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ARTICLE

Grid Reliability Through Clean Energy

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Abstract. In the wake of recent high-profile power failures, policymakers and politicians have asserted that there is an inherent tension between the aims of clean energy and grid reliability. But continuing to rely on fossil fuels to avoid system outages will only exacerbate reliability challenges by contributing to increasingly extreme climate-related weather events. These extremes will disrupt the power supply, with impacts rippling far beyond the electricity sector.

This Article shows that much of the perceived tension between clean energy and reliability is a failure of law and governance resulting from the United States' siloed approach to regulating the electric grid. Energy regulation is, we argue, siloed across three dimensions: (1) across substantive responsibilities (clean energy versus reliability); (2) across jurisdictions (federal, regional, state, and sometimes local); and (3) across a public–private continuum of actors. This segmentation renders the full convergence of clean-energy and reliability goals extremely difficult. Reliability-focused organizations operating within their silos routinely counteract climate policies when making decisions about how to keep the lights on. Similarly, legal silos often cause states and regional organizations to neglect valuable opportunities for collaboration.

Despite the challenges posed by this disaggregated system, conceptualizing the sphere of energy reliability as siloed across these dimensions unlocks new possibilities for reform. We do not propose upending energy law silos or making energy institutions wholly

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public. Rather, we argue for calibrated reforms to U.S. energy law and governance that shift authority within and among the silos to integrate the twin aims of reliability and low-carbon energy. Across the key policy areas of electricity markets, transmission planning and siting, reliability regulation, and regional grid governance, we assess changes that would integrate climate and reliability imperatives; balance state, regional, and federal jurisdiction; and reconcile public and private values. We believe this approach to energy law reform offers a holistic and realistic formula for a cleaner, more reliable grid.

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Table of Acronyms

AC	Alternating Current
AEP	American Electric Power
APC	Adjusted Production Cost
CAISO	California ISO
CO_2	Carbon Dioxide
DOE	Department of Energy
EIM	Energy Imbalance Market
EPA	Environmental Protection Agency
EPAct 2005	Energy Policy Act of 2005
ERCOT	Electric Reliability Council of Texas (Texas RTO)
ERO	Electric Reliability Organization
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
GHG	Greenhouse Gas
HVDC	High-Voltage Direct Current
ICC	Illinois Commerce Commission
IOU	Investor-Owned Utility
ISO	Independent System Operator
ISO-NE	ISO-New England
LSE	Load-Serving Entity
MISO	Midcontinent ISO (Midcontinent RTO)
MOPR	Minimum-Offer-Price Rule
MVP	Multi-Value Projects
MW	Megawatt
MWh	Megawatt-Hour
NERC	North American Electric Reliability Corporation
NIETC	National Interest Electric Transmission Corridor
NYISO	New York ISO
PJM	Pennsylvania–Jersey–Maryland (Mid-Atlantic RTO)
PSC	Public Service Commission
PUC	Public Utility Commission
REP	Retail Electric Provider
RMR	Reliability Must Run
RTO	Regional Transmission Organization
SPP	Southwest Power Pool (Southwestern RTO)

Introduction

To avoid the most catastrophic effects of climate change, the United States must rapidly decrease fossil fuel dependence while keeping the lights, heat, and air conditioning on—an increasingly difficult task due to extreme weather events intensified by climate change.[1] Many have cast these dual imperatives as dueling imperatives, arguing that there is an inherent tension between climate policy and the regulations needed to keep the lights on. In 2011, for example, the North American Electric Reliability Corporation (NERC)—the U.S. agency responsible for electric-grid reliability—claimed that "[e]nvironmental regulations are shown to be the number one risk to reliability over the next one to five years."[2] More recently, in 2021, the same agency expressed concern that the shift to increased renewable energy resources had the potential to threaten grid reliability.[3]

One high-profile example that has drawn attention to the perceived conflict between a clean-energy transition and grid reliability took place in the aftermath of Winter Storm Uri. In mid-February of 2021, an unusual yet increasingly common type of storm pummeled the lower Midwest, causing a prolonged cold snap in Texas and neighboring states. In Texas alone, millions of people were without power and water for days.[4] Texans huddled in freezing homes, trying to stay warm and find backup power for essential medical equipment—all while water pipes burst and city water-delivery systems faltered.[5] This loss of electricity to 69% of Texans had cascading effects.[6] Many areas experienced cell phone–service disruptions, which made it more difficult

1. *See* N. AM. ELEC. RELIABILITY CORP., 2019 STATE OF RELIABILITY, at viii (2019) (observing that all of the worst grid failures in 2018 were caused by extreme weather events); *see also* Miranda Willson, *Cost of Climate Change to the Grid? $4B*, POLITICO PRO: ENERGYWIRE (Jan. 12, 2022, 7:09 AM EST), https://perma.cc/J2CE-57UN (to locate, select "View the live page") (discussing a report showing that extreme weather events due to climate change may cost utilities over $4 billion each year).
2. Opinion, *More Green Blackouts Ahead*, WALL ST. J. (Feb. 23, 2021, 7:04 PM ET), https://perma.cc/sR9MX-TNHK (to locate, select "View the live page").
3. Robert Walton, *NERC Sees Potential Summer Energy Shortfalls, Says Energy Transition "Pace" May Threaten Reliability*, UTIL. DIVE (May 27, 2021), https://perma.cc/7R86-2JNB.
4. UNIV. OF HOUS. HOBBY SCH. OF PUB. AFFS., THE WINTER STORM OF 2021, at 1 (2021), https://perma.cc/K42N-3LSF.
5. *See* Reese Oxner & Juan Pablo Garnham, *Over a Million Texans Are Still Without Drinking Water. Smaller Communities and Apartments Are Facing the Biggest Challenges.*, TEX. TRIB. (Feb. 24, 2021, 6:00 PM CT), https://perma.cc/2T7C-95AV (describing how "a peak of about 14.9 million Texans faced water disruptions"); Mike Hixenbaugh & Perla Trevizo, *Texans Recovering from COVID-19 Relied on Machines to Help Them Breathe. Then the Power Went Out.*, TEX. TRIB. (Mar. 9, 2021, 6:00 AM CT), https://perma.cc/5TWL-2MHJ (describing medical-equipment failures).
6. UNIV. OF HOUS. HOBBY SCH. OF PUB. AFFS., *supra* note 4, at 6, 12.

for pipeline and power-plant workers to address rapidly developing emergencies.[7] The pumps and other electrical equipment needed to run natural gas wells, pipelines, and power plants to support the skyrocketing demand for home heating failed.[8] Residents in neighboring states suffered as well: In Jackson, Mississippi, the storm caused a power outage and damaged the city's drinking-water plant, causing a monthlong water crisis.[9] Estimates place the number of deaths from the storm and the electric grid and related infrastructure failure at between 150 and 700, with damages totaling hundreds of billions of dollars.[10]

State officials were quick to blame these outages on renewable energy, pointing to wind turbines that froze during the storm.[11] After the disaster, Sid Miller, Texas's Agriculture Commissioner, asserted that "[w]e should never build another wind turbine in Texas."[12] Expert analyses, however, just as quickly concluded that outages at fossil fuel plants, not wind farms, were the central cause of the blackouts.[13] But even with this information in hand, Texas

7. *See id.* at 12 (noting that approximately 47% of Texans lost cell phone service).

8. *See* UNIV. OF TEX. AT AUSTIN ENERGY INST., THE TIMELINE AND EVENTS OF THE FEBRUARY 2021 TEXAS ELECTRIC GRID BLACKOUTS 9, 44-45 (2021), https://perma.cc/4N7Y-TN3G (suggesting that electrical outages were a partial cause of natural gas production declines and pipeline problems).

9. *See* Ellen Ann Fentress & Richard Fausset, *"You Can't Bathe. You Can't Wash." Water Crisis Hobbles Jackson, Miss., for Weeks*, N.Y. TIMES (Mar. 22, 2021), https://perma.cc/S7PZ-E42E (noting that "[n]early one month" after Winter Storm Uri, "more than 70 percent of the city's water customers remained under a notice to boil water").

10. Peter Aldhous, Stephanie M. Lee & Zahra Hirji, *The Texas Winter Storm and Power Outages Killed Hundreds More People than the State Says*, BUZZFEED NEWS (May 26, 2021, 6:09 PM ET), https://perma.cc/85LA-55RQ (reporting on an independent investigation estimating that 702 people were killed during the week of Winter Storm Uri, as compared to the state's official tally of 151); PERRYMAN GRP., PRELIMINARY ESTIMATES OF ECONOMIC COSTS OF THE FEBRUARY 2021 TEXAS WINTER STORM 1 (2021), https://perma.cc/F75M-T7KE (estimating "projected long-term losses in gross product over time" as "between $85.8 and $128.7 billion").

11. Bryan Mena, *Gov. Greg Abbott and Other Republicans Blamed Green Energy for Texas' Power Woes. But the State Runs on Fossil Fuels.*, TEX. TRIB. (Feb. 17, 2021, 7:00 PM CT), https://perma.cc/6GLM-HVJF; *see Lessons Learned from the Texas Blackouts: Research Needs for a Secure and Resilient Grid: Hearing Before the H. Comm. on Sci., Space, & Tech.*, 117th Cong. 4 (2021) (statement of Jesse D. Jenkins, Assistant Professor, Princeton University) (stating that "2,000 MW of wind turbines were forced offline by the cold").

12. Erin Douglas & Ross Ramsey, *No, Frozen Wind Turbines Aren't the Main Culprit for Texas' Power Outages*, TEX. TRIB. (Feb. 17, 2021), https://perma.cc/78SN-ERUP.

13. *See, e.g.*, Bill Magness, Review of February 2021 Extreme Cold Weather Event—ERCOT Presentation 14 (2021), https://perma.cc/3C75-ZYCJ (showing that natural gas in Texas experienced greater reduction in generation capacity than any other fuel type); FERC ET AL., THE FEBRUARY 2021 COLD WEATHER OUTAGES IN TEXAS AND THE SOUTH CENTRAL UNITED STATES 15 (2021), https://perma.cc/KP33-Q56F (showing that 27% of wind-generating units and 58% of natural gas–fired units experience "outages, derates, or failures to start"); *see also* Jacob Mays, Michael T. Craig, Lynne Kiesling,
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lawmakers responded with reforms that harden the existing, fossil fuel–centric system, requiring stronger equipment at natural gas wells and pipelines and natural gas–fired plants.[14] These types of actions are important but nearsighted responses to the root causes of recent reliability failures: They fail to fully account for potential alternative investments in clean-energy resources that could ensure reliability while avoiding the entrenchment of fossil fuels.[15]

The perceived tension between a clean-energy transition and a reliable electric grid is not only a political talking point. For at least a century, the American legal system has treated energy and the environment as distinct policy concerns. In the 1930s, Congress charged the Federal Power Commission, later renamed the Federal Energy Regulatory Commission (FERC), with regulating the country's interstate natural gas and electricity systems—several decades before President Nixon created the Environmental Protection Agency (EPA) to regulate the environment.[16] This distribution of authority endures, as the EPA is primarily responsible for regulating the environment, including the reduction of greenhouse-gas (GHG) emissions from energy use, and FERC is primarily responsible for regulating the energy grid.

Today, energy and environmental goals have converged to some degree, particularly through states adopting aggressive clean-energy laws to tackle climate change.[17] Nonetheless, the energy regulatory system is disaggregated in ways that exacerbate the failure of energy policy to support both a reliable and

Joshua C. Macey, Blake Shaffer & Han Shu, *Private Risk and Social Resilience in Liberalized Electricity Markets*, 6 JOULE 369, 370 (2022) (arguing that market incompleteness contributed to the February 2021 blackouts in Texas).

14. *See, e.g.*, H.R. 11, 87th Leg., Reg. Sess. (Tex. 2021) (mandating that the Texas Public Utility Commission require each utility to "prepare generation facilities to provide adequate electric generation service during an extreme weather emergency").

15. *See infra* notes 356-58 and accompanying text.

16. Federal Power Act (FPA), ch. 687, 49 Stat. 803, 839-41 (1935) (codified as amended at 16 U.S.C. §§ 797-799); Natural Gas Act, ch. 556, 52 Stat. 821 (1938) (codified as amended at 15 U.S.C. §§ 717-717w); Reorganization Plan No. 3 of 1970, 3 C.F.R. 199 (1971); Clean Air Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676 (1970) (codified as amended in scattered sections of 42 U.S.C.).

17. *See generally* Lincoln L. Davies, *Alternative Energy and the Energy–Environment Disconnect*, 46 IDAHO L. REV. 473 (2010) (advocating for legal reform that aligns the energy and environmental law fields to address climate change, enhance electric-grid reliability, and promote renewable energy); Alexandra B. Klass, *Climate Change and the Convergence of Environmental and Energy Law*, 24 FORDHAM ENV'T L. REV. 180 (2013) (discussing how climate change has brought the two fields closer together); Jody Freeman, *The Uncomfortable Convergence of Energy and Environmental Law*, 41 HARV. ENV'T L. REV. 339 (2017) (discussing continuing barriers to the integration of environmental law and energy law).

low-carbon electric grid.[18] States control many decisions about the construction and siting of electric generating plants and the location of virtually all electric transmission lines—even those that extend across multiple states.[19] These transmission lines are critical to supporting the large amounts of new renewable energy infrastructure that will be necessary to meaningfully reduce U.S. carbon emissions.[20] Meanwhile, the federal government oversees wholesale electricity markets and regional planning and financing of electric transmission lines.[21] These markets, too, are essential to the expansion of renewable energy resources because they determine which types of generation win out in the competition for supplying electricity. And planning and paying for new transmission lines is a necessary precondition for a clean grid.[22]

The governance of this disaggregated system is complex. In some parts of the United States, regional institutions called regional transmission organizations (RTOs) are responsible for implementing these policies under the supervision of FERC. These RTOs sometimes work in concert with the states in which they operate, and sometimes directly against the wishes of the states.[23] In other regions, utilities and states have opposed the formation of RTOs and therefore rely on more balkanized approaches to wholesale energy procurement and planning for and financing transmission lines.[24] And throughout the entire country, regional institutions called "regional entities" manage the direct regulation of electric-grid reliability under federal oversight.[25]

To further complicate matters, a curious mix of public and private institutions governs the energy sector. Some institutions are wholly public, such as FERC and the state utility commissions that govern electric generation

18. Earlier works explored disaggregation outside of the carbon context and painted it primarily as a regulatory-commons problem. They focused on three jurisdictional "dislocations"—several federal agencies operating in the energy space, sharing jurisdiction with states, and operating within the shadow of judicial review. *See, e.g.*, Peter Huber, *Electricity and the Environment: In Search of Regulatory Authority*, 100 HARV. L. REV. 1002, 1003 (1987).

19. *See infra* Part I.

20. *See infra* Part IV.

21. *See infra* Part I.

22. *See infra* Part IV.

23. *See infra* Part III.B.1.

24. *See* William Boyd & Ann E. Carlson, *Accidents of Federalism: Ratemaking and Policy Innovation in Public Utility Law*, 63 UCLA L. Rev. 810, 836-37 (2016) (describing the "[t]raditional [m]odel" that prevails in these states); Conor Harrison & Shelley Welton, *The States That Opted Out: Politics, Power, and Exceptionalism in the Quest for Electricity Deregulation in the United States South*, ENERGY RES. & SOC. SCI., Sept. 2021, at 1, 7-9 (elucidating state opposition to RTOs).

25. *See infra* Part V.

choices and the approval (or "siting") of transmission lines. But RTOs and regional entities are private, nonprofit institutions, as is NERC, the organization that oversees the reliability of the electric grid as a whole.[26] The energy sector's substantial reliance on private governing institutions creates an additional layer of challenges that at times compounds jurisdictional and subject-matter divisions, even as these organizations' technical expertise at times provides a distinct benefit.[27]

We believe that this segmentation of energy policy—a phenomenon that renders the true convergence of energy and environmental policy extremely difficult—is an underdiagnosed cause of the perceived clash between clean energy and grid reliability. The siloed approach to energy regulation creates significant impediments to clean-energy policies, as reliability organizations often counteract clean-energy policies—often inadvertently, but sometimes more deliberately—when making decisions about how to keep the lights on. Similarly, legal silos often cause states and regional organizations to neglect valuable opportunities for collaboration. We view overcoming this structural separation that prevents the establishment of a clean, reliable grid as a crucial precondition to substantial progress on climate change mitigation in the United States.

To be sure, a grid that runs on dramatically different sources of energy will require different strategies to ensure its reliability. But the need to *reconceptualize* and enhance reliability should not detract from the fact that the only way to secure a reliable grid under conditions of climate change is to rapidly engage in a clean-energy transition in the electricity sector.[28] We need an institutional framework for energy in the United States that embraces this critical challenge.

Scholars often identify federalism as a central impediment to a clean, reliable grid, leading to the politically fraught but diagnostically simple cure of federalizing more energy policy.[29] We argue that the diagnosis is more

26. *See, e.g.*, *About MISO*, MIDCONTINENT INDEP. SYS. OPERATOR, https://perma.cc/8ESX-5UTU (archived Mar. 24, 2022); *About NERC*, N. AM. ELEC. RELIABILITY CORP., https://perma.cc/SXZ6-P7L5 (archived Mar. 24, 2022).

27. *See infra* Parts IV-V.

28. *See infra* Part I.A.

29. *See, e.g.*, Alexandra B. Klass & Jim Rossi, *Reconstituting the Federalism Battle in Energy Transportation*, 41 HARV. ENV'T L. REV. 423, 428 (2017) (arguing for a greater federal role in transmission-line siting); Lincoln L. Davies, *Power Forward: The Argument for a National RPS*, 42 CONN. L. REV. 1339, 1341, 1343-44 (2010) (arguing for a federal renewable energy requirement). *But see* David E. Adelman & Kirsten H. Engel, *Reorienting State Climate Change Policies to Induce Technological Change,* 50 ARIZ. L. REV. 835, 852 (2008) (arguing that states play an important role in climate-policy innovation); Felix Mormann, *Clean Energy Federalism*, 67 FLA. L. REV. 1621, 1628 (2015) (arguing for a split national–state approach). For a defense of the FPA's distribution of
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complex than jurisdictional mismatch. In fact, the commonly proposed antidote of federalizing energy policy would fail to harmonize reliability and climate policy, since many of the most significant impediments to climate action occur within entities subject to FERC jurisdiction that are charged with maintaining grid reliability. We show that energy policy is better understood as siloed along three separate planes: (1) across environmental and reliability goals; (2) among jurisdictions (federal, regional, state, and sometimes local); and (3) along a public–private continuum of actors. These silos are largely responsible for the failure of energy policy to adequately harmonize climate change and reliability concerns.

Conceptualizing the sphere of energy-reliability governance as siloed across multiple planes unlocks new possibilities for governance reforms that shift authority not only across jurisdictional scales but across the public–private continuum. This Article highlights these silos within four core areas of U.S. energy policy and governance: (1) decisionmaking about the type and amount of electricity generation; (2) planning for, financing, and siting electric transmission lines; (3) directly regulating electric-grid reliability; and (4) regionally governing the grid. In each of these areas, we evaluate the structure of governance and substance of policy that impedes a cleaner, more reliable grid, and we assess how this policy and structure must change.

The changes that we propose are transformative, but they do not wholly upend U.S. energy policy. For reasons of both theory and political economy, we partially embrace the disaggregation of energy governance within these core areas.[30] We explore how to effectively navigate the current siloed system by reconfiguring the balance of authority and rewriting or expanding the substance of policies. To date, energy regulators have at times operated within their silos without fully considering how their regulations interact with—and often conflict with—approaches adopted by other regulators. Our proposed solutions focus on how targeted shifts in energy governance and policy responsibilities could encourage a systematic embrace of policies that are simultaneously assigned to disparate regulators. Doing so, we argue, would better reflect the spirit of the applicable federal laws governing the electric grid, which create federal and state spheres of responsibility. It would also eliminate tensions between policies designed to promote grid reliability and those designed to reduce GHG emissions. And finally, we evaluate the extent to which congressional action will be necessary—if at all—to enable this new institutional balance.

jurisdiction, see Matthew R. Christiansen & Joshua C. Macey, *Long Live the Federal Power Act's Bright Line*, 134 HARV. L. REV. 1360, 1365-67 (2021).

30. *See infra* Part II (explaining the potential virtues of silos).

Several of the policy suggestions that we explore here are not new; a growing literature on clean-energy governance has advocated for many of these reforms.[31] Our novel contributions are threefold. First, policymakers and scholars have advocated for these changes nearly exclusively in the sphere of clean energy. We view these necessary modifications through a new lens, exploring how the proposed policies would enhance both clean energy and reliability. Second, most proposals for modifying energy policy to support clean energy are themselves disaggregated, usually resting within the transmission or RTO sphere. We propose a comprehensive suite of policy and institutional changes—modifications that will be necessary through all parts of the energy system that intertwine with climate mandates. Third, we emphasize how substantive policy changes will fall flat without substantial *governance* modifications that allow siloed actors to effectively create and implement new policies. For example, a truly interregional transmission-planning process—essential to the nationally connected grid that must support expanded renewables—likely requires a new FERC or Department of Energy (DOE) office that does the planning or coordinates regional organizations to conduct the planning.

The project of creating a clean, reliable grid is often treated as a technical challenge, dependent predominantly on the emergence of technological breakthroughs or engineering feats.[32] We show that it is equally—or largely—a challenge of law and governance. The siloed institutions and rules that dictate the configuration of the electric grid—the generation plants, transmission lines, and distribution lines that carry electricity to customers—substantially impede the rapid grid transformations necessary to tackle climate change.

These impediments create not only substantial economic costs, but also real human costs—and unequal ones at that. Black, brown, and low-income communities shoulder the bulk of the burdens caused by fossil fuel energy in the United States (and in many other countries). They inhale the air pollution from fossil fuel–fired power plants and toil in the dangerous conditions of fossil fuel–production industries.[33] Low-income communities and

31. *See, e.g.*, *infra* Part IV.C (discussing transmission-siting reforms).

32. *See, e.g.*, ANALYSIS GRP., ELECTRICITY MARKETS, RELIABILITY AND THE EVOLVING U.S. POWER SYSTEM 48-65 (2017); Semich Impram, Secil Varbak Nese & Bülent Oral, *Challenges of Renewable Energy Penetration on Power System Flexibility: A Survey*, ENERGY STRATEGY REVS., Sept. 2020, at 1, 3-10 (collecting technical sources). *See generally* NAT'L RENEWABLE ENERGY LAB'Y, RENEWABLE ELECTRICITY FUTURES STUDY (2012) (focusing on the technical aspects of a high-renewables grid).

33. *See* Shalanda H. Baker, *Anti-resilience: A Roadmap for Transformational Justice Within the Energy System*, 54 HARV. C.R.-C.L L. REV. 1, 4-6, 13, 15 (2019); Maninder P.S. Thind, Christopher W. Tessum, Inês L. Azevedo & Julian D. Marshall, *Fine Particulate Air Pollution from Electricity Generation in the US: Health Impacts by Race, Income, and Geography*, 53 ENV'T SCI. & TECH. 14,010, 14,013 (2019) (finding that Black Americans'
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communities of color are disproportionately burdened by blackouts and other reliability issues, and are also hit hardest by severe climate events, because they lack many of the resources needed to weather these events.[34] Although infrequently discussed or justified on equity grounds, it is worth emphasizing that the reforms we propose would make the grid cleaner and more reliable and would reduce costly redundancies between climate and reliability policies, thereby charting a course toward a safer and more equitable climate and energy future.

Part I of this Article explores the critical nexus between the low-carbon-energy imperative and a reliable grid and analyzes the disaggregated structure of U.S. energy policy and governance. This Part foreshadows how the policy and governance system impedes the contribution of renewable energy—the key zero-carbon energy source in the United States—to grid reliability and frames our approach to policy solutions. In the Parts that follow, we assess necessary reconfigurations of authority in four key areas of energy policy. Part II explores how silos in governance—not just energy—can be both

exposure to PM2.5 emissions from power plants exceeds that of all other races); Ann E. Carlson, *The Clean Air Act's Blind Spot: Microclimates and Hotspot Pollution*, 65 UCLA L. REV. 1036, 1046-47 (2018) (tracing how the Clean Air Act fails to regulate microclimates of heavy pollution, which disproportionately occur in low-income communities of color); Rachel Morello-Frosch, Miriam Zuk, Michael Jerrett, Bhavna Shamasunder & Amy D. Kyle, *Understanding the Cumulative Impacts of Inequalities in Environmental Health: Implications for Policy*, 30 HEALTH AFFS. 879, 881 & nn.24-26 (2011); Christopher W. Tessum et al., *Inequity in Consumption of Goods and Services Adds to Racial–Ethnic Disparities in Air Pollution Exposure*, 116 PNAS 6001, 6001-03 (2019) (finding that Black and Hispanic populations bear a pollution burden far exceeding the amount of pollution that their consumption actually causes).

34. *See* James Dobbins & Hiroko Tabuchi, *Texas Blackouts Hit Minority Neighborhoods Especially Hard*, N.Y. TIMES (updated Feb. 18, 2021), https://perma.cc/79E7-JUL2; Robert R.M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 DUKE ENV'T L. & POL'Y 23, 25, 42 (2012) (describing how the United States has created a "disaster underclass" by neglecting certain places and peoples); Jonathan P. Hooks & Trisha B. Miller, *The Continuing Storm: How Disaster Recovery Excludes Those Most in Need*, 43 CAL. W. L. REV. 21, 23-25 (2006) (focusing on the class and race dimensions of disaster recovery after Hurricane Katrina); Daniel Farber, *Symposium Introduction: Navigating the Intersection of Environmental Law and Disaster Law*, 2011 BYU L. REV. 1783, 1810 (discussing how environmental disasters highlight not only unequal exposure to risks, but also differential abilities to cope with such risks); Michel Masozera, Melissa Bailey & Charles Kerchner, *Distribution of Impacts of Natural Disasters Across Income Groups: A Case Study of New Orleans*, 63 ECOLOGICAL ECON. 299, 304 (2007) (examining why "lower income groups were more vulnerable to Hurricane Katrina during the response and recovery phases"); Ian P. Davies, Ryan D. Haugo, James C. Robertson & Phillip S. Levin, *The Unequal Vulnerability of Communities of Color to Wildfire*, 13 PLOS ONE, No. 11, Nov. 2018, at 1, 6; Wil Lieberman-Cribbin, Christina Gillezeau, Rebecca M. Schwartz & Emanuela Taioli, *Unequal Social Vulnerability to Hurricane Sandy Flood Exposure*, 31 J. EXPOSURE SCI. & ENV'T EPIDEMIOLOGY 804, 804-05, 807 (2020) (finding disparate impacts by class and race related to flooding after Hurricane Sandy).

beneficial and problematic. The Parts that follow then consider how energy governance silos can be leveraged, partially knocked down, or integrated to create a cleaner, more reliable U.S. electric grid. Part III proposes changes to the regulated state and regional markets that dictate the electricity generation mix. Part IV explores policies for expanding long-distance, high-voltage electric transmission lines and more localized, distributed resources that will be essential for the creation of a low-carbon energy economy. Part V then analyzes the multilevel, direct regulation of grid reliability in the generation and transmission sectors as well as its recent failures, proposing policy and governance changes needed to enhance reliability while incorporating large amounts of renewable generation. Part VI highlights the modifications needed to allow regional institutions—particularly RTOs—to strike an essential balance between state, federal, public, and private silos in grid policy and governance. Finally, Part VII summarizes our policy and governance proposals.

I. Climate Change, Grid Reliability, and Energy Policy

U.S. energy policy is a poster child of complex systems. It is the product of more than a century of incremental institutional additions and changes. Utilities originally controlled the system, then states intervened,[35] and later, the federal government began to "intrude" in areas once dominated by the states, in part due to Supreme Court directives.[36] The result is a menagerie of institutional actors often fighting for authority within a given policy space. A slew of recent high-profile Supreme Court cases highlights the ongoing tensions among state, regional, and federal actors in energy-governance spheres.[37]

35. Richard J. Cudahy & William D. Henderson, *From Insull to Enron: Corporate (Re)regulation After the Rise and Fall of Two Energy Icons*, 26 ENERGY L.J. 35, 45-48 (2005).

36. *See, e.g.*, Pub. Util. Comm'n v. Attleboro Steam & Elec. Co., 273 U.S. 83, 89-90 (1927) (holding that states could not assert jurisdiction over wholesale electricity sold in interstate commerce), *abrogated by* Ark. Elec. Coop. Corp. v. Ark. Pub. Serv. Comm'n, 461 U.S. 375 (1983); Otter Tail Power Co. v. United States, 410 U.S. 366, 374-75 (1973) (finding that federal antitrust principles applied to utility activity that blocked competition).

37. *See, e.g.*, PennEast Pipeline Co. v. New Jersey, 141 S. Ct. 2244, 2257 (2021) (holding that private utilities exercising FERC-granted eminent domain authority may condemn state-owned lands); Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1297 (2016) (finding that a state program designed to incentivize new generation capacity was preempted under the FPA); FERC v. Elec. Power Supply Ass'n, 577 U.S. 260, 276-77 (2016) (finding that FERC had the authority to regulate demand-response resources—which also operate in the state-regulated retail space—within federally regulated wholesale markets).

This system poses challenges to the development of a clean, reliable grid. Yet it is within this system that these challenges must be overcome. This Part explains why the pursuit of grid reliability and clean energy are complementary, mutually reinforcing goals for energy governance—thereby counteracting the chorus of skeptics asserting their incompatibility. It highlights the existing U.S. energy policies and governance structures that impede the important contribution that renewable energy–generation sources can make to reliability, and it introduces our comprehensive approach to energy-policy transformation to overcome these hurdles.

A. Why a Decarbonized Grid Is a More Reliable Grid

The U.S. electric grid transmits electricity to homes, businesses, and industries over an enormous, interconnected network of power plants and other generation facilities; long-distance, high-voltage transmission lines; and low-voltage distribution lines.[38] These generation facilities are predominantly powered by fossil fuels, but that is rapidly changing—and must change even more quickly—to address the climate crisis. It is this endeavor that worries skeptics, who increasingly argue that we cannot transition to a clean energy grid while maintaining reliability.[39]

Grid reliability has three distinct elements. First, reliability refers to the process of ensuring that there is enough generation at all points on the grid to meet electricity demand at all times of day.[40] A failure to exactly match electricity supply and demand (or "load") on an instantaneous basis can lead to over- or under-voltages in the wires and, ultimately, a blackout—the complete loss of power to customers.[41] However, short-term planning can only go so far. Ensuring reliability requires both very short-term and long-term planning and decisionmaking, from instantaneously dispatching additional energy-generation reserves to address unexpectedly high demand to building additional transmission lines that reduce congestion in existing wires.[42]

38. U.S. DEP'T OF ENERGY, STAFF REPORT TO THE SECRETARY ON ELECTRICITY MARKETS AND RELIABILITY 1 (2017).

39. *See, e.g.*, *supra* text accompanying notes 11-14.

40. *See* N. AM. ELEC. RELIABILITY CORP., DEFINITION OF "ADEQUATE LEVEL OF RELIABILITY" 5 (2007), https://perma.cc/W6PA-QKKM.

41. *Electricity Explained: How Electricity Is Delivered to Consumers*, U.S. ENERGY INFO. ADMIN. (Nov. 3, 2021), https://perma.cc/7LZW-WFGB.

