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March 11, 2024

The Honorable Pat Fallon
Chair
Subcommittee on Economic Growth,
Energy Policy, & Regulatory Affairs
Committee on Oversight & Accountability
U.S. House of Representatives
Washington, D.C. 20515

The Honorable Cori Bush
Ranking Member
Subcommittee on Economic Growth,
Energy Policy, & Regulatory Affairs
Committee on Oversight & Accountability
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairman Fallon, Ranking Member Bush, and members of the Subcommittee:

Thank you for your decision to hold a hearing on March 12, 2024, titled "The Power Struggle: Examining the Reliability and Security of America's Electrical Grid." My name is Devin Hartman, and I am the director of energy and environmental policy at the R Street Institute. I have worked on electric reliability policy as a staffer at the Indiana Utility Regulatory Commission and Federal Energy Regulatory Commission (FERC), represented large consumers on reliability policy before FERC and the North American Electric Reliability Corporation (NERC), and have published research pieces and testified before FERC on electric reliability in my current capacity at the R Street Institute.[1] I am fortunate to work alongside three R Street colleagues with electricity expertise, including Beth Garza, the former independent monitor of the Electricity Reliability Council of Texas (ERCOT); Chris Villarreal, a former technical staffer of two state public utility commissions (PUCs); and Michael Giberson, a leading academic electricity economist.[2]

The scope of these comments will focus on bulk electric system reliability, excluding cybersecurity and physical attack risk. Intentional attack risk is critical to mitigate, but often more appropriate for non-public discussions. It is worth noting that most power service interruptions

[1] For e.g., see Devin Hartman, "Enhancing Market Signals for Electric Resource Adequacy," R Street Policy Study, No. 123, Dec. 2017. https://www.rstreet.org/wp-content/uploads/2018/04/Final-123-1.pdf.
[2] See https://www.rstreet.org/people/beth-garza; https://www.rstreet.org/people/chris-villarreal/; and https://www.rstreet.org/people/michael-giberson.

affect local distribution systems, which are regulated by state authorities.[3] Such outages tend to be localized, whereas bulk system failures can result in widespread outages. Although less than one percent of customer service interruptions result from bulk system failures, the consequences of those outages can be far more damaging.[4] The economic damages and loss-of-life consequences of bulk reliability events are highly sensitive to the duration of outages.[5] This underscores the value of not only reducing the probability of reliability events, such as controlled rotating outages, but prioritizing avoidance of uncontrolled cascading outages while ensuring resilience to "bounce back" quickly from loss-of-load events.

The outlook for bulk electric reliability is deteriorating for a variety of reasons, which begs for Congress's thorough attention.[6] Two intersecting trends underscore this ominous theme; government restrictions on power supply have never been greater at a time when power demand is resurgent.[7] Of particular concern is that most restrictions on power supply are beyond the scope of electric institutions. Specifically, the unintended effects of policies outside the reliability community's control have reached an unprecedented level, with no clear pathway toward accountability and reconciliation. To punctuate this, last year NERC identified "energy policy" as a key risk to grid reliability for the first time.[8]

On top of this, climate change is inducing more extreme weather events that exacerbate reliability risk.[9] All in all, the past is not prologue. The electric policies that led to a reliable bulk system historically will not necessarily ensure reliability moving forward. Future reliability will require modifying electric policies on the supply-side while overhauling overdue demand-side reforms. Technological change is driving a growing reliability advantage for market-based electricity

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[3] Alison Silverstein et al., "A Customer-focused Framework for Electric System Resilience," Grid Strategies, May 2018. https://gridprogress.files.wordpress. com/2018/05/customer-focused-resilience-final-050118.pdf.
[4] Trevor Houser et al., "The Real Electricity Reliability Crisis," Rhodium Group, Oct. 3, 2017. https://rhg.com/research/the-real-electricity-reliability-crisis-doe-nopr.
[5] Devin Hartman, "Differentiated Reliability," Future Power Markets Forum, July 22, 2021. https://www.rstreet.org/wp-content/uploads/2021/07/Hartman-FPMF-Differentiated-Reliability.pdf; https://clean-coalition.org/disaster-resilience/.
[6] Devin Hartman, "Teeing up Congressional Grid Reliability," September 25, 2023. https://www.rstreet.org/commentary/teeing-up-congressional-grid-reliability/.
[7] Devin Hartman, "Low-Energy Fridays: How Congress Can Liberate Electric Generation," January 5, 2024. https://www.rstreet.org/commentary/low-energy-fridays-how-congress-can-liberate-electric-generation/.
[8] Sonal Patel, "NERC Identifies Energy Policy as Key Risk to Grid Reliability Amid Evolving Challenges," *POWER,* August 24, 2023. https://www.powermag.com/nerc-identifies-energy-policy-as-key-risk-to-grid-reliability-amid-evolving-challenges/#:~:text=Energy%20Security-,NERC%20Identifies%20Energy%20Policy%20as%20Key%20Risk%20to%20Grid%20Reliability,interdependent%20risks%20to%20grid%20reliability.
[9] Devin Hartman, "Testimony to FERC: Climate Change, Extreme Weather, And Electric System Reliability," Docket No. AD21-13-000, May 30, 2021. https://www.rstreet.org/outreach/testimony-to-ferc-climate-change-extreme-weather-and-electric-system-reliability/.

policies.[10] Perhaps most importantly, enshrining accountability and institutional coordination is imperative to overcome the diffusion of reliability responsibility.

