generators have underperformed during past extreme weather events. For example, both the PJM and joint FERC-NERC reports on Winter Storm Elliot conclude that gas-fired electric generators experienced unplanned outages that threatened system reliability during extreme weather events.[122] Those reports also indicate that regulators should develop gas system reliability standards and point to their absence as increasing electric system risk. Accordingly, planners are updating their thinking about these resources' contribution to reliable grid operations.[123] Moreover, planners are now focusing on the difficulties of projecting future reliability risks by using historical weather data that will not reflect future conditions given climate change.[124]

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[117] N. Am. Elec. Reliability Corp., 2023 Long-term Reliability Assessment 11 (2023), https://perma.cc/TT96-TMYN [hereinafter NERC 2023 Long-term Reliability Assessment].

[118] *Supra* Section III.

[119] *See, e.g.*, NERC 2023 Long-term Reliability Assessment, *supra* note 117, at 133 (summarizing ERO Actions "underway to monitor, assess, and reduce long-term BPS reliability risks" and concluding that "[t]he selected ERO activities . . . will result in new or enhanced Reliability Standards requirements, reliability guidelines, resources, or significant findings and actionable steps for stakeholders to address reliability risks").

[120] FERC Reliability Explainer, *supra* note 55.

[121] *See, e.g.*, *Transmission System Planning Performance Requirements for Extreme Weather*, Order 896, 183 FERC ¶ 61,191 (2023), https://perma.cc/3RX9-58KD; *Order Approving Extreme Cold Weather Reliability Standards*, 186 FERC ¶ 61,115 (2024), https://perma.cc/4FB5-F3J6.

[122] *See* FERC, NERC, & Regional Entities, Winter Storm Elliott Report: Inquiry Into Bulk-power System Operations During December 2022 (Oct. 2023), https://perma.cc/5TUM-Z3TG (additionally cataloging gas-fired electric generation failures during four prior extreme cold events); PJM, Winter Storm Elliott: Event Analysis and Recommendation Report 2 (July 2023), https://perma.cc/5LYL-MXGJ; *see also* Daniel Moore, *Gas-Fired Power Reliability Scrutinized Ahead of Winter Season*, Bloomberg L. (Sept. 8, 2023), https://news.bloomberglaw.com/environment-and-energy/gas-fired-power-reliability-scrutinized-ahead-of-winter-season ("Gas accounted for 72% of outages attributable to fuel during Winter Storm Elliott last December that hit the mid-Atlantic and Southeast states, according to the regional grid operator PJM Interconnection.").

[123] *See* Mark Specht, *How Reliable Are Gas Power Plants? What ICAP, UCAP, and ELCC Tell Us*, UNION OF CONCERNED SCIENTISTS (Aug. 23, 2023), https://perma.cc/TGN3-L4EA (discussing ongoing efforts to update accreditation methods to more accurately reflect gas-fired electric generators' contribution to grid reliability).

[124] Energy Sys. Integration Group, Weather Dataset Needs for Planning and Analyzing Modern Power Systems 7–9 (2023), https://perma.cc/S25J-Y23K; Nicholas Rivers & Blake Shaffer, *Stretching the Duck: How Rising Temperatures will Change the Level and Shape*

C. FERC and grid operators should foster transmission buildout to better ensure that new energy resources interconnect on a sufficiently rapid timeline

FERC, RTOs/ISOs, and other non-RTO grid operators[125] must also continue to reform generator interconnection, cost allocation, and long-term transmission planning to support resource adequacy and operational reliability. FERC is well positioned to ensure that its jurisdictional grid operators support the energy transition by providing consistent and uniform guidance for each of these tasks. First, as aging and inefficient fossil-fuel generators continue to retire, new energy resources must replace both lost generation capacity and reliability services from those facilities. Those new energy resources must be able to connect to and deliver power to the existing grid. Doing so requires multiple complex steps, beginning with the proposed resource submitting an interconnection request to the RTO/ISO, entering into the relevant interconnection cycle/queue with other waiting resources, awaiting a system impact study, then an interconnection facilities study, and finally, proceeding to a generation interconnection agreement.[126] As state and federal decarbonization and clean energy policies are implemented, interconnection queues have become lengthy, with renewable energy and storage projects waiting to serve the grid.[127] RTOs/ISOs are in various stages of tackling generation interconnection reforms consistent with FERC's recent Order 2023.[128] These reforms are essential mechanisms under FERC's direct control, and these reforms will support resource adequacy and reliability by ensuring that resource entry can occur at the needed scale and pace.[129]