42. N. AM. ELEC. RELIABILITY CORP., *supra* note 40, at 5 (defining reliability to cover both "adequacy," which is the "ability of the electric system to supply the aggregate electric power and energy requirements of the electricity consumers at all times," and "operating reliability," which is "the ability of the electric system to withstand sudden disturbances").

Resource adequacy—an important second element of reliability—involves long-term planning for new generation infrastructure to ensure that demand for electricity will be covered in the future.[43] In the United States, regulators define an acceptable degree of resource adequacy as allowing only a day's loss of power every ten years.[44] Finally, for the purposes of this Article, we also intend for grid reliability to encompass the third related concept of "resilience," or the ability of the grid to bounce back after power disruptions caused by weather or other emergencies, and to prevent blackouts during these emergencies.[45]

It is important to acknowledge up front that a grid fueled by clean energy—and in particular, by substantial quantities of renewable energy—poses *different* reliability challenges than fossil fuel generation.[46] Whereas fossil fuel generators can often increase and decrease production (or "ramp," in industry terminology) on command,[47] wind and solar generation are available only when the wind is blowing or the sun is shining. Many politicians and incumbent fossil fuel generators equate this intermittency with unreliability.[48]

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43. *See, e.g.*, Cal. ISO, Resource Adequacy: The Need for Sufficient Energy Supplies 1 (2021), https://perma.cc/484N-R96B ("Resource adequacy ensures that there is enough capacity and reserves for the California Independent System Operator . . . to maintain a balanced supply and demand across the grid.").

44. *See, e.g.*, ReliabilityFirst, Planning Resource Adequacy Analysis 1 (2016), https://perma.cc/9Z4Z-EB9T (noting the "'one day in ten year' loss of load expectation principles" (capitalization altered)).

45. There has been increased discussion of grid resilience in recent years, but it remains unclear whether the concept of resiliency is best treated as a separate end for the electricity system or should be encompassed within the concept of reliability. We follow the lead of former FERC chair Cheryl LaFleur in considering the grid's ability to recover from disasters quickly as an element of reliability. *See* Grid Reliability & Resilience Pricing, 162 FERC ¶ 61,012, at para. 1 (Jan. 8, 2018) (LaFleur, Comm'r, concurring) ("[R]esilience—the ability to withstand or recover from disruptive events and keep serving customers—is unquestionably an element of reliability."); *cf.* Andy Ott, *Reliability and Resilience: Different Concepts, Common Goals*, PJM: INSIDE LINES (Dec. 17, 2018), https://perma.cc/H248-AHB3 ("Resilience is directly linked to the concept of reliability; you cannot be resilient if you are not first reliable. Resilience encompasses additional concepts—preparing for, operating through and recovering from significant disruptions, no matter what the cause.").

46. We use the term "clean energy" to refer to all zero-carbon energy sources, including nuclear power. It is worth noting, though, that because of its low costs, renewable energy is projected to play a particularly large role in most future low-carbon energy scenarios. *See* ERIC LARSON ET AL., NET-ZERO AMERICA: POTENTIAL PATHWAYS, INFRASTRUCTURE, AND IMPACTS 88 (2021), https://perma.cc/W7W7-HZVG (stating that "[w]ind and solar power have dominant roles in all pathways"). We therefore focus on renewable energy resources in this Article.

47. Contingent on, of course, fuel supply and adequate weatherization. *See supra* note 13 and accompanying text.

48. *See, e.g.*, *supra* text accompanying notes 11-14; Mena, *supra* note 11.

But that is misleading. No resource runs all of the time. In fact, in the past few years, gas generation and, to a lesser degree, coal generation have played prominent roles in weather-related system failures.[49]

At the same time, numerous studies have confirmed that we already have the technology necessary to maintain grid reliability under conditions of substantial renewable energy penetration.[50] What renewable resources require to ensure reliability are complementary resources that balance out over time and can rapidly offer flexible back-up power. These can include energy storage; other forms of renewable energy; and renewable energy in different geographic locales, with different weather conditions, connected by long-distance transmission lines.[51] Moreover, clean-energy resources often offer superior performance when it comes to the provision of certain traditional reliability services.[52] For these reasons, the clean-energy transition may ultimately prove cost saving, although expensive in the interim: A 2020 study by the University of California Berkeley's Goldman School of Public Policy projects that wholesale electricity costs will be 10% lower than they are today under a 90% clean-energy scenario in 2035.[53]

It is time, then, to dispense with the myth that a cleaner grid—one that relies on substantially larger percentages of renewable generation—is not possible from a reliability standpoint. As we argue below, it is not only possible but *advisable* to do so, for three reasons. First, although atmospheric change will be slow, a clean energy grid will, over time, reduce climate impacts that

49. *See* Sonal Patel, *Polar Vortex Tests Resiliency of U.S. Power System*, POWER MAG. (Jan. 31, 2019), https://perma.cc/73AA-QJBD (describing how nuclear energy underperformed during a New England polar vortex); Mike O'Boyle & Silvio Marcacci, *As Extreme Weather Forces Coal to Falter, Where Will Resilience Come From?*, GREENTECH MEDIA (Mar. 7, 2019), https://perma.cc/29WP-Y8B3 (discussing coal's underperformance in the polar vortex); UNIV. OF TEX. AT AUSTIN ENERGY INST., *supra* note 8, at 8, 34 (describing and illustrating the scope of these resources' failures after Winter Storm Uri).

50. LARSON ET AL., *supra* note 46, at 6 (outlining "five distinct technological pathways, each of which achieves the 2050 goal" and accelerates "deployment at scale of technologies and solutions that are mature and affordable today . . . ."). GOLDMAN SCH. OF PUB. POL'Y, UNIV. OF CAL. BERKELEY, 2035 REPORT 4 (2020); NAT'L RENEWABLE ENERGY LAB'Y, *supra* note 32, at iii ("[R]enewable electricity generation from technologies that are commercially available today, in combination with a more flexible electric system, is more than adequate to supply 80% of total U.S. electricity generation in 2050 while meeting electricity demand on an hourly basis in every region of the United States.").

51. NAT'L RENEWABLE ENERGY LAB'Y, *supra* note 32, at viii-xi.

52. *See infra* Part I.A.3.

53. GOLDMAN SCH. OF PUB. POL'Y, *supra* note 50, at 4; Dan Shreve, *Deep Decarbonisation: The Multi-trillion-Dollar Question*, WOOD MACKENZIE (June 27, 2019), https://perma.cc/4W7K-DKPQ ("We estimate the cost of full decarbonisation of the US power grid at US$4.5 trillion, given the current state of technology. That's nearly as much as what the country has spent, since 2001, on the war on terror.").

currently stress the grid and human systems more generally. Second, a clean-energy transition will induce the construction of both a nationally interconnected transmission grid and numerous localized, self-sufficient microgrids that will operate when the larger grid inevitably experiences problems. Finally, renewable energy sources offer enhanced technical grid benefits compared to fossil fuel–fired power—benefits that will make the grid more reliable.

1. Mitigating climate impacts on the U.S. energy system

The effects of climate change pose increasingly serious threats to the U.S. energy system, including hurricanes, wildfires, extreme heat, and extreme cold. These weather-related threats are expected to become more frequent, which in turn will require a significant increase in electric-grid resilience and reliability.[54]

The strategy for mitigating these harms can be summarized in six words: electrify everything and decarbonize the grid. In 2019, electricity ranked as the second largest sectoral source of carbon pollution in the United States (25%), just below transportation (29%) and trailed by industry (23%), commercial and residential (13%), and agriculture (10%).[55] But electricity's role in addressing climate change is outsized: It has been described as the "linchpin" of decarbonization because the central strategy for decarbonizing most other sectors is to transition them to run on electricity.[56] Of course, electrification only works as a decarbonization strategy if the grid also cleans up as it grows in size. Thus, to facilitate U.S. decarbonization on pace with planetary imperatives, the U.S. electricity system will need to approximately triple in size by 2050 at the latest, while reducing its emissions by 95-100%.[57]

As electricity becomes central to powering our economy, grid reliability will assume even greater importance. Fortunately, though, a decarbonized grid will ultimately prove stabilizing in this regard: A transition away from fossil

54. *See, e.g.*, NAT'L COMM'N ON GRID RESILIENCE, GRID RESILIENCE: PRIORITIES FOR THE NEXT ADMINISTRATION 5 (2020).

55. *See Sources of Greenhouse Gas Emissions*, EPA, https://perma.cc/AM64-UWKC (archived Mar. 25, 2022).

56. *See* Jesse D. Jenkins, Max Luke & Samuel Thernstrom, *Getting to Zero Carbon Emissions in the Electric Power Sector*, 2 JOULE 2498, 2498 (2018) (identifying electric power as the "linchpin of efforts" to limit greenhouse-gas emissions).

57. *See* Joeri Rogelj et al., *Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development*, *in* GLOBAL WARMING OF 1.5°C, at 93, 95 (2019) (establishing 2050 as the latest date around which net-zero emissions should be achieved to limit warming to 1.5 degrees Celsius); STEPHEN NAIMOLI & SARAH LADISLAW, CTR. FOR STRATEGIC & INT'L STUDIES, DEEP DECARBONIZATION PATHWAYS 2 (2020), https://perma.cc/ZKC8-LHQA; *see also* Jenkins et al., *supra* note 56, at 2506.

fuels will be essential to slowing the rise of extreme weather events that increasingly disrupt the grid—not to mention the impact on human well-being as a whole. To be sure, unilateral decarbonization by the United States would not itself avert increases in global average temperatures and extreme weather events. But the United States, as the world's largest historical emitter, is widely understood to play a key geopolitical role within international climate negotiations, such that leadership on domestic decarbonization is critical for spurring global ambition.[58] Conversely, if the United States does not pursue rapid decarbonization, it is unlikely to be achieved on a global scale, and we will miss a critical window for stemming the rising frequency and degree of extreme weather events that are significant causes of blackouts.[59] Or, to frame this in reverse, if we do not transition to clean energy, we can expect a devastating, spiraling positive feedback loop: We will spend more money to shore up less reliable fossil fuel generation, which leads to CO_2 emissions that exacerbate reliability events, which in turn require even more investment into adaptive reliability measures for an ultimately untenable technology.

2. Enhancing grid stability and energy equity through national interconnection and localized networks

In addition to mitigating some of the effects of climate change, decarbonization can also immediately improve grid reliability and resilience. At the local level, microgrids already have been a key component of reliability and resilience. Microgrids are energy systems that power a neighborhood, university campus, or similarly small area and that can be islanded (disconnected) from the larger grid.[60] For instance, during and after Hurricane Sandy in New York in 2012, several university campuses and other microgrids kept the lights on while the rest of the city remained in the dark.[61] Although microgrids are not all zero carbon, they can be designed to run on a combination of small-scale renewables, energy storage, or green hydrogen

58. *See, e.g.*, Jennifer A. Dlouhy & Justin Sink, Bloomberg, *"A Very Weak Hand": Biden Set to Head to COP26 Summit Without Congressional Support for His Climate Pledges*, FORTUNE (Oct. 14, 2021, 4:13 AM PST), https://perma.cc/FN49-JMHS (describing why robust U.S. domestic action on climate change is critical to the success of international climate negotiations).

59. N. AM. ELEC. RELIABILITY CORP., 2019 ERO RELIABILITY RISK PRIORITIES REPORT 18 (2019).

60. Sara C. Bronin, *Curbing Energy Sprawl with Microgrids*, 43 CONN. L. REV. 547, 549-50 (2010).

61. James M. Van Nostrand, *Keeping the Lights on During Superstorm Sandy: Climate Change Adaptation and the Resiliency Benefits of Distributed Generation*, N.Y.U. ENV'T L.J. 92, 96-97 (2015).

made with renewable energy.[62] An expansion of green microgrids would substantially improve reliability and reduce carbon emissions.[63]

At the opposite end of the spectrum, deep decarbonization will require a massive build-out of utility-scale wind and solar farms.[64] This, in turn, will necessitate the construction of a large, nationally connected system of transmission lines to deliver electricity from remote, rural areas to "load centers"—high-population areas that consume a greater amount of electricity.[65] A national transmission system has inherent reliability benefits because it allows utilities to draw from a broader, more diverse pool of power.[66] Indeed, many argue that one central cause of Texas's 2021 blackout during Winter Storm Uri was the state's decision decades earlier to refuse to interconnect with out-of-state transmission networks.[67]

Enhanced interconnections and expanded microgrids could, if designed properly, also substantially enhance the equity of the grid. A nationally interconnected grid will bring cheaper, cleaner renewable energy to more people, helping to alleviate the crushing burden of energy poverty that plagues nearly one-third of U.S. households.[68] Furthermore, clean microgrid development targeted toward low-income, marginalized communities—which have the fewest resources to fall back on during grid emergencies—will enhance reliability in communities disproportionately burdened by outages.

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62. *See Microgrids*, CTR. FOR ENERGY & CLIMATE SOLS., https://perma.cc/8BBU-UTSE (archived Mar. 25, 2022) ("Historically, microgrids generated power using fossil fuel–fired combined heat and power . . . and reciprocating engine generators. Today, however, projects are increasingly leveraging more sustainable resources like solar power and energy storage. Microgrids can run on renewables, natural gas–fueled combustion turbines, or emerging sources such as fuel cells or even small modular nuclear reactors, when they become commercially available.").

63. *The Role of Microgrids in Helping to Advance the Nation's Energy System*, U.S. DEP'T ENERGY OFF. ELEC., https://perma.cc/8KFA-EGYQ (archived Mar. 25, 2022).

64. All of the reports describing pathways to a zero-carbon grid assume such a build-out. *See* LARSON ET AL., *supra* note 46, at 27, 88.

65. *See, e.g.*, Gregory Brinkman, Joshua Novacheck, Aaron Bloom & James McCalley, Nat'l Renewable Energy Lab'y, Interconnections Seam Study 33 (2020) (describing the importance of this type of interconnection).

66. *See* Ill. Com. Comm'n v. FERC, 721 F.3d 764, 774 (7th Cir. 2013) (noting the need for fewer reserve margins due to a transmission-line expansion).

67. *See, e.g.*, *After Texas, A New Spotlight on Long-Distance Transmission in MISO*, SUSTAINABLE FERC PROJECT (Mar. 5, 2021), https://perma.cc/7QHZ-9Z4U (noting the currently unfilled need to import electricity to Texas during grid emergencies).

68. *See* Sasha Ingber, *31 Percent of U.S. Households Have Trouble Paying Energy Bills*, NPR (Sept. 19, 2018, 8:12 PM ET), https://perma.cc/S2ND-A4MM.

3. Diversifying fuel supply

Beyond inducing the construction of a nationally interconnected grid, it is important to highlight another characteristic of renewable energy in the wake of Winter Storm Uri in 2021: its natural availability at the point of generation. Natural gas–plant outages were the primary cause of the crisis precipitated by Uri, in part because natural gas generates so much power in the state, and these outages arose largely from fuel-supply issues caused by frozen parts on gas wells and pipelines.[69] Many natural gas plants—like some wind turbines in Texas—also simply froze because they had not been properly weatherized.[70]

Certainly, fossil fuel infrastructure can be weatherized, and many power plants in the northern United States regularly operate in conditions that are far colder than those experienced in Texas.[71] Even then, however, this infrastructure remains vulnerable to geopolitical and physical supply shocks.[72] Moreover, spending billions of dollars to weatherize natural gas wells, pipelines, and power plants might not be the most efficient or practical approach to reliability, given the links between this infrastructure and climate change. Allocating some of these funds toward geographically diverse renewables, which simply need to access wind or sunlight and do not require wells, pumps, compressors, and pipelines, could be a more efficient path toward reliability.

Wind turbines and solar panels also can be, and often are, weatherized to avoid freezing.[73] And although renewable generation sources lack a constant

69. *See supra* note 8 and accompanying text.

70. Elec. Reliability Council of Tex., Update to April 6, 2021 Preliminary Report on Causes of Generator Outages and Derates During the February 2021 Extreme Cold Weather Event 9, 18 (2021), https://perma.cc/5MBJ-F6EF (showing weather-related issues, including the freezing of intake lines and other problems associated with a lack of winterization, as the leading cause of natural gas–plant outages in Texas during Winter Storm Uri); UNIV. OF TEX. AT AUSTIN ENERGY INST., *supra* note 8, at 30-31 (describing the weather-related issues at the 167 generation units that stopped generating as a result of freezing equipment rather than fuel-supply issues or other outage causes).

71. *See, e.g.*, Chris Hubbuch, *Built for Cold, Wisconsin Grid Hums Along in Temperatures that Crippled Texas*, MADISON.COM (Feb. 19, 2021), https://perma.cc/T5TR-PYB5 (discussing how power plants and related energy-producing equipment in northern U.S. states are designed for "frigid" temperatures as cold as "40 degrees below zero").

72. *See, e.g.*, David E. Sanger, Clifford Krauss & Nicole Perlroth, *Cyberattack Forces a Shutdown of a Top U.S. Pipeline*, N.Y. TIMES (updated May 13, 2021), https://perma.cc/6V6T-ZR5X (describing a cyberattack on Colonial Pipeline that caused significant gas shortages throughout the eastern United States).

73. *See, e.g.*, XCEL ENERGY, RENEWABLE ENERGY 8 (2020), https://perma.cc/JN7J-7PX7 ("All the wind turbines that Xcel Energy owns across its three regions are outfitted with cold weather turbine packages that support operations down to -22 F (-30 C)."); Sonal Patel, *Prepare Your Renewable Plant for Cold Weather Operations*, POWER MAG. (Oct. 1, 2014), https://perma.cc/E4FX-A7DG.

fuel supply—since the strength and frequency of wind and sunlight varies—intermittencies can be smoothed out when wind turbines and solar panels are geographically diversified, adequately interconnected through transmission lines, and supported by storage.

B. How Siloed Grid Policy and Governance Impede a Clean, Reliable Grid

Thus far, we have made the case that integrating renewable energy is central to a reliable electric grid. In this Subpart, we turn to the legal and institutional context in which a clean, reliable grid must be achieved, focusing on the ways in which the system is currently disaggregated across jurisdictional scales and the public–private continuum.

The history of electricity explains much of energy law's disaggregation. When the grid was first constructed, power generation was highly localized, with cities like Chicago authorizing around forty-five companies to build power plants.[74] Gradually, ambitious companies took over and consolidated this generation, reducing the number of power plants and vertically integrating their operation.[75] These investor-owned utilities (IOUs) began to build, own, and operate generation, the transmission lines that connected generation to load centers, and the distribution lines that carried electricity to retail customers.[76] IOUs successfully lobbied states to regulate electric utilities so that utilities could act as monopolies within established service territories.[77] As a consequence of states providing IOUs with exclusive service territories, state legislatures granted public-utility commissions (PUCs) the power to set the rates utilities charged their customers.[78] But as IOUs increasingly transacted across state lines, states began to compete for regulatory control over these interstate enterprises. These efforts by state regulators to set rates for interstate electricity sales led to a Supreme Court case prohibiting this state competition and, ultimately, to the Federal Power Act of 1935 (FPA).[79]

74. Robert L. Bradley, Jr., *The Origins and Development of Electric Power Regulation*, *in* THE END OF A NATURAL MONOPOLY: DEREGULATION AND COMPETITION IN THE ELECTRIC POWER INDUSTRY 43, 73 n.4 (Peter Z. Grossman & Daniel H. Cole eds., 2003).

75. *See id.* at 46-47; *see also* New York v. FERC, 535 U.S. 1, 5-6 (2002) (discussing the growth of public utilities).

76. See Boyd & Carlson, *supra* note 24, at 820-22, 824; *New York v. FERC*, 535 U.S. at 5-6.

77. Cudahy & Henderson, *supra* note 35, at 49; *see, e.g.*, Bradley, *supra* note 74, at 46-48.

78. Some states utilize the term PUC; other states use the analogous title public-service commission (PSC) and, occasionally, corporation commission.

79. Pub. Util. Comm'n v. Attleboro Steam & Elec. Co., 273 U.S. 83, 90 (1927), *abrogated by* Ark. Elec. Coop. Corp. v. Ark. Pub. Serv. Comm'n, 461 U.S. 375 (1983).

The FPA draws a dividing line between federal and state jurisdiction over electricity.[80] This law authorizes FERC to regulate the selling of electricity at wholesale in interstate commerce; the transmission of electricity in interstate commerce (the rates charged for transmission, and the service that must be offered); and the reliability of the U.S. electric grid.[81] The FPA left intact state authority over electricity generation, retail sales, and other electricity-related matters not expressly regulated by FERC, including the siting of transmission lines within states' jurisdictions.[82]

Today, some states continue to rely upon PUCs to regulate all aspects of the electricity system not subject to FERC jurisdiction.[83] They allow IOUs to act as regulated monopolies, with the PUC approving how much and what type of generation the IOUs may build and determining the rates that IOUs may charge retail customers.[84] Other states have restructured by separating the enterprise of generating electricity from the enterprise of delivering electricity to customers.[85] In these states, independent generators sell electricity at wholesale either directly to IOUs or through competitive energy markets.[86] In states like Texas—the most restructured state—even the retail side of the business is competitive. In most parts of the state, businesses called retail electric providers (REPs) compete to offer customers different packages of electricity at different rates.[87] But even in Texas, the transmission and distribution aspects of electricity remain a state-regulated monopoly, with

80. *See* Christiansen & Macey, *supra* note 29, at 1367. The relevant authority of FERC under the FPA was supplemented by the Energy Policy Act of 2005 (EPAct 2005). *See* Energy Policy Act of 2005, Pub. L. No. 109-58, § 1211, 119 Stat. 594, 941-46 (codified as amended at 16 U.S.C. § 824o); *see also infra* Part III.

81. 16 U.S.C. § 824 (establishing federal regulatory authority over interstate transmission and wholesale electricity sales in interstate commerce); EPAct 2005 § 1211, 119 Stat. at 941-46 (authorizing FERC to issue reliability standards in some circumstances).

82. The federal government regulates the safety of nuclear power plants and licenses hydroelectric dams, but states can still block these projects by refusing ratepayer funding.

83. James W. Coleman & Alexandra B. Klass, *Energy and Eminent Domain*, 104 MINN. L. REV. 659, 696-97, 700 (2019).

84. *See* David B. Spence, *Can Law Manage Competitive Energy Markets?*, 93 CORNELL L. REV. 765, 769-72 (2008) (describing the traditional regulation of utilities).

85. *See* Boyd & Carlson, *supra* note 24, at 837.

86. *See* Spence, *supra* note 84, at 772-74; Boyd & Carlson, *supra* note 24, at 837-39 (describing the regulatory models in which independent generators operate).

87. *REP—Retail Electric Providers Certification and Reporting*, PUB. UTIL. COMM'N TEX., https://perma.cc/UK2Z-X43F (archived Mar. 26, 2022).

regulators determining which projects utilities can build and the rates to be charged for use of the wires.[88]

States affect the carbon intensity and reliability of the electric grid in several ways. In states that have restructured, competition has increased the amount of renewable generation on the grid because wind and solar (and hydroelectric) generation are now often cheaper than most fossil-fired resources.[89] Across restructured and non-restructured states, many PUCs and PSCs operate under legislative directives to increase renewable generation.[90] Other states have blocked utility proposals to build this generation.[91] Furthermore, through siting decisions, states have at times enabled or, in many cases, blocked the construction of transmission lines required for renewable energy integration.[92] And states have approved massive utility build-out of fossil-fired power plants, citing reliability concerns.[93]

Many states rely not only on IOUs but also on rural electric cooperatives and publicly owned municipal utilities to supply power to a portion of consumers.[94] Rural electric cooperatives, which are nonprofit, member-owned organizations, are prevalent in areas of the country that IOUs chose not to serve in the early twentieth century because their low density creates higher

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88. *See Transmission/Distribution Service Providers*, ELEC. RELIABILITY COUNCIL TEX., https://perma.cc/NVW8-BQAS (archived Mar. 26, 2022) (explaining that transmission and distribution service providers continue to be regulated by Texas's PUC).

89. *See* U.S. ENERGY INFO. ADMIN., LEVELIZED COSTS OF NEW GENERATION RESOURCES IN THE *ANNUAL ENERGY OUTLOOK 2021*, at 4 (2021).

90. *See* GLEN ANDERSON, KRISTY HARTMAN, DANIEL SHEA & LAURA SHIELDS, NAT'L CONF. OF STATE LEGISLATURES, STATE RENEWABLE PORTFOLIO STANDARDS AND GOALS 7-9 (2021), https://perma.cc/977N-WNAS.

91. *See infra* Part III.B.

92. JULIE COHN & OLIVERA JANKOVSKA, CTR. FOR ENERGY STUD. AT THE BAKER INST. FOR PUB. POL'Y, RICE UNIV., TEXAS CREZ LINES: HOW STAKEHOLDERS SHAPE MAJOR ENERGY INFRASTRUCTURE PROJECTS 3-4 (2020); LIZA REED, NISKANEN CTR., TRANSMISSION STALLED: SITING CHALLENGES FOR INTERREGIONAL TRANSMISSION 4-5 (2021) (discussing state siting hurdles for transmission).

93. *See, e.g.*, *Building Capacity for a Clean Energy Future*, MCLEAN ENERGY, https://perma.cc/Z54C-MKM7 (archived Mar. 26, 2022) (describing California's resource-adequacy requirements and noting that "[t]raditionally, reserve capacity requirements have been met by gas plants").

94. *See* Alexandra B. Klass & Gabriel Chan, *Cooperative Clean Energy*, 100 N.C. L. REV. 1, 4, 10-30 (2021) (discussing the history of rural electric cooperatives and the customers they currently serve); Alexandra B. Klass & Rebecca Wilton, *Local Power*, 75 VAND. L. REV. 93, 100-01, 112-14, 123-25 (2022) (describing role of municipal utilities in providing electricity in the United States); Shelley Welton, *Public Energy*, 92 N.Y.U. L. REV. 267, 290 (2017); *Investor-Owned Utilities Served 72% of U.S. Electricity Customers in 2017*, U.S. ENERGY INFO. ADMIN., https://perma.cc/MNK7-AWQY ("Co-ops are located in 47 states but are most prevalent in the Midwest and Southeast.").

interconnection costs.[95] Today, cooperatives and municipal utilities collectively continue to serve over 27% of the U.S. population,[96] and cooperatives own and manage approximately 40% of electricity distribution lines.[97] Because cooperatives and municipalities are often exempt from state and federal regulation, we do not focus on them here.[98] Nevertheless, one could conceptualize their continued prevalence and relative insulation from regulation as another form of "siloization" in energy law—one that requires a different set of strategies for transitioning to a clean, reliable system.[99]

Federal and regional authorities also make decisions that affect the carbon intensity and reliability of the electric grid. Two years after the electric-grid failure that led to a large 2003 Northeast blackout, Congress required FERC to certify a national electric reliability organization (ERO) to govern electric reliability and directed FERC to oversee this organization.[100] Until 2005, the United States had relied wholly on a private organization with no enforcement authority—the North American Electric Reliability Council, now called the North American Electric Reliability Corporation (NERC)—to ensure the reliability of the nation's grid.[101] FERC approved NERC as the nation's ERO in 2006.[102] Today, NERC sets national and regional reliability standards for the electric grid that are subject to FERC oversight and approval.[103] Many of these

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95. Klass & Chan, *supra* note 94, at 8, 11-14.

96. PUB. POWER ASS'N, 2021 STATISTICAL REPORT 10 (2021), https://perma.cc/YWT2-V3L4 (archived Mar. 26, 2022) (reporting that cooperatives cover 13.2% of customers and publicly owned utilities cover 14.5%).

97. Klass & Chan, *supra* note 94, at 6.

98. *Id.* at 8.

99. For analysis focusing on cooperatives and municipal utilities, see generally Gabriel Pacyniak, *Greening the Old New Deal: Strengthening Rural Electric Cooperative Supports and Oversight to Combat Climate Change*, 85 MO. L. REV. 409 (2020) (considering ways to support a clean-energy transition in electric cooperatives); Klass & Chan, *supra* note 94 (discussing how cooperative principles might empower cooperatives to transition to clean energy); Klass & Wilton, *supra* note 94 (considering how localities' proprietary control over energy can act as an antidote to preemption challenges); Welton, *supra* note 94 (arguing that the challenges posed by climate change make public control over the electricity grid more appealing); and HEATHER PAYNE, JONAS MONAST, HANNAH WISEMAN & NICOLAS EASON, CTR. FOR CLIMATE, ENERGY, ENV'T & ECON., UNIV. OF N.C., TRANSITIONING TO A LOWER-CARBON ENERGY FUTURE: CHALLENGES AND OPPORTUNITIES FOR MUNICIPAL UTILITIES AND ELECTRIC COOPERATIVES (2019) (setting forth three case studies considering how municipalities and electric cooperatives are confronting the energy transition).

100. EPAct 2005, Pub. L. No. 109-58, § 1211, 119 Stat. 594, 941-46 (codified at 16 U.S.C. § 824o).

101. *See* N. Am. Elec. Reliability Corp., 116 FERC ¶ 61,062, at 7-8 (July 20, 2006).

102. *Id.* at 4.

103. *About NERC*, *supra* note 26; FERC, STRATEGIC PLAN FY 2018-2022, at 13 (2018).

standards are drafted and ultimately implemented by regional subunits of NERC called "regional entities."[104]

Reliability standards centrally affect the carbon intensity of the grid in addition to reliability. For example, one key reliability standard for "resource adequacy" requires all utilities within the geographic footprint of a regional entity to plan for adequate generation capacity: building up electricity-generation infrastructure and other resources (such as demand reductions) to ensure that there will be enough electricity to avoid blackouts.[105] As introduced in Part I.A above, utilities within regional entities are supposed to operate at a resource adequacy level that only allows one blackout every ten years.[106] As discussed below, this standard can affect—and might even determine—the type and amount of generation that utilities build or procure from other sources.

NERC's regional entities often work closely with and in some cases have territories that are identical to the territories of RTOs and independent system operators (ISOs).[107] RTOs are nonprofit entities under FERC oversight that manage and operate the electric transmission system, run regional energy markets, and plan and finance transmission within their regional footprint.[108] These organizations serve about two-thirds of the country as measured by population, but are notably absent in the Pacific Northwest and the South.[109]

In areas of the country without RTOs, private organizations or electric utilities themselves serve as "balancing authorities" responsible for ensuring adequate electricity supplies and grid reliability for customers within their jurisdictions pursuant to FERC, NERC, and state regulatory commission oversight.[110] Outside of RTOs, balancing authorities typically obtain capacity, energy, and ancillary services (such as the last-minute balancing of electricity supply and demand and the managing of other conditions that could cause

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104. *See infra* Part V.

105. See *infra* Part III. NERC does not, however, establish the specific amount of capacity that must be in reserve. *See infra* note 332 and accompanying text.

106. *See, e.g.*, ReliabilityFirst, *supra* note 44, at 1 (establishing "common criteria, based on 'one day in ten year' loss of load expectation principles, for . . . resource adequacy for load" in one NERC region (capitalization altered)).

107. We refer to RTOs and ISOs simply as RTOs in this paper because they are virtually identical.

108. Coleman & Klass, *supra* note 83, at 695-96; *see also infra* Parts III.A (markets); *infra* Part IV.B.1 (transmission); *infra* Part VI.A (RTO structure).

109. Coleman & Klass, *supra* note 83, at 695-96; *see The IRC: Shaping Our Energy Future*, ISO/RTO COUNCIL, https://perma.cc/24YH-RYVS (archived Mar. 27, 2022).