Supply-side Improvements

Grid reliability is generally the state of having sufficient supply on a planning (e.g., capacity) and operating (e.g., energy) basis to meet demand. Bulk electric supply has two components: generation and transmission. Over 2018-2022, NERC's total severity risk index revealed increased generation risk while transmission risk decreased.[11] NERC's long-term outlook recommends robust transmission and generation expansion to meet rising demand.[12]

Generation

The primary generation capacity concern within electric institutions' control is generator interconnection. This approval process for generators to connect to the transmission grid is woefully outdated everywhere except ERCOT, which falls outside of FERC's jurisdiction. Costs and wait times for interconnection have ballooned, creating a backlog so large that the amount of generation capacity seeking interconnection (about 2,000 gigawatts) far exceeds the installed capacity of the existing domestic power fleet (about 1,250 gigawatts).[13] NERC recently flagged interconnection backlogs as a growing reliability concern nationwide.[14] Some regions are acutely affected. For example, the 2023 reliability analysis of PJM, the nation's largest regional electricity system, found low rates of supply entry, putting its system at a capacity shortfall risk by 2027 and stressed generation interconnection reform as one of three key reliability reform initiatives.[15]

FERC issued Order 2023 last year to address generator interconnection, but it does not address the primary problems. A coalition of consumer groups and R Street have called for further reforms,

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[10] Michael Giberson and Devin Hartman, "Electric Paradigms: Competitive Structures Benefit Consumers," R Street Policy Study, No. 293, September 2023. https://www.rstreet.org/wp-content/uploads/2023/09/FINAL_r-street-policy-study-no-293.pdf.
[11] "2023 State of Reliability Technical Assessment," North American Electric Reliability Corporation, June 2023, p. 16. www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/NERC_SOR_2023_Technical_Assessment.pdf.
[12] "2023 Long-Term Reliability Assessment," North American Electric Reliability Corporation, December 2023. www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2023.pdf.
[13] Joseph Rand, "Queued Up: Status and Drivers of Generator Interconnection Backlogs," Transmission and Interconnection Summit, June 2023. https://www.energy.gov/sites/default/files/2023-07/Rand_Queued%20Up_2022_Tx%26Ix_Summit_061223.pdf.
[14] North American Electric Reliability Corporation, "2023 Long-Term Reliability Assessment," December 2023. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2023.pdf.
[15] PJM, "Energy Transition in PJM: Resource Retirements, Replacements & Risks," February 24, 2023. https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/energy-transition-in-pjm-resource-retirements-replacements-and-risks.ashx.

which are not imminent.[16] Finishing generator interconnection reform is a reliability imperative, which Congress should impress upon FERC via oversight as well as legislation to force FERC to finish the job properly. Recent R Street research has identified five categories to resolve generation interconnection problems beyond the scope of Order 2023.[17]

Aside from generator interconnection, there are few indications that potential generation capacity shortfalls are the result of deficiencies in bulk electric institutions, such as potential flaws in NERC standards or wholesale market design. However, there are ample indications of potential capacity shortfalls caused by state policy and federal policy outside FERC and NERC's control. These concerns will be addressed later in the institutional coordination section.

The most immediate reliability concerns in recent years do not come from a lack of installed capacity, but rather poor generator performance during extreme weather. NERC finds that generation outage rates have increased in recent years, especially because of natural-gas fired power plants.[18] In particular, generation loss from freezing and natural gas fuel deficiencies have been redundant themes of numerous FERC-NERC reports on the most severe reliability events in recent years.[19] Recent efforts by FERC, NERC, and states have greatly improved the outlook for generation weatherization.[20] The same cannot be said for natural gas fuel assurance, which is addressed in the institutional coordination section below.

It is imperative to improve the dispatchability of renewable energy and avoid inaccurate characterizations of renewables being inherently non-dispatchable. Correct vernacular is not merely of semantic importance; it is linked to fundamental policy outcomes. For example, "baseload" is an operating mode, but when mischaracterized as synonymous with "reliability" last decade, it caused the policy agenda to stray from what mattered: ensuring robust mechanisms to procure discrete reliability services, as defined by NERC.[21] Similarly, mislabeling "dispatchable"

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[16] Ethan Howland, "Consumer groups, R Street urge FERC to expand interconnection reform proposal to increase savings," *UtilityDive*, June 9, 2023. https://www.utilitydive.com/news/ferc-interconnection-reform-proposal-r-street-elcon-nasuca/652570/.

[17] Devin Hartman and Beth Garza, "Finishing Generator Interconnection Reform," December 5, 2023. https://www.rstreet.org/commentary/finishing-generator-interconnection-reform/.

[18] "2023 State of Reliability Technical Assessment," North American Electric Reliability Corporation, June 2023, p. 46. www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/NERC_SOR_2023_Technical_Assessment.pdf.

[19] For e.g., see "Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott," Federal Energy Regulatory Commission and North American Electric Reliability Corporation, October 2023. https://www.ferc.gov/news-events/news/ferc-nerc-release-final-report-lessons-winter-storm-elliott.

[20] Ethan Howland, "FERC OKs cold weather reliability standards for US generators but orders NERC to address shortcomings," *UtilityDive*, February 17, 2023. https://www.utilitydive.com/news/ferc-nerc-cold-weather-reliability-standards/643009/#:~:text=The%20standard%20requires%20generator%20owners,plans%20to%20address%20freezing%20issues..