Currently, these interconnection proceedings have acted as a substitute for robust, long-term transmission planning that considers consistent cost allocation principles and holistic benefits.[130] This has resulted in inefficient, reactive transmission builds instead of forward-looking and proactive planning. It has also yielded time consuming cost-allocation conflicts that can ultimately scuttle transmission buildout.[131] FERC is in the process of addressing these challenges, and is expected to issue a rule designed to catalyze long-term regional transmission planning and cost-allocation-reform efforts.[132]

A successful clean energy transition requires regulators to engage in long-term, holistic transmission planning. Some RTOs/ISOs and other regional grid planners are engaged in long-term, multi-value transmission planning efforts that

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of Future Electricity Consumption, 41 Energy J. 33 (2020).

[125] *See Understanding RTOs: the West*, Nat'l Caucus of Env't Legislators (Dec. 13, 2023), https://perma.cc/HLU3-EYRK.

[126] *See, e.g.*, PJM Interconnection LLC, Generator Interconnection (Nov. 17, 2023), https://perma.cc/VM8D-U8J6. Note that interconnection rules vary between RTOs/ISOs.

[127] *See* Emma Penrod, *US grid interconnection backlog jumps 40%, with wait times expected to grow as IRA spurs more renewables*, UtilityDive (Apr. 11, 2023), https://perma.cc/6CG7-AXUR.

[128] *Improvements to Generator Interconnection Procedures and Agreements*, Order 2023, 184 FERC ¶ 61,054 (2023), https://perma.cc/U7CG-S2BG.

[129] *Id.* at P 2 (Comm'r Clements, concurring) ("Ultimately, the dysfunction of the interconnection process harms consumers. It prevents low-cost generation from coming online that could have reduced the cost of electricity, and it harms reliability. Several of the nation's largest grid operators have stated that they could face resource adequacy problems if new resource entry does not occur rapidly enough to match the pace of resource retirements." (footnote omitted)); *see also* Jeff St. John, *The clean energy backlog barely budged this year. What's the way forward?*, Canary Media (Dec. 18, 2023), https://perma.cc/HU99-4C9M (emphasizing the importance of interconnection reform for the clean energy transition).

[130] *Improvements to Generator Interconnection Procedures and Agreements*, Order 2023, 184 FERC ¶ 61,054, at P 13 (2023) (Comm'r Clements, concurring) ("Interconnection processes are overloaded in part because they are being relied on to build out core transmission system infrastructure that should be considered in regional planning processes. We know interconnection processes were not intended for, and are ill suited to perform, this task.").

[131] *See, e.g.*, Miranda Willson, *'Latest battleground': How politics seized the electric grid*, E&E News (Dec. 19, 2023), https://perma.cc/7PYM-UKNC.

[132] *See Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection*, 179 FERC ¶ 61,028 (2022), https://perma.cc/SK5A-4LWS.

are proactively anticipating generation retirements (reflecting utility plans, economic and policy factors), new generation and storage (based on robust capacity expansion modeling), load growth (with multiple electrification scenarios), and longer time horizons addressing transmission's end-of-life needs.[133] More are missing these significant opportunities to plan for the clean energy transition, and ratepayers are likely to bear increased costs as a result.[134] Siloed planning for grid expansion that separates transmission projects into those driven by economic/reliability needs from those driven by public policy needs will continue to produce inefficient and overly expensive solutions.[135] FERC can help ensure grid reliability by being more prescriptive about long-term planning metrics, scenarios, and modeling.[136]

Increased regional and interregional transmission expansion can dampen the need for new generation resources, increase reliability, and help build resilience. It also complements clean energy resource integration and market integration, lowering costs.[137] Measures improving grid efficiency, like grid-enhancing technologies and reconductoring[138] can help do the same, and some reliability-related entities are working on tools supporting those efforts.[139]

DOE has a role to play in supporting transmission expansion as well;[140] its Grid Deployment Office has focused on efforts to support grid reliability.[141] On December 19, 2023, DOE finalized its guidance and process for designating national interest transmission corridors, which could serve as a key grid-reliability tool.[142] Collectively, these rules, proceedings, and tools are essential for accelerating the clean energy transition and improving grid reliability in the face of increasing extreme weather events, and all reliability-related entities must continue advancing them to bolster grid reliability.[143]

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[133] *See* Americans for a Clean Energy Grid, *Transmission Planning and Development Regional Report Card* (June 2023), https://perma.cc/LWG3-F47J (grading ten planning regions on their long-term planning practices).

[134] *Id.* at 5 (showing most regional grid planners earned a D grade or lower).