110. *See* P. DENHOLM & J. COCHRAN, NAT'L RENEWABLE ENERGY LAB'Y, BALANCING AREA COORDINATION: EFFICIENTLY INTEGRATING RENEWABLE ENERGY INTO THE GRID 5 (2015); Sarah Hoff, *U.S. Electric System Is Made Up of Interconnections and Balancing Authorities*, U.S. ENERGY INFO. ADMIN. (July 20, 2016), https://perma.cc/3C7P-KD3Y.

blackouts) through contracts with utilities or with other balancing authorities. However, some balancing authorities operate limited markets for a few of these services.[111] As discussed in more detail in Part IV below, some balancing authorities have begun to coordinate planning for new cross-state transmission lines needed to carry renewable energy to load centers. Such enhanced interconnections reduce utilities' need to maintain their own generation reserves for reliability, since utilities can call upon a more diverse pool of generation. Some balancing authorities outside of RTOs have also developed creative mechanisms for coordinating the services and rates charged for electricity crossing transmission lines operated by numerous utilities, thus easing the transport of renewable energy to customers.[112] Other non-RTO areas remain heavily balkanized, however, thus making it more difficult for renewable generators to transport energy. Despite these impediments, areas without RTOs, such as the Western Electricity Coordinating Council region, have some of the highest percentages of renewable energy generation.[113]

A final fragmentation that underscores the divides in clean energy, reliability, jurisdiction, and public–private governance is time. State utility commissions, RTOs, FERC, and NERC all have considerable interest in the day-to-day project of keeping the lights on, which involves rerouting electricity in congested wires, dispatching dirty "peaker" plants to meet unusually high demand, and making other rapid decisions needed to maintain voltage in the grid.[114] Yet this short-term imperative also demands long-term planning to site, finance, and construct new energy generation or generation alternatives, as well as the transmission and distribution infrastructure necessary to support them. To further complicate matters, a rapid transition to clean energy on the scale necessary to abate potentially cataclysmic climate impacts will likely require the abandonment of many otherwise economically viable generation resources.[115] These time-scale mismatches create a further compelling reason to break down energy governance silos where possible, to facilitate the integration of short-term and long-term grid management.

111. DENHOLM & COCHRAN, *supra* note 110, at 3.

112. *See id.* at 2-3 (explaining reserve-sharing and coordinated-scheduling practices among some balancing authorities).

113. U.S. DEP'T OF ENERGY, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, 2018 RENEWABLE ENERGY GRID INTEGRATION HANDBOOK 4 (2018).

114. *See, e.g.*, *Ancillary Services Market*, PJM, https://perma.cc/R4RP-E3UY (archived Mar. 27, 2022) (describing some of these functions).

115. *See* Emily Hammond & Jim Rossi, *Stranded Costs and Grid Decarbonization*, 82 BROOK. L. REV. 645, 646-47 (2017).

Figure 1

Siloed Actors in Energy Policy

	State	Regional	Federal
Public ↑	Public Utility Commissions State Energy Offices		Federal Energy Regulatory Commission Department of Energy
		Regional Transmission Organizations	North American Electric Reliability Corporation (NERC)
		NERC Regional Entities Balancing Authorities Transmission-Planning Regions	
↓ Private	Investor-Owned Public Utilities		
	Retail Electric Providers	Merchant Generators & Transmission Providers	

II. The Promise and Peril of Silos

We do not propose a wholesale modification of energy policy silos because within a given policy area—in our case, regulating the electric grid to be both clean and reliable—the siloing of regulation can present both benefits and obstacles. "Siloing," as we use it here, involves the division of authority over a policy area among different federal agencies, different levels of government, or private and public agencies. In some cases, the division of authority involves different agencies addressing the same policy issue. Take the example of the direct regulation of the reliability of the grid. As discussed in more detail in Part V, both NERC and FERC have the task of developing the substance of reliability standards and enforcing these standards, with FERC reviewing all proposed standards and every enforcement action taken by NERC or a NERC agent.

In other cases, the siloing of a policy issue assigns different aspects of a policy area to different entities. For example, under the FPA, states regulate the construction and operation of power plants (aside from nuclear plants), the sale of retail electricity, and the siting of electric transmission lines, and FERC regulates wholesale power sales and the operation of electric transmission lines.[116] For both power generation and transmission lines, the "sub-areas" assigned to states and the federal government influence each other substantially. Decisions about *retail* power inevitably affect wholesale power provision, and vice versa—decisions about the wholesale markets also affect retail power.[117] Thus, if a state requires its retailers to purchase a certain kind of generation—say, renewable energy generation—and FERC-regulated wholesale markets impede the participation of that generation in markets, the result is interference with state policy, as we discuss in Part III below. Additionally, as discussed in Part IV, whether or not a transmission line can be *sited* and built clearly affects the operation of that line, giving states and utilities considerable influence over federal transmission policy.

In the Subparts that follow, we contend that regulatory silos provide a critical unifying foundation to our analysis for four reasons. First, and most importantly, they substantially affect regulatory outcomes. Congress's selection of a combination of agencies (sometimes at different jurisdictional levels, and sometimes involving both public and private entities) to implement a particular command has a powerful effect on the substantive focus of the resulting regulations. Second, siloing influences the accountability of agencies to various stakeholders. Third, siloing shapes the efficiency of regulatory processes and thus the speed at which regulatory action occurs. Finally, siloing impacts the political economy of new laws and regulations—in our case, a particularly important consideration in light of the short window of time for averting potentially cataclysmic climate impacts.

A. Substantive Outcomes

To highlight the importance of siloing to the content of regulation, take the case of the enormous task of ensuring the reliability of the electric grid. Reliability requires the provision of a constant supply of electricity regardless of the level of demand, and it increasingly also demands consideration of

116. 16 U.S.C. § 824(b).

117. For a discussion of the interrelationship of the wholesale and retail systems, see *FERC v. Electric Power Supply Ass'n*, 136 S. Ct. 760, 776-77 (2016).

resilience, which involves bringing the grid back online quickly after disruptions.[118] If the EPA and Federal Emergency Management Agency (FEMA) were primarily tasked with this order, reliability standards would likely look quite different than the actual standards produced by FERC and NERC. Those standards might place more emphasis on reliability resources with lower air pollution emissions and on generation resources that would be more resistant to flooding and extreme weather, for example. And in some cases, the EPA and FEMA would likely clash, with FEMA potentially arguing for more highly durable yet environmentally impactful infrastructure and the EPA taking an opposite stance. The result could be inaction, or compromise policies with relatively weak assurances of reliability. Alternatively, the result could be a *better* one. Theories of the separation of powers among agencies posit that friction among agencies can improve decisionmaking, as agencies with "differing missions and objectives" have to "convince each other of why their view is right."[119] Overlap can thus at times promote innovation by encouraging deliberation and enhancing expertise.[120]

Overlap can also induce cooperation, causing siloed agencies to take joint action on certain issues. Such cooperation occurred, for example, when the EPA and National Highway Traffic Safety Administration jointly wrote fuel-efficiency standards for vehicles to address greenhouse gases.[121] Joint action by separate agencies can ensure that rules are more technically accurate and best address the substantive policy issue at hand. Indeed, NERC and FERC sometimes jointly act on reliability issues, as they did after the winter storm of 2021 revealed the inadequacies of weatherization standards.[122] On the flip side, a toxic combination of agencies—all with some responsibility in a particular policy area—can result in conflict, gridlock, and subpar policies. To take a recent example, the Trump Administration's Department of Energy (DOE) blocked release of a National Renewable Energy Laboratory study of the importance of building out a national transmission grid, allegedly because it conflicted with the DOE's agenda to promote fossil fuels.[123]

Assigning several agencies to one policy issue can also address lapses by individual agencies—refusals to act, or inadequate action, for example. As Sarah

118. *See supra* note 45.

119. Neal Kumar Katyal, *Internal Separation of Powers: Checking Today's Most Dangerous Branch from Within*, 115 YALE L.J. 2314, 2317 (2006).

120. *Id.* at 2325; Jody Freeman & Jim Rossi, *Agency Coordination in Shared Regulatory Space*, 125 HARV. L. REV. 1131, 1135 (2012).

121. Daphna Ranan, *Pooling Powers*, 115 COLUM. L. REV. 211, 227-28 (2015).

122. *See infra* Part V.

123. *See* Peter Behr, *DOE Study Details "Supergrid" for High Levels of Renewables*, E&E NEWS: ENERGYWIRE (Oct. 25, 2021, 7:11 AM EST), https://perma.cc/2MHW-YJBH.

Light notes, splitting up policy authority among multiple agencies can have the effect of creating *Harry Potter*–esque horcruxes: Even if one agency refuses to regulate, a policy goal can remain alive when another agency with regulatory responsibility takes up the task.[124]

There is also merit in the cross-pollination of policy ideas among state and regional silos. For example, in the area of electric-grid-reliability regulation, utilities within some states and regions have weatherized their assets either voluntarily or in response to state mandates—avoiding some of the problems experienced during Winter Storm Uri.[125] These approaches help color the debate regarding the advisability of nationally uniform weatherization standards under conditions of climate change, which is inducing more rapid swings in temperature and more severe storms across regions.[126] The interplay of federal, regional, and state authorities may well improve policy outcomes, especially in the uncharted terrain of rapid and massive electrification and grid decarbonization.[127]

Despite the substantive benefits of siloing, assigning different entities responsibility over different aspects of a policy issue, or assigning the same issue to multiple entities, can also result in a regulatory anticommons. A regulatory anticommons arises when too many entities have at least partial say over the property rights or regulatory permits necessary to see a project to fruition.[128] The result is an inefficiently low level of activity,[129] as illustrated by the transmission line development conundrum we discuss in Part IV below. Alternatively, overlapping responsibilities can result in free-rider problems within the regulatory common space: individual entities may wait for others to act first, thus externalizing the costs of action but gaining some of the benefits

124. Sarah E. Light, *Regulatory Horcruxes*, 67 DUKE L.J. 1647, 1655-72 (2018); *see also* Katyal, *supra* note 119, at 2324 ("Redundancy has practical benefits as well because reliance on just one agency is risky. . . . 'When one bulb blows, everything goes.'" (quoting Martin Landau, *Redundancy, Rationality, and the Problem of Duplication and Overlap*, 29 PUB. ADMIN. REV. 346, 354 (1969))).

125. *See supra* note 70; Hubbuch, *supra* note 71.

126. U.S. NAT'L CLIMATE ASSESSMENT, CLIMATE CHANGE IMPACTS IN THE UNITED STATES 14 (2014), https://perma.cc/APK2-YNJD. *See generally* DONALD J. WUEBBLES ET AL., U.S. GLOB. CHANGE RSCH. PROGRAM, CLIMATE SCIENCE SPECIAL REPORT 185-222 (2017), https://perma.cc/DGH7-G728 (charting the major consequences of climate change).

127. Sarah E. Light, *Advisory Nonpreemption*, 95 WASH. U. L. REV. 327, 330-31 (2017) (exploring the benefits of maintaining fluid jurisdictional authority in nascent regulatory areas).

128. Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621, 624 (1998).

129. *Id.* at 637-40, 684-87 (illustrating anticommons in Moscow storefronts, fractional property rights owned by Native Americans, and the division of real estate in Japan, among other examples).

none may be motivated to act.[130] Take again the example of the direct regulation of grid reliability, discussed in detail in Part V. Agents of NERC, called regional entities, are largely responsible for proposing reliability standards and implementing them—with NERC and FERC reviewing their actions. As explored in Part V, FERC and NERC have been slow to mandate national weatherization requirements, incorrectly assuming that regions were appropriately tailoring standards to evolving regional needs. Extensive weatherization is not necessarily the most efficient approach to addressing growing weather extremes, given that it further entrenches fossil fuels and potentially uses up funds better spent on microgrids and other, cleaner reliability measures. But given more common weather extremes—and the fact that weatherization can prevent outages at both renewable and fossil fuel–fired plants—weatherization should have at least been more seriously considered at an earlier date, as discussed in more detail in Part V. More coordination among silos is essential to address these types of anticommons and regulatory-commons problems.

B. Agency Accountability

The siloing of regulatory responsibility for a clean, reliable grid does not only affect the content of energy regulations: It also has profound effects on the extent to which regulatory processes account for stakeholder concerns. As we explore below, these effects are again sometimes beneficial and sometimes problematic.

In the context of siloing among federal agencies, certain agencies may be more adept than others at soliciting input from diverse stakeholders.[131] For example, in the reliability context, FERC has been working hard to expand the quality of its stakeholder outreach in ways that could potentially offset the relatively closed, industry-led reliability process within NERC.[132] NERC, too, is working to expand stakeholder engagement, but is largely focused on

130. William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1, 6, 9 (2003) (noting the problems of partial jurisdiction in the context of aquaculture); *id.* at 28 (noting that an individual regulator within a regulatory commons "cannot stop others from free riding on the regulator's investment in investigating the social ill and designing a regulatory response").

131. *Cf.* Katyal, *supra* note 119, at 2325 (observing that "to the extent that particular agencies are captured by interest groups, overlapping jurisdiction can mitigate the harm").

132. In particular, Congress has instructed FERC to create a new Office of Public Participation, and the agency has embraced this task with a focus on including long-marginalized voices in its proceedings. *See* FERC, THE OFFICE OF PUBLIC PARTICIPATION 4, 10 (2021), https://perma.cc/X8QP-V9VW.

expanding industry stakeholder participation on NERC committees.[133] In an ideal scenario, different federal agencies might even compete to offer a superior participatory process. Indeed, there is some evidence of this occurring among regional actors in the reliability space, with the Southwest Power Pool (SPP) and California ISO (CAISO) competing to attract utilities to participate in specially designed markets offered by these RTOs. These RTOs appear to be competing specifically on accountability grounds: They have each emphasized the extent and type of stakeholder input in governance that will be available to utilities that join their markets.[134]

Siloing policies for clean and reliable energy between states and the federal government poses potential accountability benefits and challenges, too. The federalism literature tends to identify states as more accountable to individual residents than to the federal government, as they are "closer to the people."[135] Compelling accounts have challenged this assumption, yet it remains relatively fixed within the literature.[136] Our discussion of transmission policy in Part V below embodies these dueling accounts: On the one hand, states' authority over transmission line siting allows them to respond to residents' aesthetic and environmental concerns.[137] On the other hand, this accountability may

133. *See, e.g.*, *Stakeholder-Engagement-Team*, N. AM. ELEC. RELIABILITY CORP., https://perma.cc/9YFQ-GJJ3 (archived Mar. 28, 2022) (noting that a stakeholder-engagement team formed with the goal of "optimizing the value of industry stakeholder participation," among other values, which resulted in a "comprehensive review" of how existing technical committees could be restructured).

134. CAL. ISO, EIM GOVERNANCE REVIEW COMMITTEE 1 (2020), https://perma.cc/Q4EF-59G7 (noting that the energy imbalance market (EIM) governing body and CAISO's board asked an advisory committee "to lead a public stakeholder process on EIM governance that will culminate in a proposal" for the board's consideration); *Western Energy Imbalance Service Market*, SW. POWER POOL, https://perma.cc/K9M3-YHB4 (archived Mar. 28, 2022) (asserting that "[f]or more than 75 years, SPP has distinguished itself as a stakeholder-driven organization that achieves its business objectives through consensus-building," and describing the ways in which stakeholders can participate in the development of the energy imbalance market).

135. For a summary of the literature and cases asserting the common assumption that states are "closer to the people," see Miriam Seifter, *Further from the People? The Puzzle of State Administration*, 93 N.Y.U. L. REV. 107, 146 (2018).

136. *See id.* (noting overall agreement on the assumption in scholarship); Dave Owen, *Regional Federal Administration*, 63 UCLA L. REV. 58, 63-64 (2016) (observing that the federal government, through regional subunits, can and does act at a very local level); Hannah J. Wiseman & Dave Owen, *Federal Laboratories of Democracy*, 52 U.C. DAVIS L. REV. 1119, 1123-24 (2018) (exploring federal agencies' highly local policy experiments). *But cf., e.g.*, CHRISTOPHER L. EISGRUBER, CONSTITUTIONAL SELF-GOVERNMENT 191-94 (2001) (disagreeing with the "closer to the people" assumption).

137. *See, e.g.*, Alexandra B. Klass, *Takings and Transmission*, 91 N.C. L. REV. 1079, 1107-08 (2013) (noting that state courts have denied eminent domain authority for proposed transmission lines that would run through the state but would only benefit out-of-state customers); *id.* at 1084 (noting the "environmental and aesthetic objections that

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represent a response to a relatively small group of voters—those who can see the transmission lines from their property, for example—while ignoring the growing demand of other voters for clean energy, which would require thousands of miles of new transmission lines.[138] Shifting more authority to the federal level in the area of transmission siting might better respond to these broader voices. Indeed, as we discuss in Part V, there could be federal transmission-siting processes with meaningful state input. The power of state transmission-siting silos will likely need to diminish substantially, however, for large-scale renewable energy to expand to the extent necessary to address climate change.

Conversely, as we explore in Parts III and V below, jurisdictional and public–private siloing within energy market structure has led to a somewhat opposite dynamic, in which federal and regional entities sometimes overshadow state preferences for renewable energy policy. The regional processes resulting in these outcomes diverge considerably in terms of stakeholder and state participation, and the literature has demonstrated that these different voting schemes affect regulatory outcomes.[139]

When substantial regulatory authority in a policy area resides within private institutions, there is also a threat that the powerful voice of a limited set of industry stakeholders will be further amplified due to siloing. This potentially occurs within RTOs and NERC, as we explore in more detail in

form the basis of regular opposition" to transmission lines). For a discussion of the importance of maintaining a balance between state and federal control in the land-use context, see, for example, Erin Ryan, *Federalism and the Tug of War Within: Seeking Checks and Balance in the Interjurisdictional Gray Area*, 66 MD. L. REV. 503, 509-10 (2007) (arguing that "some regulatory targets are better understood within a separate, interjurisdictional sphere that legitimately implicates both local and national responsibility").

138. The extent to which voters prefer renewable energy depends on how one poses the survey question. Indeed, when residents were asked whether they would support renewable energy if it were located in their backyard, the positive responses declined substantially. *See, e.g.*, SAMANTHA GROSS, RENEWABLES, LAND USE, AND LOCAL OPPOSITION IN THE UNITED STATES 9 (2020), https://perma.cc/NCC4-P9GU ("Nationally, 82% of Americans would support tax rebates for energy-efficient vehicles or solar panels. However, public perception can turn negative, even among those generally in favor of renewable energy, when people believe that a renewable development will cause them economic or health problems or when they dislike the aesthetics of the project."). Still, it is fair to say that a large number of U.S. voters indicate support for renewable energy. *See, e.g.*, ALEC TYSON & BRIAN KENNEDY, PEW RSCH. CTR., TWO-THIRDS OF AMERICANS THINK GOVERNMENT SHOULD DO MORE ON CLIMATE 5 (2020), https://perma.cc/7CH5-4EH2 ("To shift consumption patterns toward renewables, a majority of the public (58%) says government regulations will be necessary to encourage businesses and individuals to rely more on renewable energy . . . .").

139. Seth Blumsack & Kyungjin Yoo, *RTO Governance Structures Can Affect Capacity Market Outcomes*, 53 PROC. HAW. INT'L CONF. ON SYS. SCIS. 3087, 3087-88 (2020).

Parts V and VI. It is remarkable to think that until 2005, the United States relied solely on a private organization of utilities (that is, NERC) to prevent a cascading grid blackout.[140] And it is equally remarkable that two-thirds of the U.S. population currently lives in areas where private regional entities (that is, RTOs) are responsible for how much and what type of electricity flow through the grid at any given time.[141] FERC reviews both NERC's and RTOs' decisions, thus infusing an element of "publicness" into grid governance, but its authority to shape or contradict these decisions is in some cases surprisingly limited.[142] Again, the key point is that silos *matter* when it comes to participatory possibilities within government.

C. Efficiency

In addition to affecting both agency substance and agency accountability, silos can also either enhance or impede the efficiency of governance. With effective coordination, different government agencies with partial jurisdiction over a given policy area can divide and conquer, efficiently splitting up tasks, leveraging the expertise of individual agencies, and creating better end products more quickly than if one agency took on the same task. This may be the case, for example, with environmental impact statements under the National Environmental Policy Act, where an agency lead collaborates with other agencies with related expertise to complete the necessary evaluations.[143] On the other hand, multiple government actors or private agencies with policy-type authority acting within the same policy space can create duplication and delay.[144]

D. Political Economy

A final undercurrent running through this Part's evaluation of silos is the consideration of political economy—that is, the ways in which the distribution

140. DAVID NEVIUS, N. AM. ELEC. RELIABILITY CORP., THE HISTORY OF THE NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION 3-5 (2020), https://perma.cc/XR7Z-ZXPG (describing how, in the wake of several blackouts in the 1960s, industry executives lobbied key lawmakers to maintain private control over reliability); *id.* at 85 (describing the passage of EPAct 2005, which was the first piece of legislation to require formal government oversight of NERC).

141. *See The IRC: Shaping Our Energy Future*, *supra* note 109.

142. Shelley Welton, *Rethinking Grid Governance for the Climate Change Era*, 109 CALIF. L. REV. 209, 221-22, 222 n.66 (2021).

143. *See, e.g.*, 1 C.F.R. § 601.5 (2022) (describing agency-lead obligations).

144. *See, e.g.*, Hannah J. Wiseman, *Regional Cooperative Federalism and the U.S. Electric Grid*, 90 GEO. WASH. L. REV. 147, 203-04 (2022) (discussing the potential for duplication and overlap); Welton, *supra* note 142, at 241-46 (discussing RTO "heel dragging" in response to FERC orders to amend market rules).

of legal authority among relevant actors influences politics and power dynamics within a field.[145] Consideration of how silos inform political power is particularly important when it comes to reliable decarbonization, given the transformative nature of the project for the grid.

Here, again, there is some value to jurisdictional silos. States have been at the forefront of U.S. climate policy, while the federal government has been inconsistent and largely ineffectual, with a few notable exceptions.[146] Thus, aggrandizing federal power in this sphere may not lead to a "rationalization" of energy policy, due to the complex politics of climate action at the federal level.[147] In many cases, states have been able to overcome the myriad political hurdles to action on climate change much better than regional or national entities have.[148] But while states have paved the way in some respects, some broad-based initiatives are clearly better situated at the federal level, as discussed in Part IV below with respect to the parochialism plaguing transmission siting.

Similarly, the power dynamics within private silos—and their relationship to public-oversight agencies—shape their potential as agents of reform. In the energy sphere, some utilities jealously guard their transmission territories, opposing any efforts for needed interstate transmission lines that would enhance access to renewable generation.[149] Many also oppose new-entrant technologies, fearing they will dangerously cut their customer base.[150] At the

145. *See* Jedediah Britton-Purdy, David Singh Grewal, Amy Kapczynski & K. Sabeel Rahman, *Building a Law-and-Political-Economy Framework: Beyond the Twentieth-Century Synthesis*, 129 YALE L.J. 1784, 1791-92 (2020).

146. *See* Shannon Osaka, *Is the U.S. Uniquely Bad at Tackling Climate Change?*, YALE CLIMATE CONNECTIONS (Jan. 12, 2022), https://perma.cc/T8WA-9CZK (discussing the disappointments and challenges of federal climate action); Adelman & Engel, *supra* note 29, at 837-39 (noting the distinct benefits of state and local climate action); Garrick B. Pursley & Hannah J. Wiseman, *Local Energy*, 60 EMORY L.J. 877, 879-82 (2010) (describing the important role of local governments in the clean-energy transition). *But see, e.g.*, MOLLY F. SHERLOCK, CONG. RSCH. SERV., R43453, THE RENEWABLE ELECTRICITY PRODUCTION TAX CREDIT IN BRIEF 1 (rev. 2020), https://perma.cc/D4DE-4JMN (noting the importance of the federal production tax credit to wind-energy development).

147. On hurdles, see Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1159 (2009) (defining a "wicked problem" as one "that defies resolution because of the enormous interdependencies, uncertainties, circularities, and conflicting stakeholders implicated by any effort to develop a solution" and including climate change in that category (quoting Horst W.J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 POL'Y SCIS. 155, 160 (1973))).

148. On state action, see *State Climate Policy Maps*, CTR. FOR CLIMATE & ENERGY SOLS., https://perma.cc/T6F4-VKZR (archived Mar. 29, 2022).

149. Ari Peskoe, *Is the Utility Transmission Syndicate Forever?*, 42 ENERGY L.J. 1, 58 (2021).

150. *See, e.g.*, Mary Ellen Klas, *Insider Reveals Deceptive Strategy Behind Florida's Solar Amendment*, MIA. HERALD (updated Oct. 19, 2016, 6:20 PM), https://perma.cc/5V88-

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same time, some utilities have been leaders on the renewable energy and reliability fronts—meaningfully changing their practices in response to consumer demand or state policies.[151] Thus, a nuanced approach to public–private silos is also advisable. Attempts to force institutions such as NERC and RTOs to be wholly public would face major political hurdles and might eliminate some of the nimbleness that often accompanies privatized, less bureaucratic forms of decisionmaking. But respect for institutional expertise should not foreclose inquiry into the ways in which their current allocation of authority might impede a rapid, reliable clean-energy transition.

E. An Overview of Our Reforms to Silos in Energy Governance

In this Part, we have sketched the ways in which silos as a governance concept offer both opportunities and challenges. Our goal in the Parts that follow is to reimagine the siloed regulatory system that has evolved over the past century in energy governance to make its multiplicity work for, rather than against, a transition to a clean and reliable power grid. Because we see political and practical value in preserving elements of these silos, our reform proposals are nuanced and issue specific. In the Parts below, we discuss how best to recalibrate silos and accelerate a reliable transition to clean energy across four key issue areas: electricity market structure (Part III), transmission (Part IV), reliability regulation (Part V), and regional governance (Part VI). To assist readers in tracking and synthesizing these proposals, we provide here an overview chart of key reforms within each sector.

ZXJA (describing utility support for an initiative that would have constitutionally enshrined Florida's judicial ban on third-party-financed rooftop solar).

151. Scott Carpenter, *U.S. Utility Companies Rush to Declare Net-Zero Targets*, FORBES (Oct. 15, 2020, 6:00 AM EDT), https://perma.cc/25J5-GCSU; Klass & Chan, *supra* note 94, at 38-40 (discussing investor-owned utilities' clean-energy commitments and the associated financial benefits); Harman K. Trabish, *As 100% Renewables Goals Proliferate, What Role for Utilities?*, UTIL. DIVE (Apr. 2, 2019), https://perma.cc/XAV6-M7T2 (discussing large and small electric retail customer demand for renewable energy and response of utilities).

Table 1
Policy and Governance Reforms for a Clean, Reliable Grid

Energy Policy Area	Broad Reform	Specific Reforms
Market structure	Leverage competitive markets	Competitively solicit "reliability must run" resources—those critical to preventing blackouts.
		Limit the state-regulated generation self-scheduling and "reliability must run" market avoidance.
		Reduce constraints on generators' bids into markets (for example, MOPR).
	Properly value reliability	Recognize the value of short-term energy resources, such as batteries.
		Require contracting parties to honor commitments (for example, promises to pay for reliability).
	Accommodate state and federal policies	Implement fixed-resource requirements; procure clean-energy resources, then run capacity auction or forward clean-energy capacity markets; run one auction for clean and reliable capacity and a second traditional capacity auction.
Transmission planning, siting, and financing	Create a national transmission-planning process	Empower FERC to initiate a top-down, national process or form a planning authority to lead RTOs in multiregional planning.
		Form interregional planning boards.
		Prohibit local exemptions from interregional planning.
	Enhance federal siting authority	Rely more on federal power-marketing administrations to build transmission; streamline the process.
		Provide DOE grants to federal power-marketing administrations to identify needed transmission projects.
		Congressional reforms (for example, give FERC or RTOs siting authority, constrain states' ability to delay and deny transmission lines).

Energy Policy Area	Broad Reform	Specific Reforms
Reliability regulation	Identify gaps and weak reliability standards	Focus on standards addressing extreme weather events and intermittent generation.
	Broaden reliability standards	Form a NERC reliability and clean-energy technical committee.
		Incorporate the reliability benefits of clean energy into standards.
	Enhance public input into reliability standards	Require at least two members of regional entity or NERC boards of directors/trustees to represent the public at large.
RTO governance	Enhance public voice in RTO decisionmaking	Increase transparency: Allow public representatives to attend all RTO meetings.
		Give states larger role in RTO internal governance and/or oversight.
		Issue a FERC Notice of Inquiry revisiting the adequacy of RTO independence and responsiveness.
		Congressional reforms: Override court decisions mandating FERC deference to RTO decisions; possibly reconsider voluntary nature of RTOs.

III. Market Structure

One of the most difficult challenges energy regulators face is ensuring that enough resources enter and remain in the market to meet demand—a challenge referred to within the field as "resource adequacy." This Part describes how siloed energy governance impedes a thoughtful, integrated approach to resource adequacy and suggests ways that the goals of clean and adequate resources can be co-realized through more calibrated market signals. We focus primarily on regions of the country with RTOs, including California, Texas, the Midwest, Mid-Atlantic, and Northeast. These regions have the most sophisticated energy markets, which even utilities outside of historic RTO regions now seem increasingly inclined to join.[152] It bears noting, however, that the lack of organized wholesale markets for energy in non-RTO areas—particularly those that have not joined RTO energy markets—creates perhaps even greater impediments to renewable energy development and reliability. The lack of a market makes it more difficult for utilities to acquire backup capacity and last-minute generation support, as well as renewable generation, from other sources.[153]

A. Resource Adequacy

Resource adequacy is the project of ensuring that there will be enough electricity generated to cover the amount of electricity demanded by customers. Ensuring adequate resources involves resource management over multiple time horizons—from second-to-second balancing of voltage vacillations to distinct long-term decisions about what energy supply is necessary to meet future projected demand.[154] In the analysis below, we discuss how current approaches to resource adequacy impede the transition to a clean, reliable grid. Here, too, resource adequacy is treated as its own silo. That, in turn, prevents regulators from harmonizing resource adequacy and climate goals. We focus on resource adequacy in RTOs because this policy area has shown both the most promise (and, perhaps, peril) with respect to achieving a cleaner, more reliable grid.[155]

In market-driven RTO regions, one central resource adequacy challenge is ensuring that resources necessary to meet future demand earn enough revenue to incentivize their continued participation in the bulk electric system. One

152. *See* W. ELEC. COORDINATING COUNCIL, TECHNICAL SESSION POWER MARKET EXPANSION IN THE WEST 1 (2021), https://perma.cc/AN89-B6AR (noting that entities in the western United States "continue to join" RTO EIMs).

153. *Cf. id.* at 14 (noting that participation by areas of the western United States in the Western EIM "appears to have contributed to enhanced grid reliability, decreased energy costs, and improved integration of renewable energy"). For additional discussion, see Part V.B below.

154. *See supra* note 40 and accompanying text; *Wholesale Electricity Markets*, PROTOGEN (Jan. 1, 2016), https://perma.cc/4SJU-BW4K (illustrating the varying time scales of energy markets).