[21] "Essential Reliability Services," North American Electric Reliability Corporation, December 2016. https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/ERSWG_Sufficiency_Guideline_Report.pdf.

as synonymous with thermal power plants has become commonplace, even by entities that should know better, like the Energy Information Administration.[22] Another example is the Midcontinent Independent System Operator (MISO), which recently issued a stark reliability warning on the basis of losing dispatchable power using a definition that excludes renewables.[23] This mischaracterization contradicts a successful "Dispatchable Intermittent Resource" program that MISO has run for a decade, which converted uncontrollable, non-dispatchable wind production into a controllable, dispatchable resource that augmented system reliability. Further reforms to improve the performance of inverter-based resources should help reliably integrate wind and solar power while avoiding the creation of undue barriers to entry.[24]

This is not to be dismissive of the limitations of weather-dependent resources, namely wind and solar, which are well documented.[25] These resources are imperfect substitutes for conventional resources. This is reflected in existing capacity procurement rules already, which is why conventional generators receive much greater capacity credit in utility resource planning and wholesale capacity markets than weather-dependent resources.[26] Refining these rules further is important, especially to account for correlated outages, as historic capacity accreditation practices assumed generator outages were independent of one another.[27] This is not only important for renewables, but for natural gas, which has exhibited high correlated outages during severe cold weather events.[28]

Beyond generic capacity, it is critical to ensure the full suite of reliability services have sufficient procurement mechanisms. Historically, reliability services like frequency support, voltage control,

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[22] For an inaccurate characterization of "dispatchable" see Cara Marcy, "EIA study examines the role of high-voltage power lines in integrating renewables," Energy Information Administration. June 28, 2018. https://www.eia.gov/todayinenergy/detail.php?id=36393#:~:text=Dispatchable%20generators%20can%20respond%20to,biomass%20resources%20are%20considered%20dispatchable.

[23] Midcontinent Independent System Operator, "MISO's Response to the Reliability Imperative," February 2024, pp 1-2. https://cdn.misoenergy.org/Executive%20Summary%202024%20Reliability%20Imperative%20report%20Feb.%2021%20Final631825.pdf.

[24] J. Daniel Skees and Robert Goldfin, "NERC to Develop Inverter-Based Resources Standards," Morgan Lewis, November 29, 2023. https://www.morganlewis.com/blogs/powerandpipes/2023/11/nerc-to-develop-inverter-based-resources-standards.

[25] For e.g,. see "2013 Special Reliability Assessment: Maintaining Bulk Power System Reliability While Integrating Variable Energy Resources – CAISO Approach," North American Electric Reliability Corporation and California ISO, November 2013. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC-CAISO_VG_Assessment_Final.pdf.

[26] Ethan Howland, "FERC approves PJM capacity accreditation, modeling reforms aimed at boosting reliability," *UtilityDive*, February 1, 2024. https://www.utilitydive.com/news/ferc-pjm-capacity-accreditation-reforms-grid-reliability/706276/.

[27] Ibid.

[28] Robert Walton, "Conventional generation outages set a record in 2022: NERC," *UtilityDive*, June 23, 2023. https://www.utilitydive.com/news/conventional-generation-outages-set-a-record-in-2022-nerc/653755/.

and ramping capability were in ample supply as a byproduct of procuring capacity and energy from conventional resources.[29] Given growing reliance on renewables, which do not necessarily provide the full suite of reliability products, shortfalls in these services may result. Mechanisms to address potential shortfalls must define a discrete reliability service and use economic procurement to compensate resources for services they provide, and not penalize resources for what they do not provide. If procurement costs are considerable, it would be better to create a new market product to cost-effectively meet reliability targets rather than enact uniform requirements across generators, such as the case of primary frequency response.[30] Overall, industry initiatives at state, regional, and federal levels are making significant progress on refining procurement of essential reliability services, which warrants ongoing oversight, but not intervention, from Congress.

Transmission

Transmission expansion can be broken down into two components: building new projects and enhancing existing systems. An R Street analysis and convening of transmission consumers found profound regulatory flaws that misallocate billions of dollars annually toward costly projects while deterring the most cost-efficient forms of development.[31] The general effect is a chronic overbuild of local transmission at the expense of more efficient regional and interregional transmission, which usually carry greater reliability benefits.[32] Overall, the country's transmission expenditures are climbing considerably and raising bills for captive customers at a greater pace than the value they receive.[33] Transmission must be done more economically and effectively to ensure reliability at reasonable cost.

A forthcoming rulemaking by FERC will likely make regional transmission planning proactive, as opposed to its currently reactive posture. This is beneficial but will not resolve all problems at the regional-local nexus, like the need to close regional transmission planning exemptions that let monopoly utilities build local projects without competition or effective cost-of-service oversight.[34] The rulemaking is not expected to harmonize economic and reliability criteria, which is a core

[29] Devin Hartman, "Strengthening Electric Reliability Through Markets in the Midwest," June 23, 2022. https://www.rstreet.org/commentary/strengthening-electric-reliability-through-markets-in-the-midwest/.
[30] Devin Hartman, "Comment on FERC's Notice of Proposed Rulemaking on Primary Frequency Response before the Federal Energy Regulatory Commission," February 2, 2017. https://www.rstreet.org/commentary/comment-on-fercs-notice-of-proposed-rulemaking-on-primary-frequency-response/.
[31] Jennifer Chen and Devin Hartman, "Transmission Reform Strategy from a Customer Perspective: Optimizing Net Benefits and Procedural Vehicles," R Street Institute, No. 257, May 2022. https://www.rstreet.org/wpcontent/uploads/2022/05/RSTREET257.pdf.
[32] Ibid.
[33] Ibid.
[34] Devin Hartman and Kent Chandler, "Stakeholder Soapbox: A Transmission Planning Resolution Emerges," *RTOInsider*, Dec. 13, 2022. https://www.rtoinsider.com/articles/31281-stakeholder-soapbox-tx-planning-resolutionemerges.

flaw of current regional planning, as all transmission projects have economic and reliability benefits that can be monetized. Congressional oversight, at minimum, is valuable to encourage FERC to maximize the value of regional and local transmission reforms.