[135] *See* Jennifer Danis et al., *Transmission Planning for the Energy Transition: Rethinking Modeling Approaches* (December 2023), https://perma.cc/KZ3T-F7GC, 1 ("Historically, transmission planning has been reactive and compartmentalized, with separate efforts focusing on reliability, public policy alignment, and economic needs. However, a cost-effective clean energy transition will require building the right transmission lines at the right locations, with the right capacity, and in the right order. This will only be possible with proactive and holistic transmission planning.").

[136] *See* Institute for Policy Integrity, Comments on FERC NOPR (Aug. 17, 2022), https://perma.cc/CMF2-EEU4; Institute for Policy Integrity, Reply Comments on FERC NOPR (sept. 19, 2022), https://perma.cc/93N9-2YMC.

[137] Catherine Hausman, *Power Flows: Transmission Lines and Corporate Profits* (NBER, Working Paper No. 32091, January 2024), https://perma.cc/VA5V-J5GV.

[138] Chojkiewicz Et Al., *Accelerating Transmission Expansion by Using Advanced Conductors in Existing Right-of-Way* (Energy Institute Working Paper No. 343, 2023), https://perma.cc/WJ8A-RQAK (reporting findings that reconductoring can meet over 80% of the transmission needed to reach 90% clean power by 2035).

[139] *See, e.g.,* U.S. Dep't of Energy, Report on Grid-enhancing Technologies: a Case Study on Ratepayer Impact (2022), https://perma.cc/3D32-Q8R6; Srishti Slaria Et Al., Res. For the Future, Expanding the Possibilities: When and Where Can Grid-enhancing Technologies, Distributed Energy Resources, and Microgrids Support the Grid of the Future? 13 (2023), https://perma.cc/5ZRK-4G35 ("Overall, the zero-emission DERs described may . . . partially displace the need for transmission expansion in a renewables-dependent grid.").

[140] *Grid and Transmission Program Conductor Guide*, U.S. Dep't of Energy, https://perma.cc/4DMZ-BFGH (describing DOE "transmission and grid resilience financing programs, as well as other existing DOE transmission and grid programs"); 16 U.S.C. § 824p(a)(1) (requiring DOE to conduct a triennial nationwide study of transmission capacity constraints and congestion); U.S. Dep't of Energy, National Transmission Needs Study (2023) (2023 Needs Study), https://perma.cc/TS86-GGXR.

[141] *See, e.g.,* U.S. Dep't of Energy, National Transmission Needs Study; *National Transmission Planning Study,* U.S. Dep't of Energy, https://perma.cc/N2GQ-6X8X.

[142] *See* U.S. Dep't of Energy, Grid Deployment Office Guidance on Implementing Section 216(a) of the Federal Power Act to Designate National Interest Electric Transmission Corridors (Dec. 19, 2023) https://perma.cc/R3MC-YJUA.

[143] *See, e.g.,* Mike O'Boyle et al., Maintaining a Reliable Grid Under EPA's Proposed 111 Rules Restricting Power Plant Emissions, Energy Innovation Pol'y & Tech., LLC 5 (Nov. 2023), https://perma.cc/8CZZ-G9EX (summarizing actions that reliability-related entities can take to ensure grid reliability under proposed GHG standards for power plants).

D. Regulators and utility/grid planners should update rules related to generation retirement

Individual fossil fuel-fired generators must choose how they will respond to numerous economic and policy forces, including federal pollution-reduction mandates, federal clean energy incentives, state clean energy mandates, and renewable portfolio standards, fuel costs, and wholesale electricity markets. Although grid operators generally cannot compel a generator to remain in service, they have significant opportunities to manage the pace of retirements. For example, rules regarding how much notice a retiring generator must give planners vary from region to region, as do related requirements, and some grid operators are recognizing the importance of reexamining those provisions.[144] Clearly, planners who have more notice that they will need to procure replacement resources will be better able to plan for bringing appropriate resources online.[145] In turn, longer notice requirements could also reduce the amount and number of out-of-market payments necessary to secure specific reliability-designated generator agreements, an available but potentially expensive tool that planners should not use as a substitute for holistic planning.[146] Having ample notice could enable planners to request proposals to fill the identified reliability need that a particular generator retirement may create, providing a better opportunity to secure forward-looking solutions that are less expensive and more robust.[147]

Another way to ensure that the grid is prepared for generation retirements is through holistic planning and market design. Because generator retirements are localized,[148] state PUCs and utility and grid planners should also engage in long-term, multi-variable scenario forecasting and planning that appropriately account for generator exits and entries, ensuring sufficient attributed resource adequacy within their states and regions.[149] NERC itself recommends that planners focus on such strategies to assess, forecast, and manage the pace of these retirements to support grid reliability.[150]