155. Outside of RTOs, as well as in many traditionally regulated states within RTOs, resource adequacy is predominantly ensured through a state-mandated integrated resource planning (IRP) process, where state regulators work with their utilities to determine what resources should be built. *See* RACHEL WILSON & BRUCE BIEWALD, SYNAPSE ENERGY ECON., INC., BEST PRACTICES IN ELECTRIC UTILITY INTEGRATED RESOURCE PLANNING 3-6 (2013), https://perma.cc/JTJ2-JP73. Although state IRP practices differ considerably, with some states integrating the goals of clean and reliable energy more successfully than others, we set these issues aside because they do not involve the siloization of reliability from clean-energy goals—the central theme of our analysis.

way these resources earn money is through participating in energy markets, in which they sell electricity either one day ahead or in real time.[156] In these markets, grid operators receive bids from suppliers that are willing and able to sell electricity in a given time period.[157] Some customers also bid energy non-use—a promise to reduce demand and thus displace the need for generation—into these markets.[158] This is called "demand response."[159] RTOs determine how much energy is required to meet total demand on the system and clear—or dispatch—the resources needed at that moment.[160] In determining which resources to clear, RTOs start with the cheapest bid and move up in a process called merit-order dispatch.[161] All resources that clear receive the price bid by the highest-priced resource that clears the market.[162] This process centrally affects the carbon intensity of the grid because it dictates the type of generation infrastructure built and dispatched. If not designed properly, it can also support the construction of too much generation infrastructure—including fossil fuel–fired infrastructure.

Merit-order dispatch incentivizes generators to bid at their marginal costs.[163] Imagine it costs a generator $20 per megawatt-hour (MWh) to operate. If it bids more than $20, it risks losing out to a competitor and not clearing, even though it would be profitable for the generator to operate at that moment. And if it bids less than $20 per MWh, it risks being forced to sell electricity even when the generator's cost of producing that amount of energy is higher than the revenue it receives from the wholesale market. Merit-order

156. *See Electric Power Markets: National Overview*, FERC, https://perma.cc/8AUB-DR65 (last updated July 20, 2021).

157. *See* FERC, ENERGY PRIMER: A HANDBOOK FOR ENERGY MARKET BASICS 36, 39, 55-56 (2020), https://perma.cc/Y5MH-9GNZ.

158. *See* Demand Response Comp. in Organized Wholesale Energy Mkts., 134 FERC ¶ 61,187, at 2 n.2 (Mar. 15, 2011).

159. *Id.*; *see Demand Response*, U.S. DEP'T ENERGY OFF. ELEC., https://perma.cc/X9LQ-A65P (archived Mar. 29, 2022) ("Demand response provides an opportunity for consumers to play a significant role in the operation of the electric grid by reducing or shifting their electricity usage during peak periods in response to time-based rates or other forms of financial incentives.").

160. *See* DIV. OF ENERGY MKT. OVERSIGHT OFF. OF ENF'T, FERC, ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS 95 (2015), https://perma.cc/WN6R-3A5Q.

161. *See id.* at 95-96. For example, if four generators bid into a market and one bids $10 per megawatt-hour (MWh), another bids $20 per MWh, another bids $30 per MWh, and another bids $40 per MWh, then all four generators receive $40 when all four clear. When demand declines and only three generators are needed to meet demand, then the first three generators all receive $30 and the fourth does not clear and does not sell electricity during that time period. *See id.* at 95.

162. *See id.* at 95.

163. *See* Joshua C. Macey & Jackson Salovaara, *Rate Regulation Redux*, 168 U. PA. L. REV. 1181, 1186 (2020).

dispatch is thus excellent at disciplining generators to bid their true costs, but it presents an attendant resource-adequacy challenge: How does a grid operator ensure that occasionally needed but high-cost generators remain in the market, especially if they will only be dispatched a few times a year—likely during severe weather events such as winter storms or heat waves?[164]

At least three solutions are possible to solve this problem: energy-only markets, resource-adequacy requirements, and centralized capacity markets. The first approach, an energy-only market, has been adopted in Texas. This involves letting energy prices reach extremely high levels at times of peak demand, thus effectively privatizing the resource-adequacy decision by leaving it in the hands of potential generation developers.[165] While most generators will bid their marginal prices, "peaker plants," or generators that are only dispatched during peak demand, are able to submit extremely high bids that earn them a profit even if they operate only a few times a year.[166]

The second approach, used in California, is to create a resource adequacy requirement and mandate that all customer-serving utilities—often referred to as load-serving entities (LSEs)—procure sufficient reserves to meet projected demand.[167] The regulator requires that LSEs procure enough reserves to meet peak demand but gives LSEs discretion to procure those reserves for themselves.[168]

The third approach, used by the East Coast grid operators, is centralized capacity markets.[169] Capacity markets compensate generators for making

164. Bethel Afework, Jordan Hanania, Kailyn Stenhouse & Jason Donev, *Peaking Power*, ENERGY EDUC., https://perma.cc/D38U-8NAF (last updated Sept. 3, 2018); *Electric Generators' Roles Vary Due to Daily and Seasonal Variation in Demand*, U.S. ENERGY INFO. ADMIN. (June 8, 2011), https://perma.cc/AF84-25XG ("Peaking capacity runs a few times a year for short periods to help electricity systems meet peak demand.").

165. *See* Gavin Bade, *The Great Capacity Market Debate: Which Model Can Best Handle the Energy Transition?*, UTIL. DIVE (Apr. 18, 2017), https://perma.cc/PTR3-DDU5 ("In Texas, regulators ensure reliability through . . . scarcity pricing, which allows real-time electricity prices to reach as high as $9000/MWh . . . . Instead of guaranteeing generation revenue through a capacity market, the promise of high prices is supposed to incentivize generators to build new plants and keep them ready to operate."). The cap is now $5,000 per MWh. *See* Robert Walton, *Texas Power Plants "Ready for Winter" Following Weatherization Assessment, ERCOT Says*, UTIL. DIVE (updated Jan. 5, 2021), https://perma.cc/X5DS-D3FJ.

166. *See* Bade, *supra* note 165; Paul L. Joskow, *Challenges for Wholesale Electricity Markets with Intermittent Renewable Generation at Scale: The U.S. Experience*, 35 OXFORD REV. ECON. POL'Y 291, 302-03 (2019) (describing conditions in which scarcity pricing supports resource adequacy).

167. CAL. PUB. UTIL. CODE § 380(c) (West 2022).

168. *See id.* § 380(d).

169. THOMAS JENKIN, PHILIPP BEITER & ROBERT MARGOLIS, NAT'L RENEWABLE ENERGY LAB'Y, CAPACITY PAYMENTS IN RESTRUCTURED MARKETS UNDER LOW AND HIGH PENETRATION LEVELS OF RENEWABLE ENERGY 4 (2016), https://perma.cc/8KGC-GC7L.

themselves available to sell electricity—not for actually selling it.[170] Generators that do not make enough money in energy markets (those involving the sale of electricity on a real-time or similarly short-term basis) rely on capacity markets to make up the revenue shortfall. Capacity markets also contain a resource adequacy requirement, since the grid operator requires that LSEs procure from this market sufficient resources to meet peak demand.[171] The difference is that in central capacity markets, the regulator oversees the auction that determines which generators meet the region's capacity needs, whereas in markets like California that rely on resource adequacy requirements, the LSE is free to determine how to comply with the requirement (in collaboration with state regulators).[172]

Among these three approaches, central capacity markets are the most prescriptive approach to resource adequacy. A regulator both determines the level of reserves needed to meet peak demand and creates an administrative process to determine which resources will provide those reserves and how to value those resources' reliability benefit. Energy-only markets used in Texas are the least prescriptive because, while the regulator sets prices designed to procure sufficient reserves, it does not determine which resources are needed. Resource-adequacy requirements like those in California occupy a middle position—regulators determine the level of reserves necessary (similar to the integrated resource planning process used in traditionally regulated states) but permit LSEs to procure those reserves in whatever manner they think is best.[173]

B. Principles for a Reliable, Clean Grid

A reliable and clean energy grid requires that reliability regulators harmonize—not counteract—other policy goals, such as state clean-energy standards, when designing resource procurement markets. We contend that

170. *See Capacity Market (RPM)*, PJM: LEARNING CTR., https://perma.cc/6XGX-2V5J (archived Mar. 29, 2022).

171. *See, e.g.*, 2 MONITORING ANALYTICS, LLC, 2018 STATE OF THE MARKET REPORT FOR PJM: DETAILED ANALYSIS 49 (2019), https://perma.cc/V29D-EZ7Y ("Energy market revenues alone were not sufficient to cover total costs in any scenario, which demonstrates the critical role of capacity market revenue in covering total costs."); *id.* at 29 ("The PJM Capacity Market is explicitly designed to provide revenue adequacy and the resultant reliability.").

172. *See* PUB. UTIL. § 380(c).

173. *See supra* note 155 (discussing integrated resource planning); Kathleen Spees, Samuel A. Newell & Johannes P. Pfeifenberger, *Capacity Markets—Lessons Learned from the First Decade*, ECON. ENERGY & ENV'T POL'Y, Mar. 2013, at 1, 4 (describing the common use of integrated resource planning in traditionally regulated—that is, noncompetitive—electricity markets to ensure adequate generation capacity).

best practices in this regard include (1) eliminating barriers to entry such that market participants—not regulatory fiat—determine the particular resources that provide the needed level of reserves; (2) correctly pricing reliability so that market participants actually bear the costs imposed by those price signals; and (3) accommodating state and federal clean-energy policies.

All three of these approaches are necessary to bridge silos between resource adequacy requirements (such as those drafted by RTOs and approved by FERC) and policies at other jurisdictional levels, such as federal tax incentives and state mandates for renewables. These three principles should guide market design regardless of the resource adequacy approach the regulator adopts. The challenges of adhering to these principles, however, differ depending on the approach to resource adequacy. All approaches create some hurdles to clean energy. We explore these hurdles here and propose ways of overcoming them.

1. Eliminating barriers to entry

Failure to adhere to the first principle and erecting barriers to entry in resource adequacy markets has been a problem for RTOs across the country and has exacerbated tensions between federal and regional resource adequacy policy and state clean-energy standards. The use of competitive markets or performance standards to select future generation capacity has a natural smoothing function that is essential to integrating the many policy silos that drive generation capacity.[174] Bidders come to the table with a variety of factors influencing the price that they offer, including, for example, state and federal subsidization of certain types of generation.[175] By ignoring these many background factors and simply accepting bids on their face (within careful market-design limits),[176] competitive markets for generation resources

174. A performance standard requires regulated entities to meet specific outcomes but does not specify how entities should comply. *See* Cary Coglianese, Opinion, *On the Pitfalls of Performance Standards*, REGUL. REV. (Nov. 20, 2017), https://perma.cc/G3N6-2J6Z. A design standard, by contrast, involves a regulatory decision about how to achieve compliance. *See* Laura Montgomery, Patrick McLaughlin, Tyler Richards & Mark Febrizio, Performance Standards vs. Design Standards: Facilitating a Shift Toward Best Practices 6 (June 2019) (unpublished manuscript), https://perma.cc/BQ3D-KNK5.

175. *See, e.g.*, Joshua C. Macey & Robert Ward, *MOPR Madness*, 42 ENERGY L.J. 67, 72-73 (2021) (discussing bidder incentives).

176. The bids within "competitive" capacity markets are carefully regulated and are thus not wholly representative of free markets. RTOs design capacity markets following a variety of FERC-approved parameters that affect the market, including, for example, the amount of capacity that generators are required to acquire within the auction. *See, e.g.*, Spees et al., *supra* note 173, at 9-12 (describing the complex formation of administrative demand curves, including price caps and other features that depart from a purely competitive model, in some capacity auctions).

naturally accommodate the many silos that shape generators' bids. Those bidders that have not benefited from these silos—such as coal-fired power plants or natural gas currently disfavored by state clean-energy policies or federal tax incentives—argue that competitive resource adequacy markets do the opposite of "smoothing" and create an unlevel playing field.[177] Yet efforts to place these disfavored entities on equal footing simply place different thumbs on the scales, and often in a way that artificially elevates certain policy silos over others.[178]

When administrators become more prescriptive about how to comply with regulatory policies by selecting certain resources, they can directly contradict the policies emanating from certain silos. One such practice is the "reliability-must-run" (RMR) agreement. Faced with a pressing reliability need, grid operators will guarantee generators a certain amount of revenue regardless of the wholesale price of electricity.[179] RMR agreements are often responses to genuine reliability concerns.[180] For example, transmission constraints sometimes mean that certain generators play a critical role in keeping the lights on.[181] When such generators threaten to retire, regulators are understandably willing to pay a premium to keep them in the market.

Our concern with RMR agreements is not that they pay an above-market price to essential facilities, but rather the process by which grid operators

177. *See* Calpine Corp., 169 FERC ¶ 61,239, at 5-6 (Dec. 19, 2019) (stating that an administratively-set minimum bid amount for state-subsidized resources "is necessary" to protect "the competitiveness of the PJM capacity market," and that state clean-energy policies are "disruptive to competitive wholesale market outcomes"); Calpine Corp., 171 FERC ¶ 61,035, at 48 (Apr. 16, 2020) (asserting that administrative interventions "protect the integrity of federally-regulated markets against state policies").

178. The classic example of this is the minimum-offer-price rule (MOPR) of the Pennsylvania–Jersey–Maryland (PJM) RTO, which we discuss in further detail below. This much-maligned rule attempts to place natural gas and other fossil generators on more equal footing with subsidized renewable energy and nuclear resources by requiring state-subsidized resources to bid in at a minimum price, thus preventing them from creating what FERC previously viewed as artificially low prices. But the MOPR does not account for federal subsidies, such as federal tax credits for wind energy, and thus favors federally subsidized resources while disfavoring state-subsidized resources. Indeed, FERC Commissioner Glick—dissenting from the FERC order approving the MOPR—criticized the Commission's claim that it could not nullify federal subsidies (and thus could not include them within the MOPR) while the MOPR somehow avoided nullifying state subsidies. Framed in our terms, the MOPR validates federal silos while knocking down state silos. Calpine Corp., 171 FERC ¶ 61,035, at 20 (Apr. 16, 2020) (Glick, Comm'r, dissenting).

179. *See* ERCOT, Reliability-Must-Run Procedures 1 (2016), https://perma.cc/C4UB-SBJZ.

180. *See* N.Y. Ind. Sys. Operator, 150 FERC ¶ 61,116, at 1-3 (Feb. 19, 2015) (directing the New York ISO to develop RMR agreements).

181. *See id.* at 4.

determine that the generator is needed and the system of compensating such generators. The first problem is that grid operators and FERC rarely consider competitive solicitations before determining that the generator is in fact needed for system reliability. For example, Exelon's Mystic Generating Station, a large natural gas facility in Massachusetts, received a highly lucrative contract to keep it in the market from 2018 to 2022.[182] In approving this contract, FERC and ISO-New England (ISO-NE) ignored objections from Connecticut that these reliability needs could be met at lower cost.[183] Since ISO-NE did not solicit bids to determine whether alternative solutions were available, it is difficult to assess whether Mystic was in fact an essential facility.

California, by contrast, has relied on competitive solicitations before entering into RMR agreements.[184] While in some situations, the state has approved cost-of-service treatment for facilities that threaten to retire, in other cases, it has found cheaper and less carbon-intensive solutions.[185] One structural element that allows California's RTO to incorporate California's aggressive clean-energy policy is the fact that the RTO covers California only. The silos in this case are relatively simple: a state legislature and energy commission that push aggressively for renewable energy, and a "regional" transmission organization that operates the grid supporting this energy, the boundaries of which only cover California. This has allowed some cities to replace gas-fired power plants with solar-plus storage facilities, which in turn has helped California navigate the thorny process of achieving both federal and state mandates in generation capacity decisions.[186]

In contrast with California, central capacity markets, too, have become increasingly prescriptive in determining which resources are eligible to provide reliability services. For example, the three RTOs that rely on central capacity markets—Pennsylvania–Jersey–Maryland (PJM, the mid-Atlantic

182. *See* Gavin Bade, *FERC Approves Cost Recovery for Exelon's Mystic Gas Plant*, UTIL. DIVE (Dec. 21, 2018), https://perma.cc/88UP-LGGK.

183. *See* Constellation Mystic Power, LLC, 165 FERC ¶ 61,267, at 11-12 (Dec. 20, 2018) (describing Connecticut's objection that Mystic would receive the cost-of-service rate, not a market rate).

184. *See* Cal. Indep. Sys. Operator Corp., 168 FERC ¶ 61,199, at 24 (Sept. 27, 2019) (approving a CAISO tariff-policy revision that requires RMRs to "submit market bids at specified, marginal cost-based prices").

185. *See* Robert Walton, *CAISO: Changes to RMR Procurement Could Keep Generators from Gaming the System*, UTIL. DIVE (updated Mar. 22, 2019), https://perma.cc/E87R-WDHA.

186. *See* Cecilia Keating, *"Breakthrough" California Solar-Plus-Storage Project Bought by Capital Dynamics*, ENERGY STORAGE NEWS (Jan. 24, 2020), https://perma.cc/VVT8-WE9G; Andy Colthorpe, *Local Capacity Contract for 600MWh of California Battery Storage Signed by Recurrent Energy, PG&E*, ENERGY STORAGE NEWS (Aug. 11, 2021), https://perma.cc/7KXK-NSHY (describing how solar-plus-storage resources are being used to satisfy California resource-adequacy requirements and support state climate policies).

RTO), ISO-NE, and New York ISO (NYISO)—have expanded the scope of regulatory tools called minimum-offer-price rules (MOPRs)[187] to determine the terms and conditions on which generators are permitted to offer to sell capacity. MOPRs set a minimum price at which generators are eligible to bid into capacity markets. Utility-scale solar that would be willing to offer to sell capacity at a low price—say $5 per MW—will be unable to do so if it is subject to a MOPR. If the minimum price the array company is allowed to bid is $40 per MW, and if the market clears at $20 per MW, then the firm will not clear the capacity market and will not receive capacity revenues even though it supports resource adequacy.

Though developed in the mid-2000s as limited devices designed to curb market power abuses, MOPRs have expanded significantly since then.[188] Though PJM recently narrowed the scope of its MOPR rule, and a split Commission allowed PJM's focused MOPR to go into effect by operation of law, MOPRs have threatened to prevent some renewable resources that receive a state subsidy in the eastern states from participating in capacity markets.[189] Because capacity markets can account for 30% of generator revenues in these regions,[190] the expansion of these mitigation rules means that regulations that are ostensibly designed to maintain a sufficient level of reserves also prevent the inclusion of some renewables in the RTO's procurement of resources needed to support the region's reliability needs.[191] Thus, the siloed approach to

187. While PJM calls the tools MOPRs, NYISO calls them "buyer-side mitigation" and ISO-NE uses the phrase "alternative price rule." *See* Macey & Ward, *supra* note 175, at 72-83, 90, 97. In response to political pushback, PJM has indicated that it will scale back its MOPR. *See* Catherine Morehouse, *PJM Proposes to End FERC MOPR Policy that Raised Prices for State-Subsidized Resources*, UTIL. DIVE (Apr. 29, 2021), https://perma.cc/4C8F-79E8.

188. *See* Macey & Ward, *supra* note 175, at 73-101 (providing a history of buyer-side mitigation rules in PJM, NYISO, and ISO-NE). PJM recently narrowed the scope of its MOPR. *See Joint Statement of Chairman Glick and Commissioner Clements Regarding the Fair Rates Act on PJM MOPR*, FERC, https://perma.cc/7TCU-V5N2 (last updated Oct. 19, 2021).

189. *See* Calpine Corp., 169 FERC ¶ 61,239, at 2 (Dec. 19, 2019); Kathryne Cleary, *What the Minimum Offer Price Rule (MOPR) Means for Clean Energy in PJM*, RESOURCES (Jan. 21, 2020), https://perma.cc/9PCN-PQNJ ("[T]he MOPR . . . will likely significantly restrict the participation of new renewables in the capacity market.").

190. MONITORING ANALYTICS, LLC, *supra* note 171, at 16, 286 (stating that capacity markets accounted for $10.3 billion of generator revenues in 2018, while total generator revenues amounted to $49.29 billion); INTERNAL MKT. MONITOR, ISO NEW ENG. INC., 2018 ANNUAL MARKETS REPORT 4-5 (2019) (showing that 30% of revenues come from capacity markets in ISO-NE).

191. PJM Interconnection, L.L.C., 117 FERC ¶ 61,331, at 4 (Dec. 22, 2006) ("[PJM's capacity-market ruleset] is expected to provide greater incentives for new generation, transmission, and demand response, while also providing sufficient revenues to retain existing resources that are needed."); *see* Macey & Ward, *supra* note 175, at 110-11.

reliability adopted in PJM, ISO-NE, and NYISO means that the markets those regions have developed to maintain resource adequacy also make it harder for state-subsidized renewables to be compensated even if they provide significant reliability benefits. As introduced above, such rules cause resource adequacy markets to counteract rather than knock down silos associated with clean-energy goals. The result is that resource adequacy silos prevent generation resources from coming to the table with their own price—a price influenced by a variety of background policy factors.

A separate problem of policy segregation pervades RTOs where there has been less structural separation of generation and transmission assets—most notably, the Midwest ISO (MISO) and SPP. Substantial numbers of rate-regulated utilities participate in these markets. RTOs allow these generators to "self-schedule," or provide generation "out of merit" with least-cost dispatch practices.[192] When a generator self-schedules, it determines the hours that it will run instead of leaving such decisions to the RTO and its dispatch algorithms.[193] In practice, self-scheduling tends to benefit rate-regulated coal resources, which recover the costs of operating from ratepayers even when the energy market would not select them as a least-cost resource. A recent study by the Union of Concerned Scientists has found that this practice costs ratepayers billions of dollars a year.[194]

Self-scheduling provides another example of how the siloed nature of federal and state resource-adequacy decisions can impede the transition to a low-carbon grid.[195] No matter what state and federal regulators do to encourage renewables to enter the grid, such policies will not reduce output from a coal-fired power plant if that plant is guaranteed a profit from its captive ratepayers. The disaggregation here is particularly warped: A historic utility-driven, state-commission-sanctioned resource-procurement decision to allow the construction of a fossil fuel–fired plant prevents RTO wholesale markets from accommodating low-carbon resources prioritized by many state legislatures in the region.

When energy regulators presumptively favor fossil fuel resources to meet reliability requirements—whether that be through misguided MOPRs or RMR

192. JEREMY FISHER, AL ARMENDARIZ, MATTHEW MILLER, BRENDAN PIERPONT, CASEY ROBERTS, JOSH SMITH & GREG WANNIER, SIERRA CLUB, PLAYING WITH OTHER PEOPLE'S MONEY: HOW NON-ECONOMIC COAL OPERATIONS DISTORT ENERGY MARKETS 8 (2019), https://perma.cc/56V2-UY5V.

193. *Id.*

194. *See id.* at 4.

195. *See id.* at 22 ("The decoupled responsibility of utility regulators and RTOs has had the consequence of allowing non-economic dispatch by regulated utilities to go relatively unchecked, at the expense of captive ratepayers and competitive independent generators.").

agreements—they make it impossible to determine whether those resources are in fact critical. They also prevent renewable generators from being compensated for supporting reliability when they are capable of doing so—thereby potentially slowing the clean-energy transition and impeding reliability at the same time.

2. Correctly pricing and parameterizing reliability services

Even when federal and regional energy regulators rely on competition, the inability to correctly identify and value reliability further impedes attempts—many of them state led—to shift to a clean and reliable grid. This challenge is endemic to all three approaches to resource adequacy.

One issue is that regulators misvalue resources that provide reliability benefits. For example, for years, the RTO PJM, which operates in much of the Mid-Atlantic region, required that resources be able to operate for a minimum of ten hours in order to be dispatched in energy markets and participate in capacity markets.[196] This rule was justified on the ground that duration requirements supported the reliability of the bulk power system.[197]

The problem with this justification is that resources that operate for much shorter periods of time have substantial reliability benefits. Many batteries, for example, can store energy for only four hours.[198] Peak demand, however, is usually four hours, and so battery storage has significant benefits at this time.[199] Yet PJM's duration requirements kept batteries from participating in markets even though they could provide the precise service needed to support reliability.

PJM's performance-duration requirements are only one example of how RTOs' overly prescriptive reliability rules prevent clean-energy resources from contributing to a reliable grid. FERC recently found that similar rules also "limit customer participation in demand response programs."[200] Properly pricing and parameterizing the reliability benefits of energy resources is essential to overcoming these mismatched incentives. If renewables and storage resources support a region's reliability needs, they should be compensated for doing so. But when regulators charged with ensuring

196. *See* Jeff St. John, *Taking Aim at PJM's 10-Hour Performance Duration Capacity Rule for Energy Storage*, GREENTECH MEDIA (July 22, 2019), https://perma.cc/MR2R-LKJA.

197. *See id.*

198. *See* THOMAS BOWEN, ILYA CHERNYAKHOVSKIY & PAUL DENHOLM, NAT'L RENEWABLE ENERGY LAB'Y, GRID-SCALE BATTERY STORAGE 2 (2019), https://perma.cc/3AUX-932D.

199. *See id.* at 4.

200. FERC, 2020 ASSESSMENT OF DEMAND RESPONSE AND ADVANCED METERING 46 (2020), https://perma.cc/S7Q2-LSHL.

resource-adequacy design rules do not accommodate such resources, they create an unlevel playing field that favors fossil resources.

3. Accommodating state and federal clean-energy policies

Central to the two challenges discussed thus far—eliminating barriers to entry to ensure low-carbon, economic resource adequacy and properly valuing reliability—is the premise that a clean and reliable grid requires wholesale energy markets to accommodate, not counteract, state and federal clean-energy policies. In this case, the federal and state silos would be quite difficult to knock down—and likely should not be erased. Congress's decision to give FERC authority over wholesale power transactions and states authority over retail sales served to avoid conflicting state rate regulation of interstate transactions while still allowing states to respond to the values of their constituents. The challenge, though, is that wholesale policies centrally affect retail ones, and vice versa, because retail utilities build their own generation and purchase wholesale electricity to supply retail customers. A great deal of accommodation of state policies by federal agencies, and vice versa, is accordingly necessary. This challenge is perhaps best highlighted by comparing federal and regional policies with the zero-carbon energy mandates of state policies.

Certain approaches to resource adequacy work relatively well to accommodate state policy goals. For example, California's approach to resource adequacy, which imposes resource-adequacy requirements on LSEs, organically incorporates state policy goals. The LSE can simply balance its federal resource-adequacy goals with state clean-energy goals when procuring resources. Thus, if offshore wind supports both reliability and climate policy, the LSE can count offshore wind resources toward both its clean energy and resource obligations.

Energy-only markets are also relatively well suited to accommodating state policy goals. An LSE that needs to procure a certain percentage of supply from renewables can enter into bilateral contracts to do so. The grid operator simply needs to accommodate carbon prices and other renewable policies by letting the price signals generated by such policies pass through to energy markets.

But here, too, regulators ignore how other policy priorities impede the transition to a low-carbon grid. States that participate in RTOs need the RTO's blessing to pass an effective carbon tax.[201] If the RTO does not develop rules

201. In August 2020, FERC organized a panel to "explore general legal issues that may arise under the Federal Power Act when the Commission is presented with a proposal to integrate a carbon price set by a state (or group of states) into an RTO/ISO market design." Supplemental Notice of Technical Conference at 1, 3, Carbon Pricing in Organized Wholesale Elec. Mkts., Docket No. AD20-14-000 (FERC Aug. 28, 2020), https://perma.cc/ET88-L37M. RTOs have successfully incorporated emissions fees in

footnote continued on next page

for incorporating the state carbon tax into energy markets, then the state cannot tax all electricity-related emissions. The state could still tax in-state generators, but that has little effect on out-of-state generators that participate in the RTO's energy market. Generators in neighboring states will be unaffected, and carbon-intensive generators built in those states will still be able to sell energy into the RTOs' energy market. This issue is known as leakage.[202] An effective carbon tax therefore requires either that states coordinate with each other or that the RTO develop rules to address leakage concerns.[203]

Accommodating such policies is not particularly difficult, as RTOs have frequently incorporated federal and state rules that incorporate the costs of complying with environmental regulations.[204] But RTOs are still trying to figure out whether—and how—they should incorporate potential future carbon taxes.[205] As a result, a state cannot unilaterally impose an effective carbon tax—or, more specifically, a carbon tax that addresses leakage concerns—but must instead hope that its RTO develops a mechanism for integrating the carbon tax into wholesale markets.

Yet perhaps the most difficult tensions between resource adequacy and state policies occur in regions that rely on capacity markets. Capacity markets procure resources needed to meet expected load.[206] As discussed, the problem is that some resources will enter the energy market even if they don't clear the

energy markets. San Diego Gas & Elec. Co., 95 FERC ¶ 61,418, at 35 (June 19, 2001) (noting that "mitigation fees associated with [nitrous oxide] emissions are a legitimate cost of producing energy" and instructing CAISO to "to submit tariff modifications incorporating an emission allowance administrative charge"); Cal. Indep. Sys. Operator Corp., 153 FERC ¶ 61,087, at 26 (Oct. 26, 2015) (approving proposed "greenhouse gas bid adder enhancements" to the energy imbalance market that "allow[] a resource to recover its greenhouse gas compliance costs" imposed by California's CO_2 cap-and-trade program).

202. *See* Carbon Pricing Senior Task Force, PJM, PJM Study of Carbon Pricing & Potential Leakage Mitigation Mechanisms 13 (2020), https://perma.cc/82QC-U59M.

203. *See id.* at 8, 27-32.

204. *See, e.g.*, Policy Statement and Interim Rule Regarding Ratemaking Treatment of the Cost of Emissions Allowances in Coordination Rates, 59 Fed. Reg. 65,930, 65,935 (Dec. 22, 1994) (to be codified at 18 C.F.R. pts. 2, 35) (allowing "the recovery of incremental costs of emission allowances in coordination rates" under defined circumstances); *San Diego Gas & Elec. Co.*, 95 FERC ¶ 61,418, at 35 (instructing CAISO "to submit tariff modifications incorporating an emission allowance administrative charge"); *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,087, at 26 (approving proposed "greenhouse gas bid adder enhancements" that "allow[] a resource to recover its greenhouse gas compliance costs").

205. *See* PJM, FERC Technical Conference on Carbon Pricing in Organized Wholesale Electricity Markets 1 (2020), https://perma.cc/3X85-R8QP.

206. *See Capacity Market (RPM)*, *supra* note 170.

capacity market.[207] Some will enter because they are needed to satisfy a state renewable policy.[208] In other circumstances, a resource will enter the market because the underlying economics have changed and it operates at a profit even if it receives all of its revenues from energy markets and none from capacity markets.[209] The dramatic decline in the costs of lithium-ion batteries, for example, have made storage cost effective even if it does not clear the capacity auction.[210] Because capacity markets do not count these resources that are nevertheless participating in the energy market, they procure more capacity than is needed.

But grid operators can structure capacity markets to account for the capacity benefits of such resources—an elegant way of redesigning market policy to accommodate state silos without needing to fundamentally change the structure of governance. One market-design option is to permit LSEs to procure the resources needed to comply with state clean-energy policies and then run the capacity market after the LSE has done so. This proposal has been dubbed the "fixed resource requirement."[211] Doing so would ensure that renewables that enter the market as a result of state clean-energy policies count toward a particular region's needed reserves.

Another solution is to run capacity auctions such that they align with clean-energy policies. One option is to develop a forward clean-energy market or an integrated clean-capacity market.[212] A forward clean-energy market would allow states that have developed clean-energy standards to procure a certain percentage of their capacity obligations from resources that also support their clean-energy policies. They could fulfill the rest of their capacity obligation in the ordinary capacity market, as could states that do not have

207. *See, e.g.*, ISO New Eng. Inc., 158 FERC ¶ 61,138, at 5 (Feb. 3, 2017) (Bay, Comm'r, concurring) ("Instead, the MOPR not only frustrates state policy initiatives, but also likely requires load to pay twice—once through the cost of enacting the state policy itself and then through the capacity market.").