While FERC fixes flaws in its existing regional transmission architecture, no such architecture exists for interregional transmission. Establishing one has been the subject of considerable FERC and congressional attention recently. The long-term reliability benefits and economies of scale advantages of interregional transmission are well documented, yet regulatory defects have stifled development.[35] If FERC pursues interregional rules on its own, it is likely to repeat the same flaws it did for regional transmission, such as treating economic and reliability projects in siloes. R Street has spelled out three policy options for Congress to direct FERC to enact reforms:[36]

1. Reduce regulatory barriers to merchant high voltage direct current projects, which boasts voluntary cost allocation.
2. Where merchant transmission has limited potential, namely in cost-of-service regions where incumbent utilities resist efficient transmission expansion, adopt mandatory interregional transmission planning.
3. If mandatory planning is infeasible, consider instilling a minimum transfer requirement between cost-of-service regions, subject to resolving reliability criteria and/or subject to cost-benefit analysis to ensure consumers benefit.

It is important to note that while improving regulation of new conventional transmission projects is necessary, it will not provide much congestion relief until the mid-2030s at earliest, given the long lead times involved with greenfield projects. Fortunately, there is a massive opportunity to reduce congestion on existing transmission systems in the 2020s at far lower cost than conventional projects. Employing grid-enhancing technologies and reconductoring can save billions in congestion costs annually with remarkably attractive returns for customers.[37] Transmission customers are incredulous over the severe underutilization of these technologies, which results from the resistance of incumbent transmission owners who have perverse incentives under cost-of-service regulation.[38] FERC appears willing to only pursue these technologies across all regions uniformly, which is difficult because the opacity of congestion outside of RTOs makes their avoided costs (benefits) difficult to monetize. This is why customers are pursuing congestion transparency efforts, such as an independent transmission monitor, outside of RTOs and in

[35] Devin Hartman, "Wiring Congressional Negotiations," May 24, 2023. https://www.rstreet.org/commentary/wiring-congressional-negotiations/.
[36] Ibid.
[37] Toshiki Tsuchida et al., "Grid-Enhancing Technologies Shown to Double Regional Renewable Energy Capacity, According to Study by Brattle Consultants," Brattle, February 1, 2021. https://www.brattle.com/insightsevents/publications/gridenhancing-technologies-shown-to-double-regional-renewable-energy-capacityaccording-tostudy-by-brattle-consultants.
[38] "Comments of Joint Customers before the Federal Energy Regulatory Commission on Transmission Planning and Cost Management," Docket Nos. AD22-8-000 and AD21-15-000, March 23, 2023. https://www.rstreet.org/wp-content/uploads/2023/06/ECA-20230323-5062-1.pdf.

conjunction with technology-based reforms to improve efficiencies in existing transmission systems.[39] These twin reforms are an uphill battle with a long timeline, if they ever occur. Congress should at least press FERC to address these reforms in tandem and, if no traction is made, could require FERC to enact them.

Another reform category to quickly remedy congestion and bolster reliability is intertie optimization. Existing interregional transmission facilities are managed inefficiently, with power flowing the wrong direction 40% of the time.[40] Optimizing such seams between regional grids can save billions of dollars per interface and improve reliability by ensuring import-export flows reflect the conditions of each region simultaneously.[41] FERC has sufficient authority with clear procedural options, but incumbent interests will resist given their incentive to maintain barriers to trade. Congress should, at minimum, encourage FERC to pursue intertie optimization.

Demand-side Improvements

Reliability discussions chronically overlook demand-side policies. Demand-side resources primarily come in two forms: energy efficiency and flexible demand. The economics of energy efficiency were far less attractive under the previous era of flat demand growth and a glut of inexpensive natural gas generation expansion. In the era of resurgent demand and constrained supply, avoided costs (benefits) of energy efficiency take on new meaning. Most of this falls to states to implement demand-side management programs. However, Congress may wish to provide emphasis on Department of Energy research and development programs that may suddenly have greater returns on taxpayer investment than previously believed.

The federal government has a bigger role to play in unleashing flexible demand, which is a core component of a customer-led reliability agenda.[42] Contrary to conventional reliability policy, such as NERC standards, all firm demand is not equal. The economic value of customer service interruptions varies by orders of magnitude, depending on the type of customer, specific end use, duration of outage, and other factors.[43]

Most reliability events are shallow, such that if only low value uses of electricity were curtailed rather than indiscriminate rotating outages, the vast majority of economic and loss-of-life risk would be avoided. However, since conventional reliability procedures treat all firm load as equal,

[39] Ibid.
[40] Johannes P. Pfeifenberger et al, "The Need for Intertie Optimization," The Brattle Group, October 2023. https://www.brattle.com/wp-content/uploads/2023/10/The-Need-for-Intertie-Optimization-Reducing-Customer-Costs-Improving-Grid-Resilience-and-Encouraging-Interregional-Transmission-Report.pdf.
[41] Ibid.
[42] Devin Hartman, "Customer Reliability & Resilience Workshop," Electricity Customer Alliance, November 2, 2023. https://www.rstreet.org/commentary/customer-reliability-and-resilience-workshop-presentation-to-the-electricity-customer-alliance/.
[43] Ibid.

high and low value uses of electricity are equally likely to be curtailed. Reliability standards admirably focus on reducing the likelihood of supply shortfalls, but they inhibit market pathways to reduce the consequences of shortfalls.[44] This is important to not only avoid rotating outages from shallow shortfalls, but to minimize damages from severe shortfalls. For example, had scarce supply been allocated based on its market value during Winter Storm Uri, at least dozens of lives lost and billions of dollars in damages likely could have been avoided.[45] As reliability risks grow, necessity may force reform. For example, when California wildfires caused a firm load loss outlook, stakeholders began to tier firm load into different value levels to prioritize curtailments.[46]

The policy imperative is to increase *voluntary* demand shifts or curtailments (flexible demand), while decreasing *involuntary* curtailments. Advances in smart grid technologies and customer-sited backup systems make this potential far more economic. Achieving this reality would require reform to NERC standards and better implementation of wholesale and retail electricity markets. FERC needs to make wholesale market design amenable to demand integration, initiate review of necessary reliability standards changes, and begin a dialogue with states to ensure compatible retail policy is enacted.[47] The degree of institutional coordination is daunting. Congress should provide resources and kickstart an initiative to engage states on unleashing demand-side flexibility.

The Imperative of Markets and Institutional Coordination

Two trends are readily evident: technological change imparts growing reliability advantages to market-based systems while government interference in markets increasingly undermines reliability. Dozens of policymaking bodies undertake actions that affect electric reliability, often unknowingly, while reliability authorities have less control over the main emerging threats to reliability. A 2021 report by the National Academies of Science found it increasingly challenging to determine who is responsible for ensuring the integrity of the power system.[48] This diffusion of reliability responsibility is most readily evident in barriers to infrastructure development. Last November, the CEO of NERC stated that the country has not proven its ability to develop infrastructure to enable a reliable energy transition.[49]

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[44] Devin Hartman, "Regulation Is to Blame for Our Grid Reliability Woes," *RealClearEnergy*, June 17, 2022. https://www.realclearenergy.org/articles/2022/06/17/regulation_is_to_blame_for_our_grid_reliability_woes_837922.html.
[45] Ibid.
[46] Devin Hartman, "Differentiated Reliability," Future Power Markets Forum, July 22, 2021. https://clean-coalition.org/disaster-resilience/.
[47] Ibid.
[48] "The Future of Electric Power in the United States," National Academies of Sciences, 2021. https://doi.org/10.17226/25968.
[49] Robert Zullo, "Reliability v. sustainability: Inside the debate over the EPA's proposed carbon rules," *Missouri Independent*, November 27, 2023. https://missouriindependent.com/2023/11/27/reliability-v-sustainability-inside-the-debate-over-the-epas-proposed-carbon-rules/.

State Electric Regulation

FERC and NERC reliability assessments typically ignore the institutional context that affects reliability outcomes. A key case is the reliability advantages of regional transmission organizations (RTOs) and proper electricity restructuring. Restructured states, who wisely adopted competition for generation and retail services, properly align the profit motive with reliability incentives.[50] The exception is when generators have an incentive to withhold output, which is why effective dynamic market power and anti-manipulation measures have been in place since the late 2000s. Generally, competition has lowered generator outage rates and restructured states are the only ones showing promise of demand flexibility.[51] A close examination of the causes of the Winter Storm Uri blackout in Texas actually supports restructuring, as competitive suppliers outperformed monopolies, while many core causes of customer outages like ERCOT import limits and gas system failures are unrelated to restructuring.[52]

It is crucial to recognize that RTOs are necessary in restructured states but optional for states retaining cost-of-service monopoly utilities. In cost-of-service areas, RTOs have demonstrated superior reliability performance to non-RTO footprints. This is the result of a variety of advantages, including superior scale, operational tools (e.g., transmission congestion and reserves management), and situational awareness.[53]

Resource adequacy is becoming increasingly challenging for the cost-of-service model. This model is workable for conventional resources planned to meet simple peak periods, not for a future with heavy reliance on unconventional resources planned to meet varying conditions throughout the year. In RTOs with cost-of-service states, responsibility for resource adequacy supposedly rests with states, but the RTO is typically blamed for resource shortfalls despite having limited ability to control it. For example, the midcontinent RTO received much criticism for a capacity deficiency in 2022, but this resulted primarily from flawed state utility planning and regulation.[54] Similarly, many blamed the western RTO for the California blackouts of 2020, which actually resulted from unclear accountability between state and regional authorities operating in

[50] Michelle Michot Foss et al., "The Texas Freeze Out: Electric Power Systems, Markets and the Future," International Association for Energy Economics and Energy Forum, 2021. www.bakerinstitute.org/sites/default/files/2021-06/import/00-foss-online-texas-freeze-iaee.pdf.
[51] Giberson and Hartman, 2023. https://www.rstreet.org/wp-content/uploads/2023/09/FINAL_r-street-policy-study-no-293.pdf.
[52] Ibid.
[53] Ibid.
[54] Devin Hartman, "Strengthening Electric Reliability Through Markets in the Midwest," June 23, 2022. https://www.rstreet.org/commentary/strengthening-electric-reliability-through-markets-in-the-midwest/.

silos.[55] Congress should provide leadership toward clearer delineations of reliability responsibility with more robust markets as a path toward improved reliability.

State Restrictions

State policies affecting electric infrastructure run the gamut.[56] State permitting and siting laws may present the largest long-term supply-side barrier to a reliable energy future as they obfuscate market signals reflecting reliability conditions.[57] State policies have trended towards becoming much more restrictive of wind, solar, transmission, and natural gas infrastructure in particular. This is deeply problematic because these categories comprise almost all forms of reliability-enhancing infrastructure development of commercial interest today. The level of potential impact is astonishing. For example, the potential of wind power deployment is affected seven-fold by state and local siting policies.[58] Many states that need gas infrastructure the most have enacted outright or de facto moratoria on gas infrastructure that imperils reliability.[59] New York is one such example, and the inability to expand pipeline infrastructure through the state is degrading reliability for its neighbors in New England. The sole encouraging trend is that state restrictions on new nuclear construction are reversing, such as repealing moratoria, leaving twelve states with significant restrictions.[60]

Some state policies are forcing premature generation retirements or restricting operational modes essential to reliability. For example, New York prohibited types of oil consumption that will impact nearly three gigawatts of generation that the RTO relies upon in meeting reliability needs.[61] The restructured markets like PJM face disproportionate interference from meddling states that undermines reliability.[62] It is critical to note that markets will not build or retain resources that

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[55] Cheryl LaFleur, "What's Ailing California's Electric System?" Columbia Center on Global Energy Policy, September 2, 2020. https://www.energypolicy.columbia.edu/publications/what-s-ailing-california-s-electric-system.
[56] Devin Hartman, "Teeing up Congressional Grid Reliability," September 25, 2023. https://www.rstreet.org/commentary/teeing-up-congressional-grid-reliability/.
[57] Ibid.
[58] "Beyond Technical Potential: NREL Explores the Challenges of Siting Wind in a Low-Carbon Future," National Renewable Energy Laboratory, March 10, 2021. https://www.nrel.gov/news/program/2021/beyond-technical-potential-nrel-explores-the-challenges-of-siting-wind-in-a-low-carbon-future.html.
[59] For e.g., see "Joint Statement of FERC, NERC on Reliability," November 6, 2023. https://www.ferc.gov/news-events/news/joint-statement-ferc-nerc-reliability.
[60] "States Restrictions on New Nuclear Power Facility Construction," National Conference of State Legislatures, September 28, 2023. https://www.ncsl.org/environment-and-natural-resources/states-restrictions-on-new-nuclear-power-facility-construction.
[61] "Public Policies and the Transformation of NY's Electric Grid," New York ISO, July 7, 2022. https://www.nyiso.com/-/public-policies-and-the-transformation-of-new-york-s-electric-grid#:~:text=The%20New%20York%20City%20residual,MW%20of%20generation%20in%20NYC.
[62] "2023 in Review: PJM Urges United Action To Sustain Grid Reliability Through the Energy Transition," PJM, January 2, 2024. https://insidelines.pjm.com/2023-in-review-pjm-urges-united-action-to-sustain-grid-reliability-through-the-energy-transition/.

governments will not allow. These are cases of government failure, not market failure. It is not necessarily clear if RTO authority to issue reliability must-run (RMR) contracts for existing generation would supersede conflicts with state policy.

State restrictions on generation and transmission often do not appear to account for the consequences they impose to regional electric reliability. These restrictions are especially a concern in some areas like the Northeast, and a mounting concern in the Midwest, Mid-Atlantic, West, and Great Plains. Congress should prioritize state engagement and education while reinforcing federal reliability authorities to compel states to work toward necessary infrastructure development and retention.

Federal Environmental Regulation

A degree of coordination with reliability authorities has been evident over the Environmental Protection Agency's (EPA) proposed power plant rule under section 111 of the Clean Air Act.[63] The proposal requires technologies that are not commercially demonstrated at scale as required to meet the "best system of emissions reduction" under the Clean Air Act.[64] As such, it is legally dubious and, if enacted, would exacerbate grid reliability challenges.[65] That said, the proposal is unlikely to pose severe reliability risk given its compliance timeline and exemptions. One analysis found that nearly 80% of existing gas-fired capacity would be exempt from the proposed standards.[66] The likely compliance pathway would pivot new and existing natural gas plants toward smaller sizes or lower capacity factors beneath exemption thresholds. A compliance simulation by the New England grid operator found reduced output from affected gas units by 19%, while exempted smaller combustion turbines would increase 119%.[67]

It is likely the compliance timeline will not be binding on the existing generation fleet before the rule is fully litigated. Given the low probability of surviving litigation, it is unlikely this initiative will affect fleet retirements, but it could chill investment in some new natural gas facilities before litigation is settled. Were EPA to shorten the compliance timeline or close exemptions, the

[63] For e.g., see FERC's Reliability Technical Conference, Docket No. AD23-9-000, November 9, 2023. https://www.federalregister.gov/documents/2023/11/21/2023-25672/reliability-technical-conference-notice-inviting-post-technical-conference-comments.
[64] Nikki Chandler, "Mixed Reaction to EPA's New Carbon Pollution Standards for Power Plants," *T&DWorld*, May 11, 2023. https://www.tdworld.com/grid-innovations/generation-and-renewables/article/21265791/mixed-reaction-to-epas-new-carbon-pollution-standards-for-power-plants.
[65] Ibid.
[66] Lauren Shwisberg et al., "A Reliable Grid Depends on Rapid Clean Energy Deployment. EPA's Proposed Standards Help Accelerate That Shift," Rocky Mountain Institute, August 21, 2023. https://rmi.org/a-reliable-grid-depends-on-rapid-clean-energy-deployment-epas-proposed-standards-help-accelerate-that-shift/.
[67] Zack Hale, "Grid operators warn US EPA proposal could lead to significant power shortages," *S&P Global*, August 9, 2023. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/080923-grid-operators-warn-us-epa-proposal-could-lead-to-significant-power-shortages.

reliability risk profile of the rule could grow sharply. It appears instead that EPA may be responding to reliability concerns by expanding exemptions for natural gas plants.[68]

It is important for Congress to appreciate that EPA legally must promulgate carbon dioxide regulation of power plants. The see-saw of proposals and litigation spanning three administrations with no durable, efficient policy to show for it underscores why the Clean Air Act is not the appropriate statute for granting the federal government authority to regulate greenhouse gasses in the same way it provides authority over conventional air pollutants. Investors will continue to view added "transition risk" associated with uncertain environmental regulation until a durable resolution emerges. It would be better for electric reliability, emissions reduction, and cost savings to replace command-and-control regulation with market-based environmental policy.[69] Ultimately, reducing emissions and safeguarding electric reliability require reducing barriers to power plant development, not creating them.[70]

From a reliability perspective, the more concerning federal environmental regulations are *existing* policies that erect large barriers to entry. New power infrastructure development is prevented or delayed by years to comply with a variety of federal environmental statutes beyond the Clean Air Act, including the Endangered Species Act (ESA), Clean Water Act (CWA), and National Environmental Policy Act (NEPA). Federal environmental permitting is adversely affecting generation and transmission projects, as well as natural gas pipelines needed to ensure generator fuel adequacy.[71] NEPA timeliness and litigation risk have grown considerably and deter mostly infrastructure that would, ironically, lower industry emissions.[72] Recent NEPA actions by the Council on Environmental Quality would exacerbate costly infrastructure delays.[73] Delegated authority to states, such as CWA section 401 permits, can profoundly disrupt federal permitting

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[68] Lisa Friedman, "E.P.A. to Exempt Existing Gas Plants From Tough New Rules, for Now," *The New York Times*, February 29, 2024. https://www.nytimes.com/2024/02/29/climate/epa-climate-power-plant-emissions.html.

[69] For e.g., see Neil Chatterjee and Greg Bertelsen, "Grid Reliability and Decarbonization through Carbon Pricing," Climate Leadership Council, March 2022. https://clcouncil.org/reports/Reliability-Report.pdf.

[70] Nikki Chandler, "Mixed Reaction to EPA's New Carbon Pollution Standards for Power Plants," *T&DWorld*, may 11, 2023. https://www.tdworld.com/grid-innovations/generation-and-renewables/article/21265791/mixed-reaction-to-epas-new-carbon-pollution-standards-for-power-plants.

[71] For e.g., see James Bikales, "Power grid's future hinges on permitting and natural gas: Takeaways from POLITICO's Grid Reliability event," *Politico*, October 26, 2023. https://www.politico.com/news/2023/10/26/permitting-natural-gas-fights-threaten-grids-future-takeaways-from-politicos-grid-reliability-event-00123644.

[72] Philip Rossetti, "The Environmental Case for Improving NEPA," July 7, 2021. https://www.rstreet.org/commentary/the-environmental-case-for-improving-nepa/.

[73] Cathy Cash, "NRECA: NEPA Update Poses Costly Delays to Critical Infrastructure, Reliability Risk," October 3, 2023. https://www.cooperative.com/news/Pages/NRECA-NEPA-Update-Poses-Costly-Delays-to-Critical-Infrastructure-Reliability-Risk.aspx#:~:text=NRECA%20says%20a%20National%20Environmental%20Policy%20Act,critical%20infrastructure%20and%20jeopardize%20affordable%2C%20reliable%20electricity.

approvals, especially for hydropower and linear infrastructure.[74] The economic outlook for advanced nuclear power clearly hinges on Nuclear Regulatory Commission reform.[75]

NEPA reforms Congress should explore include narrowing and clarifying requirements for "reasonable alternatives," shortening the statute of limitations, improving community education, expanding Title 41 of Fixing America's Surface Transportation Act's litigation standing requirements to all NEPA projects, avoiding documentation duplication, improving permitting agency management and staffing, and making categorical exclusions more consistent.[76] Beneficial NRC reforms include those that require right-size regulatory scrutiny based on the safety risk profile of reactor designs, as old regulatory schemes are unsuitable to the dramatically reduced safety risk of advanced reactors. For ESA and CWA implementation agencies, Congress should explore transparency requirements and adjust agency funding terms or performance requirements to accelerate reviews, especially for those involving delegated state authority.[77] Refining criteria to ensure CWA state certification denials are only based on merit, not side agendas, is important considering the extent of specious denials based on the extensive latitude given to states over interstate projects.[78]

Natural Gas Industry Improvements

NERC's latest long-term reliability assessment made clear that "sufficient natural gas fuel supplies cannot be assured without better reliability measures and the effective coordination between the operators and planners of both electricity and natural gas infrastructures."[79] Improving gas-electric industry coordination has been a focus of FERC and NERC efforts for a decade, with considerable reforms on operating issues like coordinated scheduling processes.[80] Progress on fuel assurance, however, has been underwhelming. After multiple reliability events and near misses, last year the chairman of FERC and CEO of NERC jointly called for the creation of an authority to set and

[74] Devin Hartman and Tom Russo, "Ebbing the Flow of Hydropower Red Tape," R Street Policy Study, No. 105, August 2017. https://www.rstreet.org/wp-content/uploads/2018/04/105-1.pdf.
[75] For e.g., see "Nuclear Power: NRC Needs to Take Additional Actions to Prepare to License Advanced Reactors," Government Accountability Office, July 2023. https://www.gao.gov/products/gao-23-105997.
[76] Philip Rossetti, "What Policies Could Make it Into Permitting Reform," August 22, 2022. https://www.rstreet.org/commentary/what-policies-could-make-it-into-permitting-reform/.
[77] Devin Hartman and Tom Russo, "Ebbing the Flow of Hydropower Red Tape," R Street Policy Study, No. 105, August 2017. https://www.rstreet.org/wp-content/uploads/2018/04/105-1.pdf.
[78] For e.g., see "Section 401 Water Quality Certification," Environmental and Energy Law Program, Harvard Law School, 2024. https://eelp.law.harvard.edu/2023/02/section-401-water-quality-certification/.
[79] "2023 Long-Term Reliability Assessment," North American Electric Reliability Corporation, December 2023, p. 10. www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2023.pdf.
[80] "FERC Approves Final Rule to Improve Gas-Electric Coordination," April 16, 2015. https://www.ferc.gov/news-events/news/ferc-approves-final-rule-improve-gas-electric-coordination.

enforce winter weatherization standards for the components of the natural gas system upstream of power generation.[81]

Extending NERC's authority to natural gas, or creating a NERC-like entity for the natural gas industry, should only be considered with the utmost due diligence. While the problem statement of natural gas industry deficiencies is valid, the institutional deficiencies of NERC must be acknowledged. NERC standards are sometimes uneconomic policies for the electric industry, such as forgoing cost-benefit review and using engineering heuristics that ignore the economic value of service reliability. The same framework should not be extended to gas. Further, standards may be necessary for cost-of-service monopolies to compensate for poor reliability incentives, but competitive enterprises are amenable to market-based policy. The upstream and midstream natural gas industry is functionally competitive, unlike the electric industry that largely retains cost-of-service franchise monopolies. Competitive enterprises have strong incentives to improve service reliability to capture high market prices during scarcity events, provided markets are transparent and market power is limited.

A major concern in the gas industry is concentrated market power and opacity during extreme weather events. Rather than uniform service standards, this warrants a more appropriate role for the federal government to facilitate transparency, provide market oversight, and prevent market manipulation. Failure to do so was evident during Winter Storm Uri on intrastate pipelines in Texas.[82] Surgical fixes like narrowing the definition of force majeure events to prevent gas industry physical withholding, a form of market manipulation, may be appropriate. In addition to improving dependability of service, a key outstanding question is how flexible pipeline service can become as gas plants increasingly require higher gas ramps on shorter notice to balance renewables integration.[83]

It is especially important for stakeholders in regions like the Northeast, which has aggressive climate goals and poor gas infrastructure, to recognize that investments in gas infrastructure are warranted for reliability purposes even if gas burn declines in future years. Opposition to interstate gas pipelines are primarily coming from states, and the regional reliability implications may force Congress into action. It is also important for stakeholders in pro-gas areas, such as Texas, to address market failures like concentrated market power on opaque pipelines.

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[81] "FERC, NERC Release Final Report on Lessons from Winter Storm Elliott," November 7, 2023. https://www.ferc.gov/news-events/news/ferc-nerc-release-final-report-lessons-winter-storm-elliott.
[82] "Texas Power Grid Under Stress From Energy Transfer Gas Transmission Fees," *Bloomberg Green*, December 5, 2023. https://www.bloomberg.com/graphics/2023-texas-pipelines/.
[83] For e.g., see Andrew Fay et al., "The Hidden Flexibility of the Natural Gas Network for Electric Power Operations: A Case Study of a Near-Miss Winter Event," National Renewable Energy Laboratory, June 2023. https://www.nrel.gov/docs/fy23osti/85294.pdf.

On the electric industry side, it is important to recognize that the policy goal is to have an economical level of fuel assurance; it would be uneconomic to have a uniform industry standard. For example, gas generators built to meet summer peak load only do not necessarily warrant additional costs to increase performance in winter. Fuel assurance measures also come with varying means and costs, which is why electricity market design for merchant power plants and cost-of-service regulatory approvals for monopoly utilities are better instruments to deliver cost-effective fuel assurance. For example, on-site oil backup or gas storage behind a pipeline constraint is often more cost effective than contracting for firm pipeline capacity. Congress should press FERC to identify what gaps in upstream and midstream natural gas markets warrant better oversight and transparency measures, ensure sufficient reliability incentives in electric market design for fuel assurance, and provide information on fuel assurance needs for states with regulated monopoly utilities to incorporate into prudence reviews.

Key Recommendations for Congress

Ensuring electric reliability cost-effectively has taken a step-function increase in complexity the past decade. This requires urgent, bipartisan attention that prioritizes areas best suited to congressional involvement. In an oversight and legislative capacity, congressional priorities should include:

1. *Providing oversight and correcting institutional deficiencies that inhibit the correction of generator outage rates*. Congress should direct FERC to identify gaps in natural gas markets that warrant better oversight and transparency measures, ensure electric market design accounts for fuel assurance, and provide information on fuel assurance needs to cost-of-service states to incorporate into prudence reviews.
2. *Refining reliability authorities and instilling a framework for institutional coordination*. Congress should review and remedy any gaps in reliability responsibility and authority. This may address the role of regional authorities in resource adequacy in cost-of-service states and whether reliability instruments like RMRs supersede state policy that undermines reliability. Structures like task forces to coordinate federal interagency efforts and manage federal-state relationships may be necessary to ensure reliability authorities' concerns factor into the full suite of relevant policymaking. Congress should lead, both on policy and narrative, to enable more robust markets as the path to improved reliability.
3. *Streamlining infrastructure regulatory approvals, especially generator interconnection and permitting reforms*. Congress should prioritize continued progress on NEPA reforms, such as community engagement and judicial review, and roll generator interconnection reform into a permitting reform package.[84]

[84] Devin Hartman, "Low-Energy Fridays: How Congress Can Liberate Electric Generation," January 5, 2024. https://www.rstreet.org/commentary/low-energy-fridays-how-congress-can-liberate-electric-generation/.

4. *Encouraging or requiring FERC to enact economically-sound interregional transmission, intertie optimization, and existing transmission system reforms*. Although FERC has sufficient authority, Congress should recognize the political economy dynamics that have prevented progress for years and break the deadlock with a non-prescriptive reform directive to FERC backed by customer groups.
5. *Initiating a federal-state policy initiative to unleash demand flexibility*. With The Joint Federal-State Task Force on Electric Transmission winding down, bandwidth to explore a new federal-state collaboration is opening to drive complementary wholesale-retail reforms.

Chairman Fallon, Ranking Member Bush, and members of the Subcommittee, thank you again for holding this important hearing and for your consideration of my views. Should you have any questions or wish to have further discussion, please do not hesitate to contact me.

Sincerely,

Devin Hartman
/s/ Devin Hartman
Director, Energy and Environmental Policy
R Street Institute