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[144] Some grid operators are signaling that they may be tackling these rules in the near term. *See, e.g.,* PJM, Problem/Opportunity Statement: Enhancements to Deactivation Rules (2023), https://perma.cc/6JR3-JMLW. MISO recently changed from a 26-week prior notice provision for retiring generation to requiring four full quarterly study periods' notice. *Midcontinent Indep. Sys. Operator, Inc.*, 182 FERC ¶ 61,066, 5 (Feb. 10, 2023) ("We find that MISO's proposed Tariff revisions to expand the timing required for submission of [Notices] from 26 weeks to four full Quarterly Study Periods prior to the date of proposed suspended operation of a facility. . .are just and reasonable, and we therefore accept them. . . . As MISO explains, it expects to continue receiving a substantial amount of Attachment Y Notices for generator suspensions and retirements.20 We find that the revisions will enhance the study process by allowing MISO more time to conduct the Attachment Y Study that is needed to assess whether the reliability of the MISO transmission system is impacted by specific unit suspensions and retirements.").

[145] *See, e.g.*, Letter from Organization of PJM States, Inc. (OPSI), to Mark Takahashi, Chair, PJM Board of Managers and Manu Asthana, PJM President, and CEO PJM Interconnection, L.L.C. (Nov. 28, 2023), https://perma.cc/2SM6-ZP8P.

[146] These agreements are sometimes called "reliability must run" or "system support resource" agreements, and grid operators can use these, often expensive, measures to try to induce generators threatening retirement to continue operating. *See, e.g.,* Robert Walton, *Texas grid operator to consider reliability-must-run contract for retiring Talen Energy gas unit,* Utility Dive (Aug. 30, 2023), https://perma.cc/XTB4-3ZKC (ERCOT considering a reliability must run agreement for a gas-fired electric generator); Ethan Howland, *FERC approves MISO reliability contract to keep Ameren Missouri's Rush Island coal plant operating* (Oct. 26, 2022), https://perma.cc/5UGX-ED2C (discussing FERC's approval of MISO's system support resource agreement for a coal-fired electric generator); *See* Letter from Alison Clements, Comm'r, Fed. Energy Reg. Comm'n, to Cathy McMorris Rodgers, Chair, Comm. on Energy and Commerce, U.S. House of Representatives, and Jeff Duncan, Chair, Subcomm. on Energy, Climate, and Grid Security, U.S. House of Representatives 1 (Jan. 19, 2024), FERC Docket AD23-9, Accession No. 20240122-4013 (expressing interest in considering reexamination of retirement notification timelines for FERC-jurisdictional generators).

[147] *See, e.g.*, Telos Energy & Grid Lab, *Brandon Shores Retirement Analysis Project Update* (Jan. 30, 2024) https://perma.cc/3SGC-4EMM (finding that battery storage with grid-forming inverters, reconductoring low voltage lines, and deploying voltage support technology would be far more cost-effective than the proffered reliability must run agreement that would be kept in place until build-out of a transmission-only solution).

[148] Fed. Energy Reg. Comm'n, 2022 State of the Markets 17 (March 16, 2022), https://perma.cc/WU4A-4KGJ (showing that the vast majority of generator retirements in 2022 occurred in PJM and MISO).

[149] *See Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection*, 179 FERC ¶ 61,028 P 51 (2022) (listing several factors, including retirements, that planners should consider when conducting long-term reliability studies).

[150] NERC 2023 Long-Term Reliability Assessment, *supra* note 117, at 13.

E. FERC and other reliability-related entities should prioritize addressing gas-electric coordination issues, an ongoing source of reliability concerns

FERC, NERC, and other reliability entities consistently flag inadequate gas-electric coordination as a significant reliability concern, particularly after major winter storms highlight issues with gas-fired electric generators' ability to provide grid services.[151] Yet, gas-electric coordination remains the "Achille's heel of the energy transition."[152] Despite identifying specific areas in need of attention, like system-wide gas infrastructure need assessments, better cross-sector forecasting, increased information sharing, pricing transparency, and coordinating operating days/market timing, regulators and grid operators have been slow to develop related reliability-supporting tools.[153] These tools would help support the clean energy transition, in no small part by refocusing system planners' attention on rethinking and reevaluating how to measure fossil fuel-fired generators' and clean energy resources' contributions to grid reliability.[154]