208. *See* ROB GRAMLICH & MICHAEL GOGGIN, GRID STRATEGIES, TOO MUCH OF THE WRONG THING: THE NEED FOR CAPACITY MARKET REPLACEMENT OR REFORM 10-11 (2019); Macey & Ward, *supra* note 175, at 104.

209. *See* Macey & Ward, *supra* note 175, at 104-09.

210. *See* John Fitzgerald Weaver, *Solar Price Declines Slowing, Energy Storage in the Money*, PV MAG. (Nov. 8, 2019), https://perma.cc/E374-9Y7Y.

211. *See* Catherine Morehouse, *States Ask FERC To Eliminate MOPR, Grant More Flexibility in Pursuing Alternatives to PJM Capacity Market*, UTIL. DIVE (Apr. 26, 2021), https://perma.cc/7ZVC-HG7H.

212. This concept seems to have been developed by economists working for the Brattle Group, an energy consulting organization. *See* KATHLEEN SPEES, SAMUEL A. NEWELL, WALTER GRAF & EMILY SHORIN, BRATTLE GRP., HOW STATES, CITIES, AND CUSTOMERS CAN HARNESS COMPETITIVE MARKETS TO MEET AMBITIOUS CARBON GOALS, at ii (2019).

clean-energy policies.[213] An integrated clean-capacity market would operate similarly.[214] The auction would simultaneously procure capacity and clean-energy attributes such that participants can purchase clean attributes such as renewable energy credits (RECs).[215] The price paid for those clean-energy attributes would help determine which resources clear the capacity market.[216] This, too, would allow regions that rely on capacity markets to avoid procuring excess capacity.

None of these options would require congressional action. The FPA (Federal Power Act) clearly grants FERC jurisdiction over wholesale transactions in interstate commerce and states jurisdiction over retail decisions.[217] The Supreme Court has explicitly noted that FERC has authority to police these tensions.[218] FERC may do this policing under its explicit FPA authority to regulate practices "affecting" wholesale rates.[219]

In fact, the reforms we suggest here would be consistent with the spirit of the FPA—even if they are not required by it. The Supreme Court has long held that the FPA was "drawn with meticulous regard for the continued exercise of state power."[220] Reconstructing resource-adequacy markets in a manner that accommodates state policies would prevent reliability goals from operating at cross-purposes with clean-energy goals. That, in turn, would preserve for states the matters that the FPA left to their control.

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213. The Supreme Court has said that states may not directly regulate wholesale markets. *See* Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1298 (2016). But so long as states act within the policy designed by FERC and RTOs, rather than against it, they should be free and clear to act.

214. This concept was described in detail in a New Jersey Board of Public Utilities report investigating alternatives to PJM's capacity market. *See* ABRAHAM SILVERMAN, KIRA LAWRENCE & JOSEPH DELOSA, N.J. BD. OF PUB. UTILS., ALTERNATIVE RESOURCE ADEQUACY STRUCTURES FOR NEW JERSEY 36-39 (2021), https://perma.cc/H6WS-GXMP.

215. *See id.*

216. *See id.*

217. *See* 16 U.S.C. § 824(a)-(b).

218. See FERC v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 780 (2016) ("The Act makes federal and state powers 'complementary' and 'comprehensive,' so that 'there [will] be no "gaps" for private interests to subvert the public welfare.' Or said otherwise, the statute prevents the creation of any regulatory 'no man's land.' Some entity must have jurisdiction to regulate each and every practice that takes place in the electricity markets, demand response no less than any other." (alteration in original) (citation omitted) (first quoting Fed. Power Comm'n v. La. Power & Light Co., 406 U.S. 621, 631 (1972); and then quoting Fed. Power Comm'n v. Transcon. Gas Pipe Line Corp., 365 U.S. 1, 19 (1961))).

219. *See id.* at 767.

220. Panhandle E. Pipe Line Co. v. Pub. Serv. Comm'n, 332 U.S. 507, 517-18 (1947).

IV. Transmission Planning, Financing, and Siting

Beyond energy markets, new electric transmission lines are essential to enabling a clean, more reliable grid. This will involve planning for a new, nationally interconnected network of transmission lines across existing "seams" that divide the U.S. transmission network, deciding how to allocate costs among utilities for these new lines, and determining where these lines should be sited. As we explain below, this project will require the most federalization of institutional authority, given the inherently national scope of the project. But this is not to say that all authority should shift from the state and regional to the federal level. Rather, we explore here how federal, top-down authority must grow, while still leaving room for the expertise of state and regional actors.

A. The Need for a Nationally Interconnected Transmission Grid

An expanded, nationally interconnected transmission grid, or "macrogrid," is a prerequisite to a decarbonized, more reliable U.S. energy system. As stated in a 2021 National Academies report entitled *The Future of Electric Power in the United States*, a successful clean-energy transition will require "expand[ing] the system's ability to generate and move power so as to make abundant electricity available to support the deep decarbonization of all parts of the economy."[221] Proponents of a macrogrid build-out argue that to increase grid reliability through a decarbonized electricity sector, we must pursue a massive investment in our existing long-distance electric transmission system.[222] This strategy will involve both reinvesting in existing transmission capacity and expanding the transmission system itself. Necessary expansions include a new network of long-distance, high-voltage direct current (HVDC) transmission lines and more long-distance alternating current (AC) lines.

The map below from the National Renewable Energy Laboratory's *Interconnected Seams Study* illustrates one scenario for accomplishing this.[223] This map explains how large amounts of wind and solar energy can move between the RTOs and interconnections to accommodate demand at different

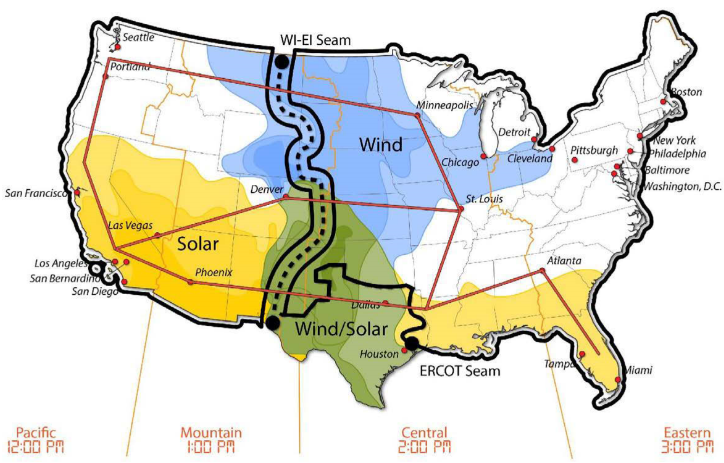
221. NAT'L ACADS. OF SCIS., ENG'G, & MED., THE FUTURE OF ELECTRIC POWER IN THE UNITED STATES 14 (2021).

222. ROB GRAMLICH & JAY CASPARY, AMS. FOR A CLEAN ENERGY GRID, PLANNING FOR THE FUTURE: FERC'S OPPORTUNITY TO SPUR MORE COST-EFFECTIVE TRANSMISSION INFRASTRUCTURE app. A at 89-95 (2021) (citing and describing numerous studies).

223. Aaron Bloom et al., *The Value of Increased HVDC Capacity Between Eastern and Western U.S. Grids: The Interconnections Seam Study*, 37 IEEE TRANSACTIONS ON POWER SYS. 1760, 1764-68 (2022) (describing how the construction of seven HVDC facilities between the Western and Eastern Interconnections could increase the efficiency and resilience of the entire energy system).

times of day through new HVDC lines (shown in red) that connect with existing AC lines.

Figure 2
Proposed "Macrogrid" (Design 3)



Source: Brinkman et al., *supra* note 65, at 22.

The source describes Design 3 as follows: "Macrogrid (a nationwide HVDC transmission network) is built and additional AC transmission and generation are co-optimized to minimize system costs." *Id.*

An expanded transmission grid along the red lines will not only facilitate greater penetration of renewable energy across the country, but will also make the grid more reliable and resilient, all while providing significantly lower electricity costs for consumers.[224] If it sounds too good to be true, there is a

224. *See, e.g.*, *id.* at 30, 33; Alexandra B. Klass, *Transmission, Distribution and Storage: Grid Integration*, *in* LEGAL PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES 527, 529-31 (Michael B. Gerrard & John C. Dernbach eds., 2019) (detailing expert studies showing the need for expanded transmission infrastructure and the benefits of such expansion); GRAMLICH & CASPARY, *supra* note 222, app. A at 89-95 (summarizing numerous studies showing the need for "large regional and interregional transmission"). *But see* Steve Huntoon, *Counterflow: Big Transmission—Still Not the Right Stuff*, RTO INSIDER (May 17, 2021), https://perma.cc/2W35-W33C (to locate, select "View the live page"); (contending that proposed long-distance HVDC lines have little chance of being built and are not cost-effective investments, while supporting more modest regional transmission projects).

catch: The current siloization of legal authority around transmission makes it exceedingly hard to accomplish this necessary expansion, as we explain below.

B. Transmission Planning and Cost Allocation

Historically, vertically integrated utilities built most of the transmission lines in the United States. These lines connect generators to utilities and utilities to each other to enable wholesale trades. Utilities built transmission to meet their obligations to provide electricity to the communities they served. This was a local process designed to serve local needs. But over the decades, the transmission grid has become gradually ever more interconnected. As this has occurred, FERC has recognized that transmission has significant benefits outside of the communities in which the line is built, and it has tried to reform transmission planning and cost allocation rules to reflect those benefits.

Yet despite FERC's efforts, transmission planning continues to be done primarily at the local level, and cost allocation does not reflect the full benefits of HVDC lines. The result is that we are not investing enough in transmission, and the transmission built primarily serves local reliability needs. This parochial approach to transmission planning and cost allocation also impedes the construction and siting of the many interstate transmission lines that will be needed to support a large amount of new renewable generation. This Subpart explains why the process FERC has developed for transmission planning and cost allocation fails to realize FERC's goal of building a reliable, robust national power grid capable of facilitating the country's changing resource mix.

1. Current transmission planning and cost-allocation policy

FERC's early transmission reforms were part of the Commission's campaign to support competitive wholesale energy markets—reforms that continue today and that have been an essential component of renewable energy growth. In landmark orders issued between 1996 and 2000, FERC sought to accomplish two goals. First, it wanted to ensure that independent merchant generators were able to access electricity markets so that they could compete with vertically integrated, investor-owned utilities that controlled and operated generation, transmission, and distribution lines.[225] Second, it

225. *See* Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, 61 Fed. Reg. 21,540, 21,541 (May 10, 1996) (codified at 18 C.F.R. pts. 35, 385); *see also* Open Access Same-Time Information System (Formerly Real-Time Information Networks) and Standards of Conduct, 61 Fed. Reg. 21,737, 21,737 (May 10, 1996) (codified at 18 C.F.R. pt. 37).

wanted to encourage utilities to join RTOs and delegate the operation of their lines to these organizations.[226]

The early reforms related to open grid access and a more regionalized electric grid had a significant effect on the operation and control of the transmission system. But FERC's primary goal in these early orders was to make sure that the sale of electric energy was subject to competitive forces. Transmission was at most a secondary goal.

FERC's emphasis shifted more directly to transmission over the next decade. In the Energy Policy Act of 2005 (EPAct 2005), Congress instructed the Commission to incentivize the further development of transmission to reduce costs and improve reliability. As a result, FERC issued the putatively landmark Order No. 1000 in 2011, which attempted to create a more regional focus for grid development.[227] In Order No. 1000, FERC acknowledged that the benefits of transmission were not concentrated in the locale where the transmission line was being built.[228] Yet utilities outside these locales—and their state regulators, at times—had every incentive to resist helping to pay for transmission benefits they reaped.[229] In effect, this infighting caused regionally beneficial transmission lines to fail to advance through planning processes—yet another example of the energy law silo at work. Recognizing that transmission creates reliability, cost, and climate benefits in a broad geographic area, FERC, in Order No. 1000, attempted to make transmission planning and cost allocation reflect those nonlocal benefits.[230]

To remediate these deficiencies, Order No. 1000 made four reforms to transmission planning and cost allocation: It (1) required RTOs to develop regional transmission plans; (2) instructed RTOs to develop systems of coordinating with each other to develop *interregional* plans, which were more efficient than region-by-region plans; (3) directed utilities to adopt a "beneficiary pays" approach to cost allocation to require that the costs of building new transmission be spread out among the entities that benefit from the new infrastructure and not be concentrated in the region where the transmission line is built; and (4) mandated that merchant transmission operators be given an opportunity to participate in the regional planning

226. *See* Regional Transmission Organizations, 65 Fed. Reg. 810, 810 (Jan. 6, 2000) (codified at 18 C.F.R. pt. 35).

227. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842, 49,842 (Aug. 11, 2011) (codified at 18 C.F.R. pt. 35).

228. *See id.* at 49,845.

229. *See id.* at 49,846 (describing the free-rider problem in transmission planning).

230. *See id.* at 49,845.

process to allow transmission-line development to be subject to competitive forces.[231]

These reforms were intended to wrest control over transmission out of the hands of vertically integrated utilities and make sure that transmission development reflected its geographically broad benefits.[232] Regional planning, for example, recognized that transmission lines often generate substantial nonlocal benefits. A transmission line near Philadelphia may support reliability or lower electricity costs in Cleveland by allowing Cleveland to import electricity from generators located in a wider array of areas. If generators located near Philadelphia shut down, perhaps as a result of a polar vortex, the transmission line may prevent Philadelphia from losing power since it can now import electricity from Ohio. That is why Order No. 1000 instructed RTOs "to create a regional transmission plan that identifies transmission facilities needed to meet reliability, economic and Public Policy Requirements."[233]

Similarly, utility-scale solar will provide only moderate benefits if the electricity it generates is cabined by state borders. For example, demand for electricity in Arizona is relatively moderate compared to some of the state's more populous neighbors.[234] But if Arizona can export solar to California and

231. *See id.* at 49,845-46.

232. *See* Preventing Undue Discrimination and Preference in Transmission Service, 72 Fed. Reg. 12,266, 12,268 (Mar. 15, 2007) (codified at 18 C.F.R. pts. 35, 37) ("In the first few decades after enactment of the [FPA] in 1935, the industry was characterized mostly by self-sufficient, vertically integrated electric utilities, in which generation, transmission, and distribution facilities were owned by a single entity and sold as part of a bundled service to wholesale and retail customers.").

233. *See* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. at 49,851.

234. Paul L. Joskow, *Facilitating Transmission Expansion to Support Efficient Decarbonization of the Electricity Sector*, ECON. ENERGY & ENV'T POL'Y, Sept. 2021, at 57, 58 ("[T]he best sources of wind and solar resources are typically located in areas that are different from the locations of the legacy stock of thermal generating plants. They are also often more remote from demand centers."); Matthew L. Wald, *Wind Energy Bumps into Power Grid's Limits*, N.Y. TIMES (Aug. 26, 2008), https://perma.cc/BY5J-4AMA ("The dirty secret of clean energy is that while generating it is getting easier, moving it to market is not. . . . Achieving [the possibility of getting 20% of U.S. electricity from wind turbines] would require moving large amounts of power over long distances, from the windy, lightly populated plains in the middle of the country to the coasts where many people live. . . . The grid's limitations are putting a damper on such projects already."); *see also Arizona State Energy Profile*, U.S. ENERGY INFO. ADMIN., https://perma.cc/3BPT-3CDE (last updated Apr. 21, 2022) (providing details on Arizona's energy generation and consumption and stating that "Arizona power plants typically generate more electricity than the state consumes, and, in 2019, more than one-fourth of the electricity generated in-state was sent to consumers outside of Arizona").

Texas, then solar energy produced in Arizona will be able to provide electric power to populations that consume massive amounts of energy.[235]

The interregional planning requirement reflected the same concerns. The idea behind interregional planning was that the benefits of transmission do not stop at an RTO's borders and that bigger is better: Joining utilities and connection regions is both more cost-effective and more reliable. Interregional benefits were apparent during Winter Storm Uri. As it did for the Electric Reliability Council of Texas (ERCOT), the storm put MISO and SPP under extreme strain.[236] However, these regions experienced far lower rates of blackouts, in large part because those RTOs were able to import a large amount of energy from PJM in the east.[237]

Additional interconnections would have provided even more significant reliability benefits during Winter Storm Uri. More transmission connecting MISO and PJM (as well as more transmission connecting northern and southern MISO) would have allowed additional electricity to be exported to resource-constrained areas, further reducing the number of blackouts in those regions.[238] FERC foresaw these kinds of benefits in its interregional requirements—even if, as we describe below, its efforts in this regard have not proven successful.

In sum, Order No. 1000 recognized that a region can meet its transmission needs more cost effectively through regional projects than through individual utilities developing their own transmission plan in isolation. In this way, transmission creates benefits outside the location of any single transmission line, and FERC took ambitious steps to make sure that planning and cost allocation reflects those benefits.

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235. *See Arizona State Energy Profile*, *supra* note 234 (discussing efforts by Arizona to export carbon-free energy resources to neighboring states and noting that "[i]nterstate transmission lines have become congested in peak demand periods, and Arizona continues to work with other states and stakeholders to improve transmission capacity").

236. *See* N. AM. ELEC. RELIABILITY CORP., FEBRUARY 2021 COLD WEATHER GRID OPERATIONS: PRELIMINARY FINDINGS AND RECOMMENDATIONS 8-9 (2021), https://perma.cc/P7E2-DZ62.

237. *See, e.g.*, *id.* at 10 (noting that during Winter Storm Uri, "MISO's and SPP's ability to transfer power through their many transmission ties with adjacent Balancing Authorities in the Eastern Interconnection helped to alleviate their generation shortfalls," unlike ERCOT in Texas, which "did not have the ability to import many thousands of MW from the Eastern Interconnection"). There are limits, however, to relying on geographic diversity for reliability. *See, e.g.*, *id.* ("Had ERCOT been able to import more power, it would have decreased the amount that MISO and SPP would have been able to import.").

238. *See id.*

2. Problems with transmission planning and cost allocation: silos, exit, and coordination challenges

Order No. 1000 remains FERC's most aggressive, well-intended effort to break down energy silos in transmission planning and cost allocation. But at least four deficiencies remain. Some of these shortcomings are a direct result of the strategy adopted in the Order. Others have arisen because of how RTOs perform regional planning and because of "beneficiary pays" cost allocation. First, because RTOs and utilities allow a bottom-up approach to planning, RTOs or individual transmission owners often undertake haphazard, localized transmission upgrades rather than more cost-effective regional and interregional solutions.[239] Second, RTOs use different methodologies to calculate the benefits of transmission, which makes interregional planning extremely difficult.[240] Third, RTOs generally define the benefits of transmission narrowly and discount (or ignore entirely) many environmental and reliability benefits, which can be difficult to quantify.[241] Fourth, utilities may be able to escape cost allocation by leaving (or threatening to leave) the market.[242] As a result, planning and cost allocation remain parochial processes that continue to be dominated by incumbent utilities.

a. Bottom-up planning

The bottom-up approach to planning adopted in response to Order No. 1000 has impeded the development of regional and interregional transmission infrastructure. In practice, local transmission development often precedes regional planning and Order No. 1000 incentivized utilities to embrace local planning.[243] While Order No. 1000 required IOUs to compete with merchant transmission developers when they are participating in the

239. *See* Johannes Pfeifenberger, Brattle Grp., Transmission Planning and Benefit-Cost Analyses 3 (2021), https://perma.cc/999Y-ZHMN ("Most projects are build [sic] solely to address reliability and local needs; the substantial recent investments in these types of projects now make it more difficult to justify valuable new transmission that could more cost-effectively address economic and public policy needs.").

240. SW. POWER POOL ENG'G, 2020 INTEGRATED TRANSMISSION PLANNING: ASSESSMENT REPORT 80 (2020), https://perma.cc/MUH2-7MSC.

241. *See* Pfeifenberger, *supra* note 239, at 3 ("Planners and policy makers do not consider the full range of benefits that transmission investments can provide.").

242. For example, state regulators and utilities in Louisiana have threatened to leave MISO to avoid paying for costs of regional transmission build-out, since Louisiana utility customers receive less benefit than utility customers in the northern part of MISO. *See* Mark Ballard, *Louisiana to Stay in MISO After State Regulators Put Off Vote to Leave Transmission Authority*, ADVOCATE (Nov. 17, 2021, 3:47 PM), https://perma.cc/2RRC-49KP.

243. *See* Pfeifenberger, *supra* note 239, at 3.

regional planning process, Order No. 1000 did nothing to upset the traditional monopoly that IOUs held on transmission built to serve local reliability needs—instead encouraging local projects rather than regional projects.[244]

For example, since 2008, PJM has developed separate processes for evaluating regional and local transmission projects. Regional projects must participate in competitive solicitations, are subject to beneficiary pays cost allocation, and must be approved by the PJM board.[245] Local plans, by contrast, need not meet all of these requirements.[246] For example, "end-of-life" projects, which are those needed to "maintain, repair, or replace transmission facilities," are generally exempt from the requirements of the regional planning process.[247] Similarly, projects that need to be built within three years to support reliability goals, known as "Immediate-need Reliability Projects," need not be part of the regional plan.[248]

The predictable result of these exceptions, as Ari Peskoe has shown in detail, is that local transmission developments are now responsible for most of the new transmission built in RTOs.[249] These local projects have rendered regional planning little more than gap-filling. Local spending in PJM has tripled since Order No. 1000 went into effect and is approximately two times greater than regional spending.[250] This suggests that PJM is allowing

244. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842, 49,887 (Aug. 11, 2011) (codified at 18 C.F.R. pt. 35) ("[O]ur actions today are not intended to diminish the significance of an incumbent transmission provider's reliability needs or service obligations.").

245. PJM Interconnection, L.L.C., 123 FERC ¶ 61,163, at 35 (May 15, 2008).

246. *See* Building Through the Future for Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection, 87 Fed. Reg. 26,504, 26,570-76 (May 4, 2022) (to be codified at 18 C.F.R. pt. 35).

247. Letter from Kenneth G. Jaffe, Couns., Alston & Bird LLP & Donald A. Kaplan, Couns., K&L Gates LLP, to Kimberly D. Bose, Sec'y, FERC 3 (June 12, 2020), https://perma.cc/5QG6-VHG8.

248. PJM Interconnection, L.L.C., 142 FERC ¶ 61,214, at 107-11 (Mar. 22, 2013).

249. *See* Peskoe, *supra* note 149, at 50; JOHANNES P. PFEIFENBERGER, JUDY CHANG, AKARSH SHEILENDRANATH, J. MICHAEL HAGERTY, SIMON LEVIN & WREN JIANG, BRATTLE GRP., COST SAVINGS OFFERED BY COMPETITION IN ELECTRIC TRANSMISSION: EXPERIENCE TO DATE AND THE POTENTIAL FOR ADDITIONAL CUSTOMER VALUE 6-7 (2019), https://perma.cc/BLJ7-8XUN (noting that between 2013 and 2017, "about one-half of the approximately $70 billion of aggregate transmission investments by FERC-jurisdictional transmission owners in ISO/RTO regions are approved outside the regional planning processes or with limited ISO/RTO and stakeholder engagement").

250. Transmission Expansion Advisory Comm., PJM, 2019 Project Statistics 3 (2020), https://perma.cc/NR77-9HVY. Annual spending on supplemental projects ballooned in the aftermath of Order No. 1000. Between 2005 and 2013, spending on supplemental projects was $1.25 billion a year. That number increased to $3.73 billion a year from 2014 to 2019. At the same time, spending on regional projects declined from $2.76 billion to $1.86 billion per year. *Id.*

transmission needs to be addressed in a haphazard process without requiring serious consideration of whether those needs could be dealt with more cost-effectively through a regional process.[251]

PJM is not unique. The other RTOs have also seen local exceptions eat into regional transmission planning. MISO, for example, exempts "Baseline Reliability Projects," which are network upgrades required to maintain compliance with applicable national electric reliability standards,[252] from many of the obligations Order No. 1000 places on projects that go through the regional planning process.[253] MISO, PJM, ISO-NE, and SPP also exempt immediate-need reliability projects from these obligations.[254] Competitive solicitations in ISO-NE and NYISO have been stymied by such exemptions.[255]

A similar problem plagues the interregional planning process. Just as local development reduces the need for regional planning, so too does regional planning reduce the need for interregional planning. Order No. 1000 required RTOs to coordinate and share the results of their regional transmission plans and identify interregional facilities that would more efficiently and cost-effectively address regional transmission needs.[256] The regional process can thus render interregional planning redundant. Regions identify their reliability needs.[257] Only then do the RTOs determine if those needs can be

251. GRAMLICH & CASPARY, *supra* note 222, at 25-26 (explaining that "the majority of [transmission] investment has been in local transmission and low-voltage projects, planned without a full regional assessment that examines their cost-effectiveness relative to regional alternatives, or in regional infrastructure that is planned to meet reliability needs without assessing how to maximize other types of benefits, or that simply rebuilds or replaces existing infrastructure").

252. MIDCONTINENT INDEP. SYS. OPERATOR, FERC ELECTRIC TARIFF, module A at 1.B (2013).

253. MIDCONTINENT INDEP. SYS. OPERATOR, FERC ELECTRIC TARIFF, attach. FF ¶¶ A.c-.d. (2021).

254. *See* Tom Marshall & Elizabeth McCormick, *FERC Rejects MISO Tariff Revisions Regarding Cost Allocation for Regional and Local Economic Transmission Projects*, TROUTMAN PEPPER: WASH. ENERGY REP. (July 18, 2019), https://perma.cc/8ZNP-FJVT; Tom Marshall & Miles Kiger, *FERC Finds PJM Not in Compliance with Order No. 1000 Immediate Need Reliability Project Exemption*, TROUTMAN PEPPER: WASH. ENERGY REP. (June 24, 2020), https://perma.cc/V68V-FAVQ; *see also* Troutman Pepper, Tom Marshall & Elizabeth McCormick, *FERC Sustains PJM and ISO-NE Immediate Need Reliability Project Exemption Orders*, JD SUPRA (Oct. 9, 2020), https://perma.cc/YC7K-JF98.

255. *See* ISO NEW ENG., NEW YORK ISO & PJM, 2019 NORTHEASTERN COORDINATED SYSTEM PLAN 3 (2020), https://perma.cc/A3JQ-EKUG; Peskoe, *supra* note 149, at 44-46.

256. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842, 49,846 (Aug. 11, 2011) (codified at 18 C.F.R. pt. 35).

257. *See* Pfeifenberger, *supra* note 239, at 35 (describing a MISO study that "[did] not address any interregional opportunities" and explaining that the regional solution is "likely far from optimal for the broader grid").

better resolved through interregional seams.[258] As a result, an RTO that moves forward with a regional plan may resolve its regional needs before determining whether the need could be better addressed through a coordinated transmission plan.[259] In addition, interregional transmission planning has to successfully navigate the regional transmission–planning processes of all of the transmission-planning region in which the new facility will be built. Thus, if one RTO disagrees about how the interregional need can be addressed, or about how to calculate the regional benefits of the interregional project, it can veto an interregional transmission plan.[260]

The result is that virtually no interregional planning occurs today. This is in part because IOUs have financial incentives to pursue those bottom-up, local transmission lines that they know they do not have to compete for. As Ari Peskoe has explained, "In general, IOUs build all transmission projects located in their retail service territories, including segments of projects that span across more than one IOU territory."[261]

Entities' varied incentives also create a timing challenge. Even though regions are in theory supposed to use interregional plans when doing so is more cost-effective than regional planning,[262] the reality is that local and regional planning often occurs before an interregional plan can be evaluated. That, in turn, obviates the need for interregional planning, which makes it more difficult to install the HVDC lines needed to bring electricity generated from renewable-rich regions to population centers that consume a large amount of electricity.

258. *Id.* at 34 ("Regional planning will tend to pre-empt more valuable and cost effective interregional solutions.").

259. *See id.*

260. *See* Ben Stearney, PJM, Joint and Common Market: Interregional Planning Update 2 (2020), https://perma.cc/6XPY-W4XA; Building Through the Future for Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection, 87 Fed. Reg. 26,504, 26,576 (May 4, 2022) (to be codified at 18 C.F.R. pt. 35) ("The Commission clarified that the developer of an interregional transmission facility must first propose its transmission facility in the regional transmission planning processes of each of the neighboring transmission planning regions in which the transmission facility is proposed to be located. The submission of the interregional transmission facility in each regional transmission planning process triggers the procedure under which the public utility transmission providers, acting through their regional transmission planning process, jointly evaluate the proposed transmission project.").

261. Peskoe, *supra* note 149, at 40.

262. *See* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842, 49,907 (Aug. 11, 2011) (codified at 18 C.F.R. pt. 35) (noting that the order's requirements "obligate public utility transmission providers to identify and jointly evaluate interregional transmission facilities that may more efficiently or cost-effectively address the individual needs identified in their respective local and regional transmission planning processes").

b. Methodological differences

Methodological differences compound the difficulties of interregional planning. Each RTO uses its own internal models when valuing transmission. Because these models differ, RTOs often disagree about whether transmission is needed, how much transmission is needed, and where it is needed.[263] Even if the RTOs agree to build transmission, modeling can raise further challenges when it leads to disagreements about who will pay for the new transmission.

These methodological differences are partly responsible for situations in which renewable energy is stranded in a region. For example, wind capacity in SPP is often greater than load, and a significant amount of additional wind is currently sitting in SPP's interconnection queue.[264] However, transmission operators in SPP refuse to build—and pay for—transmission that will be used to export energy to other regions.[265] To fully take advantage of this energy, the RTOs need to coordinate with each other to develop transmission. To do so, however, they must figure out a way to allocate the costs of building transmission so that regions that benefit from transmission pay. Modeling disputes have made it difficult for RTOs to accomplish this.[266]

The RTOs are aware of the need for better coordination, yet they remain unable to reconcile these modeling differences. For example, in 2020, MISO and SPP agreed to jointly evaluate transmission upgrades, in recognition that congestion between the north and south of the two regions was leading to higher energy prices.[267] They failed, however, to move forward on any projects. The RTOs explained that, "[d]ue to differing methodologies between MISO and SPP when calculating benefits and project costs, the two RTOs decided not to pursue any projects in this area as part of the 2020 [Integrated Transmission Plan]."[268]

c. Calculating the benefits of transmission

A third problem is that RTOs "calculate the benefits of transmission narrowly and often consider distinct needs in separate processes. Regional

263. Pfeifenberger, *supra* note 239, at 37-39 (describing barriers to transmission planning created by "divergent criteria").

264. *See GI Active Requests*, SW. POWER POOL, https://perma.cc/YZB9-4ZQQ (last updated Mar. 31, 2022) (showing projects in SPP's interconnection queue to be dominated by wind).

265. JULIE LIEBERMAN, CONCENTRIC ENERGY ADVISORS, HOW TRANSMISSION PLANNING & COST ALLOCATION PROCESSES ARE INHIBITING WIND & SOLAR DEVELOPMENT IN SPP, MISO, & PJM 6 (2021), https://perma.cc/N9AC-L8PL.

266. SW. POWER POOL ENG'G, *supra* note 240, at 3, 79-80.

267. *Id.* at 79-80.

268. *Id.* at 80.

planning typically begins by running a model to determine whether the region has violated any NERC reliability requirements."[269] The RTOs apply NERC transmission system planning performance requirements. Under these requirements, transmission planners must evaluate the region's long-term reliability issues.[270] RTOs often compartmentalize—or silo—a region's reliability needs from the region's economic and policy needs.[271] In doing so, RTOs consider future scenarios that are supposed to analyze how electric demand and the mix of resources could change going forward.

Although reliability projects are usually selected based on cost,[272] economic and policy projects are selected based on the benefit-to-cost ratio.[273] "Those projects that create the most sizable benefits compared to their costs are chosen, and regulators often require a benefit-to-cost ratio of 1.25—meaning that the benefits of a new transmission line should be 25% greater than the costs of building it."[274]

But many RTOs narrowly calculate the benefits of transmission. Most RTOs calculate the benefits using a metric called the adjusted production cost (APC).[275] APC "compares the costs of operating a generation fleet with and without the proposed transmission upgrade."[276] APC further "allows the RTO to identify the monetary savings of operating under normal conditions."[277] Doing so, however, excludes substantial reliability and climate benefits. A resource mix that is geographically diffuse and diversified can (1) improve resilience against extreme weather events; (2) allow grid operators to better respond to transmission outages; and (3) support integration of renewable

269. Pub. Int. Orgs., Comment Letter on Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection 119 (Oct. 12, 2021) [hereinafter Public Interest Comment Letter], https://perma.cc/6RM4-VMWK; *see infra* Part V.

270. STAFF OF THE FERC, REPORT ON BARRIERS AND OPPORTUNITIES FOR HIGH VOLTAGE TRANSMISSION 25 (2020), https://perma.cc/JH55-6U23.

271. Pfeifenberger, *supra* note 239, at 37-39; *see also id.* at 39 (describing how interregional planning compartmentalizes the benefits of new transmission).

272. *See id.* at 7-11.

273. *See* Johannes Pfeifenberger, Brattle Grp., Improving Transmission Planning: Benefits, Risks, and Cost Allocation 38 (2019), https://perma.cc/A3CG-YKEE. To calculate the benefit-to-cost ratio, RTOs quantify the expected benefits of a proposed project and compare those benefits to the costs of building the transmission line.

274. Public Interest Comment Letter, *supra* note 269, at 119; *see* Pfeifenberger, *supra* note 273, at 47.

275. *See, e.g.*, Midcontinent Indep. Sys. Operator, MISO Adjusted Production Cost Calculator White Paper (2021), https://perma.cc/8U5D-6ZSV.

276. Public Interest Comment Letter, *supra* note 269, at 120; *see* Midcontinent Indep. Sys. Operator, *supra* note 275.

277. Public Interest Comment Letter, *supra* note 269, at 120.

energy which provides climate benefits. "These are all quantifiable benefits, but in many cases, RTOs do not count them when calculating the benefits of proposed transmission upgrades."[278]

Again, the siloed approach to energy regulation makes it difficult to build the type of transmission needed to allow renewables to support grid reliability. Here, RTOs' refusal to consider the benefits of such resources causes grid operators to develop transmission plans that do not accommodate an interregional, reliable macrogrid.[279]

d. Utility exit and cost allocation

Finally, the ability of utilities to exit RTOs discourages RTOs from imposing costs that the utilities do not want to bear.[280] This became apparent in the immediate aftermath of Order No. 1000, when MISO tried to adopt a series of ambitious transmission upgrades.[281] Consumers in the eastern part of MISO were expected to experience substantial benefits from these new lines.[282] As a result, MISO planned to impose some of the costs on Duke Power and FirstEnergy.[283]

But before those costs could be allocated to Duke and FirstEnergy, the two utilities decided to leave MISO and join PJM.[284] In doing so, they were able to escape the requirement that they pay for many of the transmission upgrades MISO had proposed.[285]

Utilities have all sorts of reasons to oppose new transmission lines. In some cases, utilities may be concerned that a more integrated grid will create

278. Public Interest Comment Letter, *supra* note 269, at 120; *see* GRAMLICH & CASPARY, *supra* note 222, at 8-9.

279. For one heartening counterexample, see the text accompanying notes 415-17 below.

280. As noted in Part I above, RTOs are *voluntary* regional organizations. Part VI below discusses the possibility of making RTO membership mandatory.

281. *See* Midwest Indep. Transmission Sys. Operator, Inc., 135 FERC ¶ 61,204, at 3-4 (May 31, 2011).

282. MISO allocated costs of new transmission across the entire service territory in part based on the benefits of the new line. *See* MISO Transmission Owners v. FERC, 860 F.3d 837, 841 (6th Cir. 2017) ("[T]he [MISO] Tariff allocates twenty percent of the total 'Project Cost' 'on a system-wide basis to all Transmission Customers and recovered through a system-wide rate.' . . . It allocates the remaining eighty percent of the costs to designated pricing zones and sub-regions, with utilities in those zones paying annual charges calculated under a formula set forth in the Tariff.").

283. *See id.*

284. *See MISO Transmission Owners*, 860 F.3d at 841. This may not have been the only reason for their departure. *See* Rich Heidorn Jr., *MISO Defectors Deny Moves to PJM Are Evidence of Barriers*, RTO INSIDER (July 2, 2013), https://perma.cc/6NJ7-UK6E (to locate, select "View the live page").

285. *See MISO Transmission Owners*, 860 F.3d at 841.

economic challenges for their generation assets as cheaper or cleaner options are now able to compete with their extant generation facilities.[286] In other situations, the utility may want to build transmission itself and not pay a utility located in a different service territory.[287] Utilities' decisions to embrace local projects likely reflect an attempt by those utilities to ensure that they—not a utility located in another part of the RTO—build the transmission infrastructure that supports reliability in that utility's service territory.

Regardless of Duke and FirstEnergy's motivations, the threat of exit makes it difficult for RTOs to impose costs on utilities that do not want to pay for the transmission upgrade or to pursue transmission projects that their IOU members don't want because they facilitate competition against them.

* * *

Virtually no interregional projects have been constructed in the decade since Order No. 1000 went into effect. A more ambitious transformation of transmission planning and financing will be necessary to achieve the macrogrid necessary for a cleaner, more reliable energy system. And in this case, the state, regional, and federal silos must actually be broken down, not accommodated. A national grid requires a federalized planning process that includes local and state stakeholders but does not allow them full veto authority.

3. Toward national planning and cost allocation

FERC, RTOs, and states must make further reforms to realize Order No. 1000's laudable goals of interregional transmission planning and cost allocation. While Order No. 1000 did not lead to regional transmission planning marked by competitive solicitations, FERC should continue to pursue those goals.[288] Transmission planning and cost allocation should be national and mandatory. Utilities should not be able to avoid regional and interregional planning by relying on the local process. Nor should they be able to escape cost allocation by leaving RTOs to avoid costs they do not want to

286. Inquiry Concerning the Commission's Merger Policy Under the Federal Power Act; Policy Statement, 61 Fed. Reg. 68,595, 68,610 (Dec. 30, 1996) (codified at 18 C.F.R. pt. 2) ("Limitations on available transmission capability that prevent competitors from participating in a market can give substantial market power to incumbents in the market."); New York v. FERC, 535 U.S. 1, 8-9 (2002) ("The utilities' control of transmission facilities gives them the power either to refuse to deliver energy produced by competitors or to deliver competitors' power on terms and conditions less favorable than those they apply to their own transmissions.").

287. *See* Peskoe, *supra* note 149, at 29-34.

288. In our view, though, regional planning and cost allocation should be prioritized over competition.

bear. There are a variety of ways to accomplish these goals of breaking down jurisdictional and parochial silos in transmission policy, all of which would appear to be well within FERC's jurisdictional authority, thus requiring little congressional action.

Since 2011, courts have routinely upheld transmission planning that adopts a broad understanding of the benefits of transmission and FERC's authority to promote it. The most important in the line of FERC transmission cases is *South Carolina Public Service Administration v. FERC*, in which the U.S. Court of Appeals for the D.C. Circuit in 2014 broadly upheld the Commission's authority in Order No. 1000 to regulate transmission planning and mandate beneficiary pays cost allocation.[289] Also significant are two Seventh Circuit cases on cost allocation, both called *Illinois Commerce Commission v. FERC* (*ICC II* and *ICC III*, respectively).[290] In *ICC II*, the court upheld MISO's approach to cost allocation.[291] Judge Posner wrote that FERC and the RTOs did not have to precisely quantify all of the benefits and costs of transmission; they just had to make a good faith effort to allocate the costs based on the benefits created by transmission.[292] In *ICC III*, Judge Posner invalidated a PJM transmission plan on the ground that PJM ignored evidence that the east would benefit disproportionately.[293] Read together, these two cases suggest that courts will defer to RTO and FERC determinations of how to allocate costs but will overturn transmission plans that ignore evidence about the costs and benefits of a transmission plan.

These decisions plausibly suggest that FERC and the RTOs are now legally compelled to reform transmission planning and cost allocation to better reflect transmission's scale economies. There is immense evidence that national transmission corridors would improve reliability and reduce electricity costs.[294] Under the logic of these decisions, a just and reasonable transmission-planning process would require that FERC and RTOs develop transmission plans that consider those benefits.

Perhaps the most direct route to developing the necessary macrogrid would be for FERC to create a national transmission-planning authority that

289. 762 F.3d 41, 48-49 (D.C. Cir. 2014).

290. Ill. Com. Comm'n v. FERC (*ICC II*), 721 F.3d 764 (7th Cir. 2013); Ill. Com. Comm'n v. FERC (*ICC III*), 756 F.3d 556 (7th Cir. 2014).

291. *ICC II*, 721 F.3d at 780.

292. *See id.* at 775 (quoting Ill. Com. Comm'n v. FERC (*ICC I*), 576 F.3d 470, 477 (7th Cir. 2009)).

293. *See ICC III*, 756 F.3d at 564-65.

294. Patrick R. Brown & Audun Botterud, *The Value of Inter-regional Coordination and Transmission in Decarbonizing the US Electricity System*, 5 JOULE 115, 130 (2021); LARSON ET AL., *supra* note 46, at 103, 108.

coordinates transmission and allocates the costs of building it.[295] It is unclear, however, whether FERC has jurisdiction to do this. Under the FPA, only utilities can file tariffs with FERC,[296] and transmission utilities are defined as firms that own or operate transmission infrastructure.[297] If utilities do not voluntarily give filing rights to the national planning authority, it is possible that the planning authority would not be able to allocate the costs of new transmission to developers.

This legal interpretation is far from certain. It is also possible that, simply by virtue of participating in one of the interconnections, utilities have engaged in the type of coordination needed to satisfy the FPA's definition of "public utility."[298] If that is the case, then the planning authority would have filing rights. Alternatively, FERC may be able to force all utilities to join RTOs and mandate robust interregional planning.[299] But because FERC's jurisdiction here is speculative, pursuing this route could lead to a protracted legal fight that would itself delay transmission developments.

Alternatively, FERC could work with the RTOs to make sure that they engage in multiregional transmission planning and cost allocation. To do this, we recommend that FERC create a national transmission-planning authority to develop transmission plans. This authority would not need to have filing rights. FERC could therefore develop this planning authority internally or do it through RTOs or NERC. If it relies on RTOs, the Commission should require that the planning authority be independent, as it did in Order

295. *See* BOB ZAVADIL & ALISON SILVERSTEIN, BLUEPRINT FOR A NATIONAL ELECTRIC TRANSMISSION AUTHORITY 1-2 (2021), https://perma.cc/AFV8-YZVG.

296. 16 U.S.C. § 824d. Tariffs are "compilation[s] of all effective rate schedules of a particular company or utility." *Glossary*, FERC, https://perma.cc/LC7B-FW39 (archived Apr. 4, 2022).

297. 16 U.S.C. § 824(e).

298. There is considerable uncertainty about when a firm "operates" a transmission facility such that it receives filing rights under the FPA. *See* FPA, ch. 687, sec. 213, § 201(e), 49 Stat. 803, 848 (1935) (codified as amended at 16 U.S.C. § 824). The D.C. Circuit has clarified that FERC can exercise its section 205 authority to order RTOs that have filing rights to participate in regional planning. *See* S.C. Pub. Serv. Auth. v. FERC, 762 F.3d 41, 55 (D.C. Cir. 2014). FERC cannot, however, order utilities to give up their filing rights. *See* Atl. City Elec. Co. v. FERC, 295 F.3d 1, 9-11 (D.C. Cir. 2002). To our knowledge, no court has clarified what, precisely, constitutes the operation of a transmission facility. *See* FPA sec. 213, § 201(e), 49 Stat. at 848; *cf. Atl. City Elec. Co.*, 295 F.3d at 9-11 (concluding that section 205 bars FERC from ordering utilities to give up their filing rights without addressing the threshold question of whether FERC has jurisdiction under section 201(e)).

299. *See infra* Part VI.

No. 2000.[300] The studies the planning authority conducts would provide a baseline from which to assess the plans submitted by the RTOs.

In addition to the planning authority, FERC should require robust interregional and multiregional planning. Specifically, the Commission should prohibit local exemptions that have undermined regional and interregional planning and mandate that RTOs begin with the multiregional plan. Because FERC and RTOs are required to consider the full costs and benefits of their transmission plan under *ICC II* and *ICC III*, FERC has legal authority to declare the current approach to be unjust and unreasonable on the ground that they fail to consider the full benefits of transmission.

The formation of new interregional planning boards is one way to accomplish this goal.[301] These boards would not have authority to make section 205 filings to FERC, but they would not have to since the RTOs would file the plans the boards developed. Of course, RTOs could try to file alternative plans, but given the massive benefits of multiregional transmission developments, any RTO plan that did not consider those benefits would be unjust and unreasonable—and thus would be rejected by FERC. Thus, while this approach would go through the RTOs (and the RTOs would retain filing rights), it would result in much more interregional and multiregional transmission planning.

This approach would resolve the problems that currently plague transmission planning and cost allocation. A multiregional process would not have inconsistent modeling assumptions, since FERC would require that participants agree on the same methodologies. Moreover, utilities would be unable to escape cost allocation by exiting an RTO, since all of the RTOs would be subject to the planning process. Finally, it is worth mentioning that FERC should require that the plans developed by RTOs and planning boards account for the full benefits of transmission and consider whether a transmission plan will support state policy goals. This way, FERC could avoid completely restructuring today's siloed transmission-planning process while making sure that these silos do not undermine grid reliability or impede the transition to a low-carbon economy.

C. Transmission Siting

To build the interconnected, national macrogrid that will be required to enhance reliability everywhere—not just in pockets of the country—and to

300. For additional discussion on governance, see Part VI below. *See also* Regional Transmission Organizations, 65 Fed. Reg. 810, 810 (Jan. 6, 2000) (codified at 18 C.F.R. pt. 35) (listing independence as a required RTO characteristic).

301. *See* GRAMLICH & CASPARY, *supra* note 222, at 14 (suggesting such boards); LIEBERMAN, *supra* note 265, at 8.

support a decarbonized grid, policy reforms in transmission planning and financing will not be enough. The states, which exercise exclusive jurisdiction over the siting of intrastate and interstate transmission lines, have been one of the primarily obstacles to a clean, reliable grid. As with planning, enhanced federal authority in this policy area will be required. The literature has extensively analyzed the issue of siloed transmission-siting authority and potential solutions to it.[302] Here, we build from this foundation to briefly explore a variety of options for supporting a clean, reliable grid through existing or enhanced federal authority.

1. Working within existing law to site interstate lines

As explained in Part I above, FERC has jurisdiction over the transmission of electricity in interstate commerce and the wholesale sale of electricity in interstate commerce. Unlike with interstate natural gas pipelines, there is (with limited exceptions) no general federal authority over interstate electric transmission lines. Thus, electric utilities and other actors who wish to build transmission lines, including interstate lines spanning several states, must obtain a siting certificate from each state's PUC and navigate the vagaries of divergent state laws—many of which actively impede reliability and clean-energy goals.[303]

In the mid-2000s, Congress attempted to shift some regulatory authority over the approval of interstate electric transmission lines from the states to the federal government to address these concerns, but it was largely unsuccessful.[304] EPAct 2005 created an enhanced role for DOE and FERC in transmission line siting to provide a more national scope of review for transmission lines needed for grid reliability.[305] First, under section 1221 of EPAct 2005, Congress granted DOE authority to designate national interest electric transmission corridors (NIETCs) for regions of the country with documented transmission congestion.[306] It then authorized FERC to use "backstop siting authority" to approve the siting of transmission lines in

302. *See infra* Part IV.C.2.

303. *See* U.S. DEP'T OF ENERGY, SUMMARY OF FINDINGS IN RE APPLICATION OF CLEAN ENERGY PARTNERS LLC PURSUANT TO SECTION 1222 OF THE ENERGY POLICY ACT OF 2005, at 5-6 (2016), https://perma.cc/V7SL-NKZU (describing an example of state impediments to merchant transmission); Klass, *supra* note 137, at 1144-47 (describing state-based barriers to interstate transmission); Klass & Rossi, *supra* note 29, at 424-25 (same); ARK. CODE ANN. § 23-3-205 (2021) (expressly prohibiting merchant transmission lines from obtaining a certificate of public convenience and necessity to foreclose efforts by the Plains & Eastern Clean Line project to obtain one).

304. Klass & Rossi, *supra* note 29, at 452-55.

305. *Id.*

306. *Id.* (quoting 16 U.S.C. § 824p(a)).

NIETCs, and grant transmission companies the power of eminent domain to build them, if states failed to approve those lines.[307]

Not surprisingly, this transfer of regulatory authority from the states to the federal government was strongly opposed by states. In the Ninth Circuit, states quickly and successfully challenged DOE's first efforts to designate NIETCs.[308] States also obtained a Fourth Circuit victory invalidating FERC's rulemaking regarding standards for approving transmission lines in an NIETC.[309]

In 2021, Congress passed the Infrastructure Investment and Jobs Act,[310] which overturned the Fourth Circuit's decision by expressly granting FERC backstop siting authority for transmission lines in NIETCs even in cases where a state had denied a permit. Notably, even prior to that legislation, experts had argued that DOE and FERC could try to employ this authority again elsewhere, given the procedural postures and somewhat narrow application of these holdings.[311] We are skeptical, however, of the viability of using section 1221 to build new long-distance lines, even with the new Congressional authorization to override state permit denials in NIETCs. Apart from the federalism concerns associated with taking such actions, with FERC only acting as a "backstop" siting authority, the process is a clunky one at best.[312]

Another provision of EPAct 2005—section 1222—provides an alternative method for the federal government to facilitate electric-grid expansion, but in a proprietary rather than a regulatory capacity. That section provides new authority to two federal power-marketing authorities to "design, develop, construct, operate, maintain, or own . . . an electric power transmission facility and related facilities . . . needed to upgrade existing transmission facilities" either in partnership with a private transmission line company or

307. *Id.*

308. Cal. Wilderness Coal. v. U.S. Dep't of Energy, 631 F.3d 1072, 1079 (9th Cir. 2011).

309. Piedmont Env't Council v. FERC, 558 F.3d 305, 310 (4th Cir. 2009).

310. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021) (to be codified in scattered sections of the U.S. Code).

311. *See* AVI ZEVIN, SAM WALSH, JUSTIN GUNDLACH & ISABEL CAREY, BUILDING A NEW GRID WITHOUT NEW LEGISLATION: A PATH TO REVITALIZING FEDERAL TRANSMISSION AUTHORITIES 37-46 (2020) (recommending a pathway forward under section 1221 authority).

312. *See, e.g.*, Benjamin Storrow, *Power Lines are Infrastructure Bill's Big Climate Win*, E&E NEWS: CLIMATEWIRE (Nov. 9, 2021, 6:31 AM EST), https://perma.cc/YSW8-5DQ5 (discussing provisions of the infrastructure law that overturned Fourth Circuit decision but cautioning that barriers to new transmission remain); John Decker & Andrew DeVore, *President Biden Signs the Bipartisan Infrastructure Bill into Law, Certain to Fuel Long Standing Debates at FERC*, VINSON & ELKINS: ENERGY UPDATE (Nov. 16, 2021), https://perma.cc/686J-UQNQ (discussing FERC's new legislative authority over transmission and the implementation difficulties FERC may encounter).

independently.[313] As federal actors, these entities need not obtain state siting permits nor rely on state eminent domain authority.

During the Obama Administration, DOE developed regulations to operationalize section 1222 and ultimately granted an application from Clean Line Energy Partners to build the Plains and Eastern Clean Line project to support wind energy. Arkansas had previously denied this line.[314] During the Trump Administration, DOE withdrew from the partnership and the project was sold to NextEra.[315] Nevertheless, authority under section 1222 still exists, and could be used by DOE for projects in the future.[316]

A renewed focus on section 1222 and the federal power-marketing administrations appears more promising than enhancing backstop siting authority under section 1221, for several reasons. First, DOE has already gone through that process once with the Plains and Eastern Clean Line.[317] Second, because it is a public–private partnership, the state law barriers are political, but not legal. Any line built pursuant to section 1222 does not need any state siting permits.[318] Third, even though the power-marketing authorities authorized to use section 1222 do not cover the entire United States, they cover most of the areas in the western and central United States with access to the strongest onshore wind and solar resources, and thus are in areas of the country where long distance, multi-state HVDC and AC lines are most feasible.[319] By contrast, the integration of more renewable energy into the regional grids further east may soon hinge on offshore wind resources, which do not require multistate transmission lines.

Finally, DOE has indicated that it intends to play an enhanced role in supporting the construction of new, regional transmission lines both through

313. 2 U.S.C. § 16421(a).

314. *See supra* note 303 and accompanying text (citing and discussing Arkansas legislation).

315. For a detailed discussion of the Plains & Eastern Clean Line and its demise, see RUSSELL GOLD, SUPERPOWER 127-42 (2019); and Ros Davidson, *Ambitious Clean Line Energy "Wrapping Up,"* WINDPOWER MONTHLY (Feb. 1, 2019), https://perma.cc/MFJ7-NYUU.

316. *See* ZEVIN ET AL., *supra* note 311, at 47-50 (recommending a streamlined section 1222 process for public–private partnerships and more resources for federal power-marketing administrations to pursue transmission investments).

317. *Id.* at 46-49.

318. *Id.* (citing Downwind LLC v. U.S. Dep't of Energy, No. 16-cv-00207, 2017 WL 6542747, at *2-3 (E.D. Ark. Dec. 21, 2017), *vacated as moot*, No. 18-1399, 2018 WL 3648283 (8th Cir. Apr. 18, 2018)).

319. ZEVIN ET AL., *supra* note 311, at 13, 24-25 (providing a map showing the strongest U.S. wind- and solar-energy resources and a map showing the footprint of power-marketing authorities subject to section 1222 of EPAct 2005); *Interconnection Seams Study*, NAT'L RENEWABLE ENERGY LAB'Y, https://perma.cc/SN4V-AZ9H (archived Apr. 5, 2022) (to locate, select "View the live page") (showing a map of regions of the United States with the strongest wind and solar resources).

its prior authority under EPAct 2005 and its new authority and funding under the Infrastructure Investment and Jobs Act. As part of its Building a Better Grid initiative announced in early 2022, the DOE expressed its intent to spend approximately $20 billion in new funding for transmission through grants, financing, and direct expenditures for new transmission to expand renewable energy integration across the country; engage in enhanced coordination with states, tribes, local governments, utilities, and RTOs to facilitate the development of new transmission lines; support research and development for new transmission technologies; and create new NIETCs in areas of the country with transmission congestion.[320] Thus, even if FERC does not play a major role in direct permitting of interstate lines, the DOE has the opportunity to do so through its own authority and funding, and can partner with FERC, states, RTOs, and utilities in doing so.[321]

2. Permitting and eminent domain reforms that can build a reliable, decarbonized grid

A full build-out of the necessary macrogrid is also likely to require enhanced federal or regional permitting authority. Experts have long proposed siting and permitting reforms to address the mismatch between state authority over transmission line siting and the regional and national scope of the nation's electric grid.[322] Proposals include (1) Congress granting additional siting authority to FERC, as was done in the early part of the twentieth century for interstate natural gas pipelines[323]; (2) Congress granting greater authority to RTOs to approve transmission lines that focus on more regional permitting while matching existing regional grid planning[324]; and (3) Congress creating federal standards regarding process and timing for states to implement—similar to what Congress did through the Telecommunications Act of 1996 to ease local siting barriers for telecommunication towers.[325]

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320. *See Fact Sheet: Biden–Harris Administration Races to Deploy Clean Energy That Creates Jobs and Lowers Costs*, WHITE HOUSE (Jan. 12, 2022), https://perma.cc/DHM3-6UG2; Peter Behr & Miranda Willson, *Details Emerge About DOE, FERC Grid Plans for Clean Energy*, E&E NEWS: ENERGYWIRE (Jan. 13, 2022, 7:22 AM EST), https://perma.cc/DN59-XTF9 (to locate, select "View the live page").

321. *See, e.g.*, Behr & Willson, *supra* note 320 (considering this potential outcome and discussing state opposition to federal agency encroachment on state siting authority).

322. Joshua C. Macey, *Zombie Energy Laws*, 73 VAND. L. REV. 1077, 1122-25 (2020); Alexandra B. Klass & Elizabeth J. Wilson, *Interstate Transmission Challenges for Renewable Energy: A Federalism Mismatch*, 65 VAND. L. REV. 1801, 1858-69 (2012).

323. *See* Klass & Wilson, *supra* note 322, at 1858-65; Klass, *supra* note 224, at 540-42.

324. *See, e.g.*, Alexandra B. Klass, *The Electric Grid at a Crossroads: A Regional Approach to Siting Transmission Lines*, 48 U.C. DAVIS L. REV. 1895, 1948-51 (2015).

325. *See id.* at 1951-52 (discussing federal siting provisions in the Telecommunications Act of 1996).

We believe that all of these reforms would be a significant improvement over the status quo. They would realign transmission-line-siting authority with both transmission-planning reforms and the need for a national macrogrid to maintain grid reliability. Since many of these reforms require congressional action, we recommend that Congress and the Biden Administration seriously consider such proposals—going beyond what Congress enacted in the 2021 Infrastructure Investment and Jobs Act—despite the potential backlash from states. For reforms to be feasible, the federal government will have to reach across the current silos and work with the willing states while developing strategies to overcome other states' intransigence.

FERC has indicated an interest in doing just that. In June 2021, it announced a joint federal–state task force on electric transmission.[326] We are hopeful that this will realize the Commission's goal of "secur[ing] the benefits that transmission can provide . . . in the public interest."[327] Given states' historical reluctance to build transmission, however, we are also skeptical that it will achieve the necessary large-scale reform.

For this reason, we continue to support shifting some siting authority from the states to either RTOs or FERC along the lines described above. Commissioner Christie recently pointed out that there has been "an increasing divergence of public policies in states that are members of multi-state RTOs/ISOs, over such fundamental issues as mandated resource mixes, compensation in capacity markets, transmission-planning criteria and cost allocation, and carbon taxes."[328] States that control siting decisions are able to effectively veto the type of large-scale transmission projects needed to connect renewables to large load areas. This is one area where siloing is fatal to a clean and reliable power grid, and where some centralization of the permitting process is needed to break the states' authority to veto developments that are critical to grid reliability.

V. Reliability Regulation: NERC Reforms

A final key area of U.S. energy policy and governance that requires transformation is, predictably, the direct regulation of reliability—a serious

326. *See* Joint Fed.–State Task Force on Elec. Transmission, 175 FERC ¶ 61,224, at 1 (June 17, 2021).

327. *Id.* at 1-2.

328. State Voluntary Agreements to Plan and Pay for Transmission Facilities, 175 FERC ¶ 61,225, at 2-3 (June 17, 2021) (Christie, Comm'r, concurring).

task shouldered by NERC (the North American Electric Reliability Corporation).[329]

The reliability of the electric grid centrally depends on a complex set of policies pertaining to markets for energy capacity and generation, as well as transmission planning, financing, and construction, as explored above. Another central piece of the reliability puzzle is the direct regulation of the reliability of all the grid components introduced above and more. NERC writes and administers standards with extensive assistance from regional subsets of NERC called regional entities, and with oversight from FERC.[330] Owners and operators of power plants, transmission lines, transformers, and other grid components, which collectively form the "bulk electric system," are required by reliability regulations to comply with these standards.

Reliability regulations, which are called "reliability standards," cover most facets of the grid. They address everything from properly training workers who install and maintain bulk electric system components to requiring tree trimming around transmission lines to ensuring adequate capacity.[331] Indeed, the approaches to securing capacity that we discussed in Part III above—capacity markets, minimum capacity thresholds, and price-based systems such as those in Texas—are partially designed to meet federal reliability standards for capacity.[332]

In covering nearly all grid components and operations, reliability standards implicate the three sets of silos introduced above. First, they centrally affect both the reliability and the amount of clean energy installed on

329. *See About NERC*, *supra* note 26 (explaining that "NERC is the [ERO] for North America").

330. 16 U.S.C. § 824o(a), (d).

331. *See United States Mandatory Standards Subject to Enforcement*, N. AM. ELEC. RELIABILITY CORP., https://perma.cc/RH65-6DWR (archived Apr. 5, 2022).

332. NERC itself does not prescribe minimum generation capacity that must be maintained by grid operators. However, NERC publishes criteria that must be included in capacity planning and regularly compares capacity (planning reserves) with NERC's ideal levels of reserves. NERC's regular assessments of planning-reserve margins, which analyze the adequacy of capacity, aim to influence grid-operator decisions and policymakers who control generators and grid operators. *See* N. AM. ELEC. RELIABILITY CORP., 2020 LONG-TERM RELIABILITY ASSESSMENT 8 (2020) [hereinafter 2020 LONG-TERM RELIABILITY ASSESSMENT], https://perma.cc/3MXQ-K3VU (assessing the adequacy of capacity in all regions governed by NERC and noting that "[w]hile NERC does not have authority to set Reliability Standards for resource adequacy . . . NERC independently evaluates where reliability issues may arise"); N. Am. Elec. Reliability Corp., Standard BAL-502-RF-03, at 1 (n.d.) [hereinafter Standard BAL-502-RF-03], https://perma.cc/UJL6-LKMZ (requiring regulated NERC entities to conduct annual resource-adequacy analyses with specific requirements, including a planning-reserve margin, to address NERC's reliability standard, but not setting a specific numerical requirement for resource adequacy or planning-reserve margin).

the grid. For example, NERC's requirement that grid operators plan for and report adequate generation capacity—an assurance that there will be enough operable generation infrastructure to meet all demand—aims to limit a major electrical outage to only one day every ten years.[333] This standard requires the entity responsible for regulating capacity—an RTO or balancing authority—to model the adequacy of capacity and to describe the model's assumptions regarding intermittent generation resources, such as wind.[334] Capacity models that overestimate the risk that renewable energy capacity poses to reliability undervalue this capacity and could discourage its construction. And as explored here, current reliability standards do not adequately account for the reliability attributes of sources that can operate on clean energy, such as microgrids.

Second, reliability standards cross jurisdictional silos because of their universal nature. For example, utilities must obtain permission from a state regulatory commission or municipal officials to recover the costs of complying with a variety of NERC mandates.[335] Reliability standards also apply at the regional level and affect regional decisionmaking. RTOs regularly request permission to recover costs associated with NERC compliance through the rates for transmission line service charged by RTOs.[336] At the federal level, FERC reviews all NERC reliability standards and the enforcement of those standards. FERC and NERC sometimes work together to address the cause of reliability problems and to draft new standards in response.

333. Standard BAL-502-RF-03, *supra* note 332, at 1 (describing the required resource-adequacy analysis for the "'one day in ten year' loss of load expectation principles" (capitalization altered)).

334. *Id.* at 1-2.

335. *See* PAUL W. PARFOMAK, CONG. RSCH. SERV., R45135, NERC STANDARDS FOR BULK POWER PHYSICAL SECURITY: IS THE GRID MORE SECURE? 18 (2018) (discussing "state public utility commissions which regulate the rates grid owners may charge for electric transmission and distribution service" and noting that these commissions "must be convinced that any new grid security capital costs and expenses are necessary and prudent before they will allow them to be passedthrough to ratepayers"); *id.* at 13 (noting that for changes in utility capital and operational spending, including spending on efforts to comply with NERC requirements, "[p]ublicly owned utilities may need approval from cooperative boards, or municipal or federal officials").

336. *See, e.g.*, Midwest Indep. Transmission Sys. Operator, Inc., 135 FERC ¶ 61,118, at 1-2 (May 6, 2011) (approving MISO's recovery of NERC compliance penalties through rates); Letter from Monica Gonzalez, Couns., ISO New England, Inc., to Kimberly D. Bose, Sec'y, FERC (Jan. 6, 2020), https://perma.cc/7CB9-UJT7 (including a filing that requests cost recovery for compliance with NERC standards); *cf.* Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards, 71 Fed. Reg. 8662, 8686 (Feb. 17, 2006) (codified at 18 C.F.R. pt. 39) (noting that FERC "will allow recovery of all costs prudently incurred to comply with the Reliability Standards").

Reliability standards also centrally involve public and private silos. NERC itself is a 501(c)(6) nonprofit corporation, and the regional entities that propose reliability standards to NERC and enforce these standards are 501(c)(3) organizations. Indeed, the regulation of the reliability of the U.S. grid was entirely in private hands until 2005. As noted in Part I above, from the 1960s through 2005, the North American Electric Reliability Council—NERC's predecessor, which was an association of electric utilities—was solely responsible for assuring grid reliability through privately administered standards.[337] NERC, with input from its regional entities, now writes reliability standards for approval by FERC and, with the help of regional entities, enforces these standards—also with FERC approval. Regional entities, in turn, write and enforce *regional* reliability standards that only apply within their territories.[338]

The clean energy–reliability, jurisdictional, and public–private silos present both challenges and opportunities for regulating the reliability of the U.S. grid while expanding clean-energy generation. Specifically, the silos impede or enhance two specific challenges of reliability regulation. First, as highlighted by the events in the U.S. South in 2021, all types of power plants, both conventional and clean, and their fuel supplies, require better reliability standards that address weather extremes and other emergencies, many of which are at least partially caused by climate change. Second, in improving reliability standards, NERC and FERC must better recognize and leverage the value that clean-energy resources can offer in terms of enhancing reliability. Siloed reliability regulation makes these two efforts challenging, but it can also pose opportunities for incorporating clean-energy resources solidly within clean-energy standards. This Part uses Winter Storm Uri and historical approaches to regulating reliability for extreme cold-weather events to illustrate the broader challenges associated with updating reliability regulations and incorporating clean energy into these standards. It explores the weaknesses of some modern reliability regulations and then analyzes the challenges and opportunities posed by silos when it comes to updating these regulations to address modern extremes and clean-energy values.

337. NEVIUS, *supra* note 140, at 5-9, 85.

338. *See, e.g.*, *Standards*, RELIABILITYFIRST, https://perma.cc/7KF4-ZM6F (archived Apr. 5, 2022) ("ReliabilityFirst also maintains Regional Reliability Standards as needed to provide for the reliable regional and sub-regional planning and operation of the Bulk Power System.").

A. Weaknesses of Current Reliability Regulation: The Case of Cold Weather

The U.S. electricity grid faces a growing number of threats.[339] One such threat, which regulators have repeatedly studied yet failed to fully address, is the loss of generation capacity from extreme weather, such as extreme cold.[340] This does not always result in the loss of power to customers. Grid operators often manage to cobble together adequate backup reserves—particularly when they can draw from generation capacity in regions that are not experiencing the extreme weather. But Winter Storm Uri in 2021 involved major capacity losses and outages in Texas and neighboring states.

The winter events of 2021 that caused these outages were not entirely an anomaly. Indeed, similar cold-weather events in 2018, 2014, 2011, and earlier years had caused NERC, FERC, RTOs, and regional entities to investigate the events and associated outages and propose changes. In 2011, following "unusually cold and windy weather" and associated outages in the Southwest, NERC, FERC, and the regional entities affected by the cold—including the Texas Reliability Entity—analyzed the causes of capacity outages during the cold snap.[341] In the individual states affected by the cold, utility regulatory commissions and legislatures also initiated investigations and inquiries.[342]

The joint NERC–FERC 2011 report examined past winter events and individual state responses to those events as well, examining similar "cold weather events in 1983, 1989, 2003, 2006, 2008, and 2010" in the Southwest, including two events that involved colder weather than that experienced in 2011.[343] After exploring the causes and consequences of power outages in 2011 and previous years, FERC and NERC identified needed changes, including, for example, (1) avoiding scheduled power-plant outages for maintenance and other reasons during projected cold-weather events; (2) designating natural gas facilities that supply power plants as "critical and essential loads" that should continue to receive electricity even during events causing shortages; and

339. *See, e.g.*, N. AM. ELEC. RELIABILITY CORP., 2021 ERO RELIABILITY RISK PRIORITIES REPORT 17, 22-34 (2021), https://perma.cc/KBY9-SG9M (identifying "grid transformation," "extreme events" such as wildfires, pandemics, flooding, and drought, "security risks," and "critical infrastructure dependencies" as the greatest reliability threats in 2021).

340. *See id.* at 26-28.

341. FERC & N. AM. ELEC. RELIABILITY CORP., REPORT ON OUTAGES AND CURTAILMENTS DURING THE SOUTHWEST COLD WEATHER EVENT OF FEBRUARY 1-5, 2011: CAUSES AND RECOMMENDATIONS 1-2 (2011).

342. *Id.* at 2.

343. *See id.* at 169-87.

(3) requiring "generators to perform winterization."[344] Regional entities and states did not consistently implement these recommendations, however, as evidenced by the fact that the same shortcomings were some of the primary causes of the extensive outages in Texas in 2021.[345]

Similarly, after extreme cold in the form of a "polar vortex" enveloped the "Midwest, South Central, and East Coast regions of North America" in 2014, regional entities such as ReliabilityFirst, with the assistance of the two RTOs in which it operates—MISO and PJM—investigated the causes of capacity losses and suggested "areas for improvement."[346] These suggestions included a recommendation that the entities subject to reliability standards, such as operators of power plants and transmission lines, "review their power plant weatherization programs."[347] NERC also conducted a "Polar Vortex Review" in 2014, recommending that power plants review their ability to maintain natural gas supply and transport through pipelines even in the face of cold weather and "[r]eview and update power plant weatherization programs."[348] Also in 2014, FERC—citing to the 2011 and 2014 cold-weather events—required all RTOs affected by the polar vortex to provide data on the causes of frozen equipment and "policy and procedural changes" to address RTOs' awareness of "generators' ability to run at extreme ambient temperatures," among other data.[349] Yet again in 2019, FERC and NERC issued a report on outages in the South Central United States after a 2018 cold-weather event, noting that

344. *See id.* at 195-96; *see also id.* at 90-91 (defining critical-load customers as those that are "either exempt from rolling outages or are given a higher priority for preservation of service").

345. UNIV. OF TEX. AT AUSTIN ENERGY INST., *supra* note 8, at 8-9 ("Some power generators were inadequately weatherized; they reported a level of winter preparedness that turned out to be inadequate to the actual conditions experienced."); *id.* at 9 (noting that some critical power plants supplying natural gas infrastructure were not identified as critical load and had even been identified as the opposite—infrastructure that could be shut down during periods of peak demand); *see also* FERC ET AL., *supra* note 13, at 17 ("Despite multiple prior recommendations by FERC and NERC, as well as annual reminders via Regional Entity workshops, that generating units take action to prepare for the winter (and providing detailed suggestions for winterization), 49 generating units in SPP (15 percent, 1,944 MW of nameplate capacity), 26 in ERCOT (7 percent, 3,675 MW), and three units in MISO South (four percent, 854 MW), still did not have any winterization plans.").

346. RELIABILITYFIRST, RELIABILITYFIRST'S REVIEW OF WINTER PREPAREDNESS FOLLOWING THE POLAR VORTEX, at iii, 1 (2015), https://perma.cc/3G4M-T8V6.

347. *Id.* at 7.

348. N. AM. ELEC. RELIABILITY CORP., POLAR VORTEX REVIEW, at iii (2014), https://perma.cc/WB55-KLNJ.

349. Letter from Michael Bardee, Dir., FERC Off. of Energy Reliability, to Ne. Power Coordinating Council, Inc. et al. 2-4 (Sept. 26, 2014), https://perma.cc/3MWK-886B.

"[m]ore than one-third" of the generators that stopped generating electricity during the cold weather "did not have a winterization plan."[350]

In short, the panoply of actors responsible for writing and implementing reliability standards repeatedly identified the causes of power outages during extreme cold and proposed solutions. Yet many of these solutions—particularly mandatory winterization—were not consistently implemented.[351] And repeatedly, regional entities, FERC, and NERC only *recommended* solutions such as winterization of power plants, despite having the power to mandate winterization.[352] After the 2014 polar-vortex event, ReliabilityFirst emphasized that its recommendations "are not, and should in no way be construed as, directives to industry to undertake any actions."[353] Likewise, NERC recommended that entities "continue or *consider* implementing a program of periodic site reviews of generation facilities' winter preparation."[354] NERC did not formally consider mandatory weather-readiness standards until 2019, when it published proposed standards for comment. Following Winter Storm Uri in 2021, the NERC Board of Trustees voted to "direct the completion" of cold-weather reliability standards first proposed in 2019 by June 2021.[355]

Equally important, it appears that none of the many reports addressing the semi-regular occurrences of "unusually" cold weather in the South have assessed the substantial costs of continuing to rely on winterization of utility-scale power plants—and particularly fossil fuel–fired power plants—as compared to expanding microgrids. Nor have they compared these costs to the benefits and costs of expanding microgrids and other distributed (small-scale) resources such as home batteries paired with rooftop solar.[356] Indeed, one

350. FERC & N. AM. ELEC. RELIABILITY CORP., THE SOUTH CENTRAL UNITED STATES COLD WEATHER BULK ELECTRIC SYSTEM EVENT OF JANUARY 17, 2018, at 10 (2019), https://perma.cc/SP6V-U8GS.

351. *See supra* note 345 and accompanying text.

352. *See, e.g.*, FERC & N. AM. ELEC. RELIABILITY CORP., *supra* note 341, at 203-04; N. AM. ELEC. RELIABILITY CORP., *supra* note 348, at 19-20. NERC presumably has this authority (at least in its own view) because its staff, along with the staff of FERC and regional entities, have now recommended federal reliability standards that mandate winterization plans and actions. *See* FERC ET AL., *supra* note 13, at 18.

353. RELIABILITYFIRST, *supra* note 346, at iii.

354. N. AM. ELEC. RELIABILITY CORP., *supra* note 348, at 20 (emphasis added).

355. *Project 2019-06 Cold Weather*, N. AM. ELEC. RELIABILITY CORP., https://perma.cc/F9Z4-58ZR (archived Apr. 6, 2022).

356. N. AM. ELEC. RELIABILITY CORP., *supra* note 348, at 19-20 (recommending improved weatherization programs but not discussing distributed solar or microgrids); FERC & N. AM. ELEC. RELIABILITY CORP., *supra* note 341, app. at 34 (discussing the costs of weatherization but not comparing these with the costs of microgrids or distributed solar); FERC & N. AM. ELEC. RELIABILITY CORP., *supra* note 350, at 166-67

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report noted the expense of using a distributed solar-powered unit at a natural gas–well site to ensure continued production of natural gas for power plants even during cold weather—ignoring the value that such generation could provide elsewhere.[357] Distributed solar, batteries, and microgrids could provide substantial reliability benefits without locking in fossil fuel–fired infrastructure that will continue exacerbating the very climatic conditions that are contributing to weather extremes.[358]

Cold-weather events, of course, are not the only causes of reliability failures. In part due to climate change, other extreme events such as wildfires and droughts have also caused electricity outages.[359] But they provide an example of the challenges that reliability regulators have faced in ensuring that reliability standards keep pace with modern events. As catastrophes at least partially induced by climate change continue to wreak havoc on the grid, and as we move toward more clean-energy infrastructure, it is important to examine the challenges of updating reliability standards for both clean and conventional infrastructure. Given the expansion of clean energy and its potential to enhance reliability, reliability regulators must better incorporate the reliability attributes of clean energy into standards rather than focusing so heavily on the risks. The three planes of siloed energy regulation can impede or enhance these efforts, as explored below.

B. Crossing Substantive Silos

In the sphere of substantive silos between clean energy and reliability, all actors responsible for writing and implementing reliability standards need to better integrate the current divide between the mission of reliability regulation and clean-energy mandates. For example, most of the reports following the outages associated with the cold-weather events in the U.S. South tend to focus on the direct causes of those outages, such as frozen electricity-generation infrastructure and frozen fuel-supply components.[360] This is important, but additional reports should examine how to replace some parts of the existing system rather than simply weatherizing it. For example, in some cases,

(recommending winterization but not assessing the value of microgrids or distributed solar).

357. FERC & N. AM. ELEC. RELIABILITY CORP., *supra* note 341, app. at 36 (describing winterization expenses for a solar-powered pump under a gas well).

358. *See, e.g.*, I. Waseem, M. Pipattanasomporn & S. Rahman, Reliability Benefits of Distributed Generation as a Backup Source 7 (2009) (unpublished manuscript), https://perma.cc/L2JH-MQKA (noting that when distributed generation resources are located on portions of the grid that can be disconnected from the larger grid, they "can supply the loads cut off from the substation" in the event of certain grid failures).

359. *See* N. AM. ELEC. RELIABILITY CORP., *supra* note 339, at 27.

360. *See, e.g.*, *supra* text accompanying notes 344, 347-50.

expanding the amount of solar and wind energy on the grid could address the fuel-supply issues that arise for sources like natural gas during cold weather, when wells and pipeline components freeze. Wind and sun are also sometimes scarce during and immediately following a cold-weather event, but they could help to fill in some fuel-supply gaps given that fuel in the form of sunlight and wind does not freeze—provided the wind- and solar-generation infrastructure is also adequately winterized. Furthermore, recommendations following cold weather and other extreme events should focus more heavily on the value of geographic diversity in grid operations. When one part of the country is enveloped in cold or heat, for example, a well-connected grid would allow the importation of electricity—from either clean or conventional sources—from regions experiencing different conditions.[361]

Additionally, very local generation supply can be key during widespread outages, whether these are caused by drought (and associated unavailability of water for conventional power plants or hydroelectricity), wildfires, extreme temperatures, or severe storms. NERC, FERC, and regional entities should more consistently recognize the value of small energy resources such as rooftop solar coupled with storage, and microgrids—including microgrids that can run on green hydrogen—in helping to fill supply gaps during reliability incidents. Some states have begun to do this, requiring the consideration of non-wires (non-transmission) alternatives in transmission planning.[362]

FERC, too, has taken several initiatives to incorporate renewable energy and other alternatives to conventional generation into wholesale markets, despite grid operators' concerns about the intermittency of renewable energy. For example, FERC developed uniform standards for the interconnection of renewable energy to the grid, thus preventing grid operators from using arbitrary or inconsistent data and excuses for refusing interconnection.[363] FERC also required RTO wholesale markets to allow energy nonuse in lieu of generation to maintain a balance of supply and demand during periods of peak

361. *See supra* note 237 and accompanying text.

362. *See, e.g.*, TOM STANTON, NAT'L REGUL. RSCH. INST., GETTING THE SIGNALS STRAIGHT: MODELING, PLANNING, AND IMPLEMENTING NON-TRANSMISSION ALTERNATIVES STUDY 9-13 (2015) (describing state guidelines, policies, and regulations for non-transmission alternatives).

363. Interconnection for Wind Energy, 70 Fed. Reg. 34,993, 34,995-96 (June 16, 2005) (codified at 18 C.F.R. pt. 35); Standardization of Small Generator Interconnection Agreements and Procedures, 68 Fed. Reg. 49,974, 49,974-75 (Aug. 19, 2003) (to be codified at 18 C.F.R. pt. 35); Standardization of Small Generator Interconnection Agreements and Procedures, 70 Fed. Reg. 34,190, 34,190-92 (June 13, 2005) (codified at 18 C.F.R. pt. 35); Reform of Generator Interconnection Procedures and Agreements, 83 Fed. Reg. 21,342, 21,343 (May 9, 2018) (codified at 18 C.F.R. pt. 37).

demand.[364] Further, FERC required that distributed resources, such as rooftop solar, have the opportunity to participate in RTO and ISO markets.[365] In so doing, it emphasized the reliability benefits of these resources. For example, FERC noted the small lead time needed to build distributed energy resources, thus allowing these resources to "respond rapidly to near-term generation or transmission reliability-related requirements" and to enhance reliability.[366] But these policies do not directly regulate reliability, and NERC has been slow to incorporate clean energy into reliability standards.

NERC has made some progress toward including clean-energy considerations into its regular reviews of grid reliability. For example, in 2017, NERC wrote a report on distributed energy resources that focused on how modeling and projections for the reliability of the grid needed to change in order to address the growing use of these resources.[367] But this report primarily addressed the reliability risks posed by distributed energy resources, leaving for another day the agency's observation that some of these resources "have the capability to ride through [grid] disturbances" and "contribute reliability services."[368] In the report, NERC also listed the existing reliability standards that addressed the extent to which transmission operators could obtain information from distributed resources so as to accurately predict their impact on reliability.[369] But again, it did not suggest how standards could be modified or added to capture the reliability benefits of distributed energy. Further, NERC has only addressed renewables in fits and starts within other

364. Wholesale Competition in Regions with Organized Electric Markets, 73 Fed. Reg. 64,100, 64,101-02 (Oct. 28, 2008) (codified at 18 C.F.R. pt. 35); Demand Response Compensation in Organized Wholesale Energy Markets, 76 Fed. Reg. 16,658, 16,658-59 (Mar. 24, 2011) (codified at 18 C.F.R. pt. 35).

365. Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators, 85 Fed. Reg. 67,094, 67,095-96 (Oct. 21, 2020) (codified at 18 C.F.R. pt. 35).

366. *Id.* at 67,096.

367. N. AM. ELEC. RELIABILITY CORP., DISTRIBUTED ENERGY RESOURCES: CONNECTION, MODELING, & RELIABILITY CONSIDERATIONS, at iv-v (2017), https://perma.cc/R63J-H2LV.

368. *Id.* (omitting from discussion the dispatch of distributed energy resources to provide these sorts of benefits to the power system); *id.* at iv (specifying that the "report discusses the potential reliability *risks* and mitigation approaches for increased levels of" distributed energy resources on the bulk power system (emphasis added)). NERC also wrote a report on renewable energy and distributed resources in 2015, which similarly focused on reliability risks. *See* N. AM. ELEC. RELIABILITY CORP., ESSENTIAL RELIABILITY SERVICES TASK FORCE MEASURES FRAMEWORK REPORT, at iv-v (2015), https://perma.cc/UC7X-N8CP (noting that variable generation (the retirement of coal-fired power plants and the increase in renewables), as well as distributed generation and demand response (the reduction of energy use during peak demand), "will challenge system planners and operators to maintain reliability").

369. N. AM. ELEC. RELIABILITY CORP., *supra* note 367, at 25-26, 37-38.

reliability reviews. For example, in its assessment of reliability and reliability challenges for summer 2021—when heat waves taxed the electric grid—NERC noted that in Texas, "generator performance . . . is optimized for summer conditions" even though there is not a great deal of generation capacity in excess of demand.[370] This optimization is due to the "diverse mix of fuel types, including natural gas, nuclear, on-shore and coastal wind, solar, and a small amount of coal-fired generation."[371] Given U.S. clean-energy and reliability imperatives, NERC should comprehensively identify the potential for clean-energy resources to enhance reliability and incorporate this knowledge into standards and guidelines, through a newly established technical committee or task force.

The jurisdictional silos in the area of reliability regulation could both enhance and impede this effort to meld reliability and clean-energy values while strengthening reliability standards, as explored below.

C. Leveraging Jurisdictional Silos

The complex web of actors involved in reliability regulations poses both opportunities and hurdles with respect to enhancing reliability standards to address modern problems, such as more extreme weather, and incorporating clean-energy benefits into these standards. On the upside, the fact that reliability regulation involves regional actors that cross state and other regional lines, in addition to a federal agency and national organization, means that innovations in regulation that embrace the reliability attributes of clean energy could trickle up to the federal level.

Take the example of ReliabilityFirst—one of NERC's six regional entities. This corporation is responsible for implementing NERC standards in all or parts of thirteen states and the District of Columbia,[372] and its territory covers parts of two RTOs—PJM and MISO.[373] ReliabilityFirst and the five other regional entities can and sometimes do bring important reliability issues to the attention of NERC or make direct recommendations to the grid operators and owners that they regulate. For example, as noted above, following the 2014 polar vortex, ReliabilityFirst recommended several best practices that would have prevented some of the problems experienced in Texas in 2021, including, for example, limiting planned outages of generation when cold weather was forecasted, securing natural gas and alternative fuel supplies even in the face of

370. N. AM. ELEC. RELIABILITY CORP., 2021 SUMMER RELIABILITY ASSESSMENT 9 (2021), https://perma.cc/4P2A-6UX4.

371. *Id.*

372. *About Us*, RELIABILITYFIRST, https://perma.cc/KK4B-X2PX (archived Apr. 7, 2022).

373. ReliabilityFirst, ReliabilityFirst Newsletter 10 (Nov./Dec. 2021), https://perma.cc/B4R3-KJRM.

cold weather, and winterizing equipment.[374] Texas's regional entity took similar action, recommending improvements and conducting "spot checks" of utilities; this resulted in several power plants implementing weatherization recommendations, such as replacing thermostats and other equipment that measured ambient air temperature at power plants.[375] But as shown by the events in Texas, especially, in 2021, these measures were not enough. Not all plants had winterized, and fuel-supply issues caused major capacity outages. These challenges highlight the downside of jurisdictional silos in the reliability regulation space.

Although regional subunits of NERC have the potential to recommend innovative or more effective reliability approaches, the presence of regional entities, NERC, and FERC in the reliability space poses several silo-based problems. First, FERC, NERC, and regional entities lack jurisdiction over many facets of fuel supply—one of the main problems that contributed to the 2021 blackout in Texas.[376] States primarily regulate natural gas wells, gathering lines that collect gas from those wells, intrastate natural gas pipelines, and natural gas distribution lines. Therefore, although NERC can (and has) recommended mandatory winterization of power plants, it lacks the authority to mandate winterization of these state-regulated fuel-supply components for power plants. This leaves NERC in the relatively weak position of recommending that "Congress, state legislators, and regulators with jurisdiction over [these] facilities . . . should require those gas facilities to have cold weather preparedness plans" and that these facilities "should consider implementing measures to protect against freezing and other cold-related limitations."[377]

A second limitation posed by jurisdictional silos in the area of reliability regulation is the free-riding threat. As noted above, several regional entities—including the Texas regional entity—had recommended winterization of plants prior to the 2021 crisis, as had NERC and FERC.[378] But the numerous actors operating in the reliability space, at different jurisdictional levels, might

374. RELIABILITYFIRST, *supra* note 346, at 5-7.

375. *See, e.g.*, ReliabilityFirst, RF 2020-2021 Outreach Approach, Lessons Learned, Best Practices & Cold Weather SAR Update 6-11 (n.d.), https://perma.cc/79ZP-CF96 (noting winterization responses by utilities such as replacing plant equipment that measures ambient temperature and thermometers on transmitter boxes).

376. *See, e.g.*, N. AM. ELEC. RELIABILITY CORP., *supra* note 236, at 5 (noting that "[d]uring the Event, [well] shut-ins," or closures to make wells nonproducing, "and unplanned outages of natural gas wellheads, as well as unplanned outages of gathering and processing facilities, resulted in a decline of natural gas available for supply and transportation to many natural gas–fired generating units in the south-central U.S.").

377. *Id.* at 24.

378. *See supra* notes 374-75 and accompanying text.

have created a false sense of complacency, with NERC and FERC potentially assuming that regional entities and RTOs were doing enough, or vice versa. This is similar to the regulatory gaps that emerge in a regulatory commons as discussed in Part II above, in which numerous actors have partial regulatory authority and may assume that the other actors have addressed a problem. Indeed, the remarks of American Electric Power (AEP)—a large utility—on proposed mandatory winter reliability standards are illustrative. AEP argued against mandatory standards in part because it believed that numerous organizations had already adequately addressed the risks. It pointed to NERC's guidelines and guidance documents from RTOs and regional entities and argued that "ERCOT already has a suitable mechanism in place, which has proven itself in practice."[379] Here, FERC—as the umbrella organization overseeing all reliability standards and thus benefitting from a bird's-eye view—could have done more to identify and recognize regulatory gaps that remain despite (and in part due to) multiple actors operating in the reliability space.

The weaknesses of some reliability standards and NERC's failure to adequately incorporate the reliability benefits of clean energy into reliability standards might also arise from public–private silos in the reliability regulation space. Here again, however, there are some benefits to these silos, which could enhance reliability standards for clean energy and protect against overly weak standards.

D. Bridging Public–Private Values in Public–Private Energy Silos

The status of NERC as an organization that relies centrally on private entities to draft and enforce standards (with government oversight) is beneficial in part. Utilities are keenly aware of the nuanced and technical requirements for maintaining a reliable grid—more so, perhaps, than anyone else. Additionally, the structure of NERC and its regional entities may protect against undue political influence of the relatively wealthy, well-resourced utilities subject to reliability standards. This potentially helps to support adequately protective standards and innovative standards that recognize the value of relatively new entrants to the market, including, for example, small-scale renewables. In drawing together public and private members from a variety of geographies, from areas governed by RTOs and not governed by RTOs, and from areas with competitive and noncompetitive state markets, NERC's regional entities may serve as entities that the political-science literature describes as "boundary organizations." These are organizations that can transcend typical political (and other) divisions by shaking up traditional

379. N. AM. ELEC. RELIABILITY CORP., COMMENT REPORT ON 2019-06 COLD WEATHER STANDARD AUTHORIZATION REQUEST (2019), https://perma.cc/Z4MF-VDZ9.

authority structures.[380] Indeed, ReliabilityFirst provides a good example of this, with its leadership team alternating between members from different RTOs and explicitly including representatives from different geographies and markets.[381] Boundary organizations can create innovative, effective policies by overcoming traditional divisions and assumed limitations to policy reform. But NERC and its regional entities have not yet realized the full potential of boundary organizations, as evidenced by recent reliability crises and the overall failure of reliability standards to capitalize on the reliability benefits offered by clean energy.

These weaknesses of reliability standards suggest that the opportunity to shake up traditional political power within regional entities and NERC has not been realized. Utilities, like any rational economic actor, understandably tend to resist mandates that constrain their operations and add costs. And these utilities have a powerful voice, particularly within private organizations such as regional entities and NERC governed by individuals who were previously or currently are in the utility industry. For example, the board of directors of ReliabilityFirst is chaired by the vice president of the largest transmission-only company in the United States.[382] The vice chair is the Senior Vice President of Transmission Ventures, Strategy, and Policy at AEP—one of the nation's largest utilities, and most of the other members also represent large utilities and transmission companies.[383] NERC's governing body, its board of trustees, includes former or current utility CEOs and members of utility boards of directors, utility consultants, vice presidents of commercial energy users, and a former president and CEO of the American Public Power Association—an association of government-owned and -operated utilities—among other trustees.[384] So membership is diverse, but utilities are well represented on the board.

Large utilities are in some cases incentivized to argue against national mandatory standards, such as power-plant winterization, that will increase their expense. As AEP commented on NERC's proposed 2019 standards for cold weather, "[W]e believe entities need the flexibility of engineering judgement to

380. Stephanie Lenhart, Natalie Nelson-Marsh, Elizabeth J. Wilson & David Solan, *Electricity Governance and the Western Energy Imbalance Market in the United States: The Necessity of Interorganizational Collaboration*, ENERGY RSCH. & SOC. SCI., Sept. 2016, at 94, 95.

381. *Governance*, RELIABILITYFIRST, https://perma.cc/HHN4-G85S (archived Apr. 7, 2022).

382. *Board of Directors*, RELIABILITYFIRST, https://perma.cc/LM6T-YPTB (archived May 20, 2022); *About Us*, ITC HOLDINGS CORP., https://perma.cc/6RT3-89BT (archived Apr. 7, 2022).

383. *Board of Directors*, *supra* note 382.

384. *Board of Trustees*, N. AM. ELEC. RELIABILITY CORP., https://perma.cc/YF84-UTAX (archived Apr. 7, 2022).

design and implement their own procedures to prepare for cold weather outside of prescriptive obligations."[385] Additionally, some utilities have resisted recognizing the value of resources such as distributed solar. For example, when FERC issued a rule requiring that distributed energy resources (including collections of these resources bundled together, or "aggregated") be able to participate in wholesale markets, some utilities voiced "concerns about the cost, and operational and reliability impacts, of distributed energy resource aggregations on distribution utilities and the distribution system."[386] This is in part because utilities do sometimes have to shoulder the costs of enhancing the distribution grid to accommodate more solar energy—albeit typically with ratepayer support. But some large utilities also oppose distributed solar because they view it a problematic competition.[387] Ultimately, the challenges of updating reliability standards and incorporating clean-energy benefits into these standards might not arise directly from the silos themselves, but partially from powerful players who are able to leverage these silos to their advantage.

The relatively strong utility presence within private regional entities and NERC could potentially push back against values that the broader public increasing demands, including a more reliable and cleaner grid. FERC, a public agency with review authority over NERC, should do more in reviewing NERC's proposed reliability standards to require incorporation of clean-energy benefits. More public participation within NERC and NERC's regional entities could also potentially help to incorporate public values into reliability regulation. Including at least two members on regional entity boards of directors from nonprofit groups that advocate for reliability and low-carbon generation would go a long way toward helping to balance private and public values within the standard setting and enforcement process.

VI. Public–Private Regional Governance: Improving RTOs

As FERC and the states have sought means to improve market design, transmission planning and financing, and reliability services, they have consistently converged on the regional level as a preferred scale of

385. *See* N. AM. ELEC. RELIABILITY CORP., *supra* note 379.

386. Participation of Distributed Energy Res. Aggregations in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators, 172 FERC ¶ 61,247, at 39-51 (Sept. 17, 2020).

387. *See, e.g.*, Joby Warrick, *Utilities Wage Campaign Against Rooftop Solar*, WASH. POST (Mar. 7, 2015), https://perma.cc/6R8Q-MEWC (noting utilities' concerns, voiced in a private meeting, ranging from "'declining retail sales' and a 'loss of customers' to 'potential obsolescence'" (quoting DAVID K. OWENS, EDISON ELEC. INST., FACING THE CHALLENGES OF A DISTRIBUTION SYSTEM IN TRANSITION 3, 7 (2012))).

coordination.[388] Regional-governance structures—in particular RTOs—dominate each of the critical energy-policy areas that we have discussed. RTOs design capacity markets, plan for transmission (often across state lines), and establish structures for financing new transmission needed for renewable energy and reliability, all under FERC oversight.

The appeal of regional governing entities stems from their ability to mediate among energy governance's jurisdictional silos. RTOs, at their best, are technically skilled grid managers that advance the objectives of both FERC and the states in their region. They can reduce policy conflicts among private utilities and transmission owners, states, the federal government, and other stakeholders by providing a forum in which constituents hash out state and federal and public and private values to reach a compromise. Regional governing entities can also fill gaps that occur when neither federal nor state entities fully address an issue—as, for example, RTOs with capacity markets have attempted to do with respect to resource adequacy.[389]

But the potential for regional organizations to effectively serve as these kind of mediating institutions hinges on their design. The regional format can only succeed only if utilities, states, public federal regulators, and public stakeholders view these organizations' systems of governance as appropriately balancing federal authority with state authority and private expertise with public values. Recent challenges in RTOs' management of clean energy and reliability suggest that this balance is presently off, throwing into question the choice to silo predominant control of regional grids and electricity markets within private membership organizations.

This Part discusses why RTOs, the privatized, regional institutions we have charged with managing the grid, too often fail to facilitate the transition to a clean, reliable grid. As this analysis shows, before we can champion regionalization as a mode of achieving a clean, reliable grid, we will need to also reform the oversight or structure of the regional institutions in charge of this project.

A. RTOs in Depth

As discussed in Parts I and II above, RTOs and ISOs manage the grid and electricity markets in most areas in the United States. From a governance perspective, these RTOs are unique institutional constructs: They are membership organizations, comprised primarily of industry insiders along with others with sufficient stake in industry outcomes to register as members

388. *See* Wiseman, *supra* note 144, at 151-52, 166-167; *see also supra* Part III (discussing capacity markets); *supra* Part IV (discussing transmission-planning reforms); *supra* Part V (discussing NERC regions).

389. *See supra* Part III.

and pay annual membership dues.[390] States and consumer advocates have limited voting authority in most RTOs and ISOs.[391] To ensure efficient regional dispatch of electricity, transmission-owning members of RTOs agree to give the RTO operational control over their transmission assets.[392] Individual transmission owners, however, retain ownership, which gives them a distinct interest in what gets built where and how the grid is run.[393] In most RTOs, membership voting processes—in collaboration with RTO Boards—establish the rules for how transmission owners are compensated, how utilities share the costs of regional transmission upgrades, and what resources are eligible to participate in energy, capacity, and ancillary service markets.[394] FERC reviews these proposed rules under a deferential standard, rejecting them only if they will clearly produce unjust or unreasonable rates.[395]

This governance structure creates a range of competing—and often perverse—incentives when it comes to achieving a clean, reliable grid.[396] RTOs

390. Each RTO has internally established membership and participation rules. *See, e.g.*, RTOGov Researchers, Comment Letter on the Office of Public Participation 11-12 (May 10, 2021), https://perma.cc/N927-89BB; *Membership Enrollment*, PJM https://perma.cc/PJL3-Z6MS (archived Apr. 7, 2022) (listing membership fees to join largest RTO).

391. *See* JENNIFER CHEN & GABRIELLE MURNAN, STATE PARTICIPATION IN RESOURCE ADEQUACY DECISIONS IN MULTISTATE REGIONAL TRANSMISSION ORGANIZATIONS 7-15 (2019) (documenting the role of states across various RTOs); CHRISTOPHER A. PARENT, KATHERINE S. FISHER, WILLIAM R. COTTON & CALI C. CLARK, GOVERNANCE STRUCTURE AND PRACTICES IN THE FERC-JURISDICTIONAL ISOS/RTOS, at ES-2 to ES-3 (2021), https://perma.cc/XP58-K8N2 (comparing state and stakeholder roles across RTOs).

392. *See* Regional Transmission Organizations, 65 Fed. Reg. 810, 811 (Jan. 6, 2000) (codified at 18 C.F.R. pt. 35).

393. *See* Michael H. Dworkin & Rachel Aslin Goldwasser, *Ensuring Consideration of the Public Interest in the Governance and Accountability of Regional Transmission Organizations*, 28 ENERGY L.J. 543, 552-53, 552 n.43 (2007).

394. *See* Welton, *supra* note 142, at 237-52 (describing RTOs' roles in market rulemaking); Klass & Wilson, *supra* note 322, at 1869-72 (describing RTOs' role in cost allocation). There is considerable complexity to how various RTOs structure membership voting, and regions also differ in the issues that are determined through membership voting, as compared to direct board control. For details on RTO-governance processes, see, for example, Stephanie Lenhart & Dalten Fox, *Participatory Democracy in Dynamic Contexts: A Review of Regional Transmission Organization Governance in the United States*, ENERGY RSCH. & SOC. SCI., Jan. 2022, at 1, 2.

395. *See* Welton, *supra* note 142, at 221-22; Morgan Stanley Cap. Grp. v. Pub. Util. Dist. No. 1, 554 U.S. 527, 530 (2008); NRG Power Mktg., LLC v. FERC, 862 F.3d 108, 114 (D.C. Cir. 2017) (observing that "[s]ection 205 puts FERC in a 'passive and reactive role'" (quoting Advanced Energy Mgmt. All. v. FERC, 860 F.3d 656, 662 (D.C. Cir. 2017))).

396. *See* MARK JAMES, KEVIN B. JONES, ASHLEIGH H. KRICK & RIKAELA R. GREANE, HOW THE RTO STAKEHOLDER PROCESS AFFECTS MARKET EFFICIENCY 15 (2017) (observing incumbency power and bias); Kyungjin Yoo & Seth Blumsack, *The Political Complexity of Regional Electricity Policy Formation*, COMPLEXITY, Dec. 2018, at 1, 2 (modeling political power structures within RTOs); Blumsack & Yoo, *supra* note 139, at 3087; Welton,
footnote continued on next page

are deeply invested in grid reliability. First, they are typically charged to act as the Balancing Authorities and Reliability Coordinators for their respective territories to ensure a steady match between electricity supply and demand.[397] Second, they oversee transmission planning to ensure necessary expansions to guard the reliability of the grid.[398] Third, in several regions, they also run markets to ensure resource adequacy.[399] Politically and practically, RTO members and boards have every incentive to avoid major blackouts or other reliability events—if the lights go out in their region, they are likely to shoulder much of the blame.[400]

In contrast, RTOs have no clear mandate to promote renewable energy, given that the primary legal authority under which they operate is the assurance of "just and reasonable rates."[401] Instead, RTOs proclaim themselves to be resource-neutral organizations, in charge of making the grid function reliably and cost-effectively in light of whatever resource priorities state and federal regulators establish for their respective jurisdictions.[402]

But in application, RTO rules and policies often veer far from neutrality in ways that favor incumbent members and punish new-entrant technologies

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supra note 142, at 213-14, 241-43, 245-47, 252-53; Christina E. Simeone, *Reforming FERC's RTO/ISO Stakeholder Governance Principles*, ELEC. J., June 2021, at 1, 1 ("The RTO/ISO governance system has the potential to influence almost every aspect of the organization's functioning.").

397. ASHLEY J. LAWSON, CONG. RSCH. SERV., R45764, MAINTAINING ELECTRIC RELIABILITY WITH WIND AND SOLAR RESOURCES: BACKGROUND AND ISSUES FOR CONGRESS 9 (2019) (noting that RTOs act as balancing authorities in their regions); FERC, RELIABILITY PRIMER 27 (2020), https://perma.cc/6BLR-E646 (describing how reliability coordinators have broader regional authority over reliability).

398. LIEBERMAN, *supra* note 265, at 3 (describing how regional transmission-planning processes "begin with a reliability model designed to identify and determine a means to resolve any violations of . . . reliability requirements or applicable regional or local reliability requirements").

399. *See supra* Part III.

400. *See* Dworkin & Goldwasser, *supra* note 393, at 562.

401. *See* 16 U.S.C. §§ 824d-824e. Some argue that this language provides a mandate to pursue clean energy, but regulators have not yet agreed. *Compare* Christopher J. Bateman & James T.B. Tripp, *Toward Greener FERC Regulation of the Power Industry*, 38 HARV. ENV'T L. REV. 275, 278 (2014) (urging FERC to incorporate environmental considerations into market design), *with* Rich Glick & Matthew Christiansen, *FERC and Climate Change*, 40 ENERGY L.J. 1, 5, 32-33 (2019) (explaining FERC's role as a fuel-neutral regulator).

402. *See* Benjamin A. Stafford & Elizabeth J. Wilson, *Winds of Change in Energy Systems: Policy Implementation, Technology Deployment, and Regional Transmission Organizations*, ENERGY RSCH. & SOC. SCI., Nov. 2016, at 222, 229 ("We are a taker of policy not a maker of policy . . . . We don't create policy. We attempt to interpret policy as handed to us." (quoting an RTO employee)); MIDCONTINENT INDEP. SYS. OPERATOR, MISO'S RESPONSE TO THE RELIABILITY IMPERATIVE 2 (2021) (describing the organization as "policy-neutral" on renewable energy's growth and thus interested only in the challenges rising levels of renewables pose for grid management).

that are critical for decarbonization. Consider a few examples. When it comes to interconnection queues, most resources now wanting to connect to the grid are renewables and battery-storage projects that can support renewables.[403] But interconnecting resources face high transmission-related costs, including the full cost of network upgrades associated with interconnection (such as expanded transmission capacity to support the new interconnecting generation), even though these upgrades typically offer reliability and economic benefits to load across the region.[404] In application, these rules mean that incumbent utilities reap free grid-reliability improvements financed by renewable energy generators, while competition from new entrants is tamped down through the imposition of often unaffordable network-upgrade costs.[405]

Another example of RTOs acting in a resource-biased manner when confronting the twin aims of reliability and clean energy comes from transmission planning. As discussed in Part IV.B above, Order No. 1000 requires regions to take into account "public policy requirements" when planning for future regional transmission expansion, including, for example, state requirements for renewable energy generation.[406] But RTO transmission planners, under pressure from transmission owners, employ renewable forecast scenarios, or "Futures," that vastly underestimate the amount of renewable energy that both changing economics and policies cause to enter the grid.[407] This, in turn, causes planners not to solicit or select regional transmission projects that facilitate renewable energy development, with rare yet notable exceptions.[408]

403. *See* Miranda Wilson, *FERC Complaint Highlights "Structural Problem" for Renewables,* POLITICO PRO: ENERGYWIRE (May 25, 2021, 7:13 AM EDT), https://perma.cc/D5M4-B4UF (to locate, select "View the live page"); *Berkeley Lab Data Products Summarise Proposed US Projects in Interconnection Queue,* RENEWABLES NOW (May 25, 2021, 8:56 AM CEST), https://perma.cc/MG6V-R5TX (showing graphs of queues dominated by wind and solar projects).

404. *See* LIEBERMAN, *supra* note 265, at xii ("Currently, in each RTO the generator is charged for all or nearly all of the upgrade even though the upgrade will have benefits to other generators or load.").

405. *See id.* at vi, xii (reporting that these costs are "sometimes in the hundreds of millions of dollars").

406. *See* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842, 49,855 (Aug. 11, 2011) (codified at 18 C.F.R. pt. 35) (capitalization altered).

407. LIEBERMAN, *supra* note 265, at vii, x, 10 (noting transmission owners' "significant influence[]" in these planning processes and the problematic use of signed interconnection agreements as a forecast for renewables' growth); GRAMLICH & CASPARY, *supra* note 222, at 10-11.

408. LIEBERMAN, *supra* note 265, at 19. For discussion of exceptions, see notes 415-18 and the accompanying text below.

A similar dynamic is at work in the energy-market design challenges discussed in Part II, where incumbent nonrenewable generators pushed market changes that penalized renewable energy competitors. And this dynamic also emerges in the self-scheduling practices discussed in Part II.[409] What do these examples have in common? They all highlight instances in which RTOs fail to embrace the potential of new resources that could contribute to a clean, reliable energy future but threaten the bottom line of incumbents.[410]

The key problem here is that RTO governance, focused as it is on amalgamating member preferences, often fails to facilitate forward-looking reforms that would ensure the reliability of a transformed, clean energy grid. Experts widely agree that the key to integrating high levels of variable renewable energy generation into the grid while maintaining reliability is to seek out complementary resources that offer *flexibility* to balance out temporal variations in renewables' output.[411] To date, most RTOs have proven resistant to updating their conceptions of reliability to embrace flexibility as a key grid characteristic that regions should be procuring.[412] Indeed, many RTOs have actively resisted incorporating a host of more flexible resources into their energy, capacity, and ancillary service markets.[413]

Thus, behind many of the current laws, tariffs, and practices that impede a clean, reliable energy future lies an RTO-governance model where incumbents hold outsized sway and, at times, have structural interests against the build-out

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409. *See supra* notes 192-94 and accompanying text.

410. For a longer discussion, see Welton, *supra* note 142, at 241-46. *See also* SONIA AGGARWAL & MIKE O'BOYLE, ENERGY INNOVATION LLC, REWIRING THE U.S. FOR ECONOMIC RECOVERY 22 (2020) ("As new technologies emerge and request to participate in the market, RTOs/ISOs have often reacted by imposing restrictions on the types of connections and services those technologies can offer.").

411. *See, e.g.*, N. AM. ELEC. RELIABILITY CORP., 2020 STATE OF RELIABILITY: AN ASSESSMENT OF 2019 BULK POWER SYSTEM PERFORMANCE, at x, 49-51 (2020); Amory B. Lovins, *Reliably Integrating Variable Renewables: Moving Grid Flexibility Resources from Models to Results*, ELEC. J., Dec. 2017, at 58, 58 ("Careful analyses consistently find that largely or wholly renewable power supply can be delivered with little or no bulk storage and at reasonable cost by integrating at least seven kinds of 'grid flexibility resources.' "); 2020 LONG-TERM RELIABILITY ASSESSMENT, *supra* note 332, at 37; NAT'L RENEWABLE ENERGY LAB'Y, *supra* note 32, at 3 ("Electric sector modeling shows that a more flexible system is needed to accommodate increasing levels of renewable generation.").

412. *See* ERIC GIMON, ENERGY INNOVATION, WHY THE CLEAN ENERGY INDUSTRY SHOULD BE INTERESTED IN RESOURCE ADEQUACY 1 (2020) (describing how incumbent generators, "having failed to make the argument that clean power is too expensive . . . are now falling back on resource adequacy as a last bastion to defend their market share and slow the power grid's decarbonization").

413. *See* Welton, *supra* note 142, at 241-45; *see also* FERC v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 774 (2016) (upholding a FERC order forcing RTOs to compensate demand response and generation equally).

of clean energy.[414] Transmission companies resist having their customers pay for their fair share of transmission upgrades, instead pushing these costs onto renewable entrants and overbuilding local transmission lines to the detriment of regional and interregional development. Incumbent fossil fuel generators resist market reforms that increase the entry of new flexible resources into competitive energy markets, while pushing market reforms that are punitive to renewable energy.

There are, to be sure, counterexamples to the ones discussed above, where RTOs have pursued policies to support renewable energy integration. The most cited of these is the multi-value projects (MVP) planning initiative in MISO. MISO undertook the MVP initiative to help build the transmission necessary for states in the region to meet their renewable energy targets.[415] Through the MVP process, MISO identified projects that were regional in nature, provided economic value to the region, and allowed for compliance with state public policy requirements such as renewable energy mandates. The costs of these projects, which were effective in connecting new wind energy resources to the regional grid, were distributed across load on a regional rather than a local basis.[416] SPP has undertaken similar initiatives.[417] MISO and SPP have also proven proactive in integrating new wind resources into energy markets through improved forecasting and bid flexibility.[418]

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414. *See* AGGARWAL & O'BOYLE, *supra* note 410, at 20 ("RTO/ISO proposals [for market rules] tend to favor incumbents, stifle innovation, and lack upfront input from state, consumer, and environmental interests that have to then battle bad proposals in FERC-regulated dockets."); *see also* Ethan Howland, *SOO Green Transmission Project Faces PJM Obstacles: Are Grid Operators Hindering the Energy Transition?*, UTIL. DIVE (Jan. 13, 2022), https://perma.cc/ST6M-YE4G (discussing how outdated PJM rules that favor incumbent utilities are creating unnecessary roadblocks to innovative interregional HVDC transmission projects designed to bring wind energy from MISO to PJM).

415. Wiseman, *supra* note 144, at 181-82.

416. *See* Ill. Com. Comm'n v. FERC (*ICC II*), 721 F.3d 764, 771-72 (7th Cir. 2013) (describing the MISO MVP process); LIEBERMAN, *supra* note 265, at 14, 24. MISO has begun planning a second round of regional projects, but disagreements over regional cost sharing between the north and south subregions of MISO has slowed progress. *See, e.g.*, Jeffrey Tomich, *MISO Urges Splitting South, Midwest Grid for Transmission Build-Out*, POLITICO PRO: ENERGYWIRE (Oct. 15, 2021, 7:19 AM EDT), https://perma.cc/Z4HQ-DBKY (to locate, select "View the live page") (discussing success of MVP lines and MISO efforts to build on that success); Ballard, *supra* note 242 (discussing the opposition of Louisiana and utilities in the southern region of MISO to paying for Midwest transmission lines).

417. Wiseman, *supra* note 144, at 185; *Priority Projects*, SW. POWER POOL, https://perma.cc/J5KX-VX47 (archived Apr. 9, 2022).

418. *See* Stafford & Wilson, *supra* note 402, at 225; SW. POWER POOL, 2016 WIND INTEGRATION STUDY 5 (2016), https://perma.cc/CY7X-2PNV (describing how the RTO proactively undertook a study "to identify challenges for integrating higher levels of wind penetration into the SPP transmission system").

Notably, these proactive, pro-renewables stances have taken place in RTOs where (1) states retain substantial decisionmaking authority within RTO-governance structures; and (2) utilities remain vertically integrated, recovering their generation costs under cost-of-service ratemaking.[419] This first factor is important because it allows states in SPP and MISO to have more institutional power in advancing pro-renewables stances in both regions.[420] The second factor is important because it makes incumbent generators in a region less likely to object to renewable energy growth, as they are more likely to recover their sunk generation costs under state public-utility law.[421]

The two examples discussed above, both of RTOs stymieing new clean-energy technologies and at times accepting them, highlight the importance of governance structures to substantive outcomes. RTOs' mixed performance drives home the risks of public–private siloing, as well as the importance of public oversight in policing the potential skewed incentives of private providers of critical public services. These dynamics suggest that it may not be enough to *substantively* fix each discrete RTO rule or practice that discriminates against renewable energy and complementary reliability-enhancing resources. It might, instead, be wise to engage in more *structural* reforms that carve away at the ways in which RTO-governance models enable anti-renewable incumbent power. Subpart C below offers several suggestions for reforms in this regard, drawing on examples of RTO pro-renewables policies for inspiration. First, though, we turn to discuss governance challenges in those regions outside of RTOs and ISOs.

B. Non-organized Regions

RTO and ISO regions serve two-thirds of the nation's electricity load, which means that millions of Americans live in areas of the country without this regional-governance construct. These areas are underdiscussed in the academic and policy literature, likely because their diffuse governance

419. In MISO, state regulatory authorities maintain 16% of the membership voting rights. MIDCONTINENT INDEP. SYS. OPERATOR, STAKEHOLDER GOVERNANCE GUIDE 9 (2021). In SPP, a regional state committee maintains oversight of transmission planning and pricing and resource adequacy. SW. POWER POOL, GOVERNING DOCUMENTS TARIFF: MEMBERSHIP AGREEMENT § 3.10 (2021); SW. POWER POOL, GOVERNING DOCUMENTS TARIFF: BYLAWS § 7.2 (2010); FISHER ET AL., *supra* note 192, at 8 ("[T]he majority of the generators in the market regions of [MISO] and [SPP] are owned by regulated utilities.").

420. *See* Stafford & Wilson, *supra* note 402, at 228 (describing state and wind industry pressure on MISO to "better integrate" renewable resources); GRAMLICH & CASPARY, *supra* note 222, at 79 ("State involvement was critical to the successful regional transmission plans that have occurred.").

421. These same dynamics, however, are involved in the self-scheduling challenges discussed in notes 192-94 and the accompanying text above.

structures and regional specificity make them less easy to analyze as a bloc.[422] But although RTOs deserve critique, unorganized regions pose perhaps even greater institutional risks to the project of constructing a reliable, clean energy grid.

Outside RTOs, reliability remains much more tightly managed by state public-utility-commission oversight of individual utilities.[423] Many of these commissions—especially in southern states—oversee politically powerful utilities that frequently dominate legislative and regulatory initiatives at the state level.[424] As highlighted by the recent debates in Texas, utilities often resist energy-system change at their commissions and statehouses, deploying reliability as an argument against clean-energy integration.[425]

In non-RTO regions, there is limited regional coordination of transmission planning or electricity dispatch, each of which hinders clean-energy integration. Although Order No. 1000 applies to these regions,[426] in practice utilities outside RTOs have resisted any dramatic transformations to their bottom-up transmission-planning processes and rarely cooperate as well as RTO regions.[427] When it comes to dispatch, most non-RTO utilities run their own systems that have only limited integration with neighboring utilities.[428] This siloed approach frequently causes these utilities to overbuild fossil fuel generation as a means of ensuring reliability—all while impeding competition from cost-effective renewable energy generators who have limited ability to interconnect into these systems.

Some states outside RTOs have, however, begun to reconsider this go-it-alone governance model for their utilities, particularly given the challenges presented by the clean-energy transition. In 2014, several non-RTO western

422. *See* Harrison & Welton, *supra* note 24, at 2-3 & 2 n.1; Wiseman, *supra* note 144, at 159, 173-74.

423. *See* LAWSON, *supra* note 397, at 4.

424. *See* Harrison & Welton, *supra* note 24, at 8.

425. *See supra* notes 11-14. For an example of this same phenomenon outside Texas, see RACHEL WILSON, NINA PELUSO & AVI ALLISON, NORTH CAROLINA'S CLEAN ENERGY FUTURE: AN ALTERNATIVE TO DUKE'S INTEGRATED RESOURCE PLAN 1 (2019) (highlighting the perversity of Duke's proposed strategy of adding 9,000 MW of new natural gas generation, given reliable and cost-comparable renewable energy options); and Travis Fain, *State Regulators: More Info Needed to Approve Duke Energy's Natural Gas, Other Construction Plans*, WRAL.COM (updated June 30, 2021, 11:42 AM EDT), https://perma.cc/VG3C-UR5F ("Duke has argued that it needs the reliability of natural gas in the near and medium term.").

426. *See supra* Part IV.B.

427. *See* Wiseman, *supra* note 144, at 173-74, 185.

428. *See, e.g.*, SE. ENERGY MKT. SERVS., SOUTHEAST ENERGY EXCHANGE MARKET AGREEMENT 5-7 (2020), https://perma.cc/Z2AV-JR54 (describing the traditional southeastern marketplace).

states collaborated with California to form a regional energy imbalance market (EIM).[429] The EIM operates as an extension of CAISO's preexisting EIM and allows utilities across the region to share energy resources more efficiently in real time.[430] A 2020 analysis suggests that the EIM has created $1.1 billion in total economic benefits in its first six years, through cost savings and better integration of renewable energy in the region.[431] Whether the EIM goes far enough is a continued point of debate: Many suggest that a full Western RTO would create even greater regional benefits—if participants were able to agree on a suitable governance model that would not threaten California's climate leadership.[432]

In light of the EIM's success, the long-market-resistant South is also beginning to explore the possibility of more regional cooperation. One 2020 analysis of the southeastern energy grid found that if the region were to form a competitive RTO, it could reap cost savings of $384 billion by 2040, while lowering retail costs by 23% and carbon emissions by 37% (relative to 2018 levels).[433] Utilities in the southeast have since cited this study in support of their petition to form what they call the Southeast Energy Exchange Market. This market—scheduled to go into operation as a result of FERC deadlock and currently facing litigation in the D.C. Circuit—will facilitate more bilateral sales among utilities in the region, but will *not* result in centrally dispatched electricity nor full market competition.[434] Many have expressed concerns that this multi-utility agreement or "RTO-lite" arrangement might be a poor model for facilitating a clean-energy transition in the Southeast.[435] Again, it appears that the devil is the details of these new regional-governance arrangements.

429. *See* Lenhart et al., *supra* note 380, at 94-95, 103.

430. *Id.* at 95.

431. *See* MKT. ANALYSIS & FORECASTING, CAL. ISO, WESTERN EIM BENEFITS REPORT: THIRD QUARTER 2020 5, 17 (2020); SADIE COX & KAIFENG XU, NAT'L RENEWABLE ENERGY LAB'Y, INTEGRATION OF LARGE-SCALE RENEWABLE ENERGY IN THE BULK POWER SYSTEM: GOOD PRACTICES FROM INTERNATIONAL EXPERIENCES 7 (2020) ("A significant potential benefit of BA coordination and expansion is that it reduces renewable curtailment. By the end of 2018, the Western EIM market had avoided more than 700 cumulative gigawatt-hours of curtailments.").

432. *See* BENTHAM PAULOS, PAULOSANALYSIS, A REGIONAL POWER MARKET FOR THE WEST: RISKS AND BENEFITS 5-7 (2018).

433. ERIC GIMON, MIKE O'BOYLE, TAYLOR MCNAIR, CHRISTOPHER T.M. CLACK, ADITYA CHOUKULKAR, BRIANNA COTE & SARAH MCKEE, SUMMARY REPORT: ECONOMIC AND CLEAN ENERGY BENEFITS OF ESTABLISHING A SOUTHEAST U.S. COMPETITIVE WHOLESALE ELECTRICITY MARKET 1-2 (2020).

434. *See* SE. ENERGY MKT. SERVS., *supra* note 428, at 1; Ethan Howland, *Clean Energy, Environmental Groups Sue FERC Over Approval of Southeast Energy Market*, UTIL. DIVE (updated Feb. 9, 2022), https://perma.cc/H9K8-P94X.

435. *See, e.g.*, Protest of Public Interest Organizations at 1, 9, Ala. Power Co., Docket Nos. ER-21-1111-0000 et al. (FERC June 28, 2021).

Regional collaborations can only counteract energy silos when their governance is calibrated to appropriately mediate public and private, and state and federal, objectives for energy policy.

C. Regional-Governance Reforms to Support Reliability Through Renewables

Regional-governance arrangements must shift if regions are to fulfill their potential as integrationists of clean and reliable energy, state and federal aims, and public and private entities. But reforming RTOs and non-RTO regional governance will be complex. One way to conceptualize potential approaches to creating more effective regional organizations is to identify them on a spectrum from minor, useful adjustments to transformative systemic overhaul.

We begin with more pragmatic adjustments, which would not require congressional action to implement. One of the central challenges with RTO governance outlined above is its overly privatized nature. States, new entrants, and organizations representing the public interest have little sway within current regional-governance constructs. There are several solutions internal to RTOs that might remediate this challenge. Perhaps the most basic would be to enhance the transparency of RTOs, which too often operate like secret cabals. For example, reformers in New England are pushing for their RTO's stakeholder processes to allow public representatives at its meetings,[436] while reformers in PJM have expressed outrage at the continued secretive nature of transmission-rate development.[437]

There is a relatively simple fix available for these transparency-related concerns: As suggested by several congressional representatives during a 2019 hearing, FERC could initiate a notice of inquiry into whether RTOs continue to meet required governance characteristics.[438] In 2007, in Order No. 719, FERC established governance objectives that regional entities had to achieve to maintain RTO status, emphasizing the need for RTO boards' "responsiveness," defined as their "willingness, as evidenced in its practices and procedures, to directly receive concerns and recommendations from customers and other stakeholders, and to fully consider and take actions in response to the issues

436. FERC rejected a petition forcing such openness in 2019. RTO Insider LLC, 167 FERC ¶ 61,021, at 17-18 (Apr. 10, 2019). States, however, continue to pursue other avenues of reform. *See* Mark Pazniokas, *Governors Want Sunlight on the Secretive ISO New England*, CT MIRROR (Oct. 15, 2020), https://perma.cc/UJT9-PWLA; NEW ENG. STATES COMM. ON ELEC., NEW ENGLAND STATES' VISION FOR A CLEAN, AFFORDABLE, AND RELIABLE 21ST CENTURY REGIONAL ELECTRIC GRID 6-8 (2020), https://perma.cc/77FQ-J8SY.

437. Peskoe, *supra* note 149, at 52-53 (describing PJM's "secretive" transmission-planning process and FERC's investigation into these practices).

438. Paul Ciampoli, *Lawmakers Seek Details from FERC on RTO Governance*, AM. PUB. POWER ASS'N (June 19, 2019), https://perma.cc/MHL2-C4LA.

that are raised."[439] In light of mounting evidence of secrecy and skewed representation within RTOs, FERC can and should revisit whether or not RTOs are living up to these preexisting expectations perhaps through reopening Order No. 2000 or by requiring that RTOs have new characteristics or functions. Similarly, such a proceeding might provide a forum for considering whether RTOs' current membership rules, including sectoral designations and weighted voting procedures, prove adequately representative of all members in light of the shifting nature of energy generation.

These reforms to internal RTO-governance arrangements would be a useful first step, but they likely would not go far enough to create regional entities trusted by states and public actors. Instead, FERC may need to reconsider the role it has carved out for states within privatized regional processes. As states have argued, they are "not just stakeholders . . . . States are sovereign entities with their own laws that the regulators are tasked with implementing."[440] To date, FERC has allowed RTOs to differ on the extent to which states reserve authority over certain issues, including resource adequacy.[441] Going forward, FERC might consider rebalancing the nature of public, state-level input and control in RTOs. Fortunately, the agency has several tools at its disposal to do so. It might inquire as to whether RTO rules that do not accommodate state resource preferences are "just and reasonable," and thereby force accommodative changes to RTO governance.[442] Or, it might explore using its section 209 authority in more muscular ways. Section 209 allows FERC to delegate its full authority over particular matters to a committee of affected states.[443] More experimental use of this section 209 authority could prove important in addressing a range of roadblocks that exist at the clean energy–reliability nexus, including innovative approaches to regional resource adequacy and regional carbon pricing.

Finally, and particularly if FERC initiatives prove unsuccessful, Congress might consider more thorough set of reforms to RTO governance. A series of court decisions has bounded FERC's oversight of RTO-governance

439. *See* Wholesale Competition in Regions with Organized Electricity Markets, 73 Fed. Reg. 64,100, 64,154 (Oct. 28, 2008) (codified at 18 C.F.R. pt. 35).

440. Catherine Morehouse, *New England States Push for Governance Changes in ISO-NE, Ahead of Anticipated MOPR Reform*, UTIL. DIVE (June 7, 2021), https://perma.cc/FG7A-7ZEM.

441. *See* CHEN & MURNAN, *supra* note 391, at 2.

442. *See, e.g.*, TRAVIS KAVULLA, NRG ENERGY, MOVING FORWARD: APPROACHES FOR STATE–FEDERAL COOPERATION IN A DECARBONIZING ELECTRICITY SECTOR 12 (2021) (describing how such arrangements might be modeled off of SPP, where the "Regional State Committee" exercises the rights to "determine what the regional market will file as a tariff at FERC with respect to certain topics that traditionally implicate states' regulatory prerogatives").

443. 16 U.S.C. § 824h(a)-(b).

arrangements and their outputs under its current FPA (Federal Power Act) authority. In particular, two D.C. Circuit cases have held that FERC cannot dictate RTO board composition or require RTOs to make amendments to their filings to gain FERC approval.[444] If Congress is concerned that such decisions cabin FERC too greatly, it could pass legislation overriding these precedents