Stakeholders across the industry have highlighted the urgent need for a natural gas reliability organization with authority similar to NERC.[155] A group of RTOs recently published a position paper containing several specific recommendations and action steps focused on helping address these gas-electric reliability concerns.[156] FERC and other industry stakeholders should consider these and move to quickly implement the gas-electric harmonization recommendations suggested by the North American Standards Board.[157] In particular, FERC can establish or revise standards related to the timely sharing of gas pipeline informational data, including schedules, to improve situational awareness and communication between the gas and electric industries.[158] It can also consider policy changes encouraging more frequent use of capacity release or asset management arrangements and remove barriers to capacity release.[159] Lastly, the relevant agencies can and should study whether there is adequate natural gas infrastructure in place.[160]

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[151] *See, e.g.*, FERC, NERC, & Regional Entities, Winter Storm Elliott Report, *supra* note 122, at 143; *see also* Opening Remarks of Comm'r Allison Clements, *Fed. Energy Reg. Comm'n November Meeting* (Nov. 16, 2023), https://perma.cc/4AQT-RFL5 ("Gas-electric coordination issues are central to energy system reliability.")

[152] James Downing, *Gas-electric Coordination 'Achille's Heel' of Energy Transition, NERC Summit Told*, RTO Insider (Jan. 27, 2023), https://perma.cc/9QMZ-SPAA.

[153] *See* Comments of Susan F. Tierney, PH.D. before the Fed. Energy Reg. Comm'n at attach. 1, *Annual Reliability Technical Conference – Fall 2023*, Docket No. AD23-9 (Accession No. 20231205-5105) (Dec. 15, 2023) (Recommendation Table 3); North American Energy Standards Board, Gas Electric Harmonization Forum Report (July 28, 2023), https://perma.cc/SU5D-JTUU [hereinafter NAESB Gas Electric Harmonization Forum Report]; FERC, NERC, & Regional Entities, Staff Report: Inquiry Into Bulk-power System Operations During December 2022 Winter Storm Elliott (Oct. 2023), https://perma.cc/5TUM-Z3TG. These gaps are in addition to oversight gaps discussed *infra*, at Part III.B, such as lack of gas system reliability standards, which could be another useful reliability tool that regulators have not yet developed.

[154] For a discussion of the need for such refocusing of attention, see Paul Arbaje et al., Gas Malfunction: Calling into Question the Reliability of Gas Power Plants, Union of Concerned Scientists (Jan. 2024), https://perma.cc/LKN9-XTQ5.

[155] NAESB Gas Electric Harmonization Forum Report, *supra* note 153, at 3.

[156] ISO-NE, MISO, PJM, and SPP, Strategies for Enhanced Gas-Electric Coordination: A Blueprint for National Progress (2024), https://perma.cc/BRL3-VRCZ.

[157] *See id*. at 2.

[158] *Id*. at 5.

[159] *Id*.

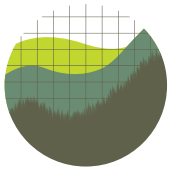
[160] *Id*. at 6. *See also* Burçin Ünel & Jennifer Danis, *It's past time for FERC to assess if the US needs more gas infrastructure*, Utility Dive (Nov. 14, 2023), https://perma.cc/TTA5-GE8M.

Conclusion

The network of reliability-related entities have developed a toolbox to guide generators' operating and retirement decisions, bolster resource adequacy, and maintain operational reliability. They should continue to build upon this foundation to meet the challenges of the clean energy transition and to increase grid resilience to extreme weather events and reliably support growing demand.

Against this backdrop, we can understand how increased pollution reduction measures, like EPA's Proposed 111 Rules, contain several important design elements that allow flexibility during implementation. This regulatory design helps support the above-described work of reliability-related entities in meeting key challenges, while fulfilling EPA's statutory mandate to reduce air pollution. Alongside EPA's pollution-reduction actions, FERC's broad jurisdiction to create regulations and policy guidance can help ensure a safe, cost-effective, and managed clean energy transition.

The ongoing energy transition presents opportunities as well as challenges. And as noted in this report, in some cases, planners and policymakers are missing significant opportunities to manage the transition in an economic and orderly way. This report suggests that, going forward, they address reliability concerns raised by generation retirements through a variety of potential tools, like rethinking energy adequacy metrics, reexamining energy market price formation tariffs, exploring capacity expansion planning that considers clean energy policies in base-case scenarios, requiring longer notice periods for generators considering retirement, and amending their existing toolkits to ensure generators identified as critical to reliability stay operational until other grid operators can solicit and procure other resources.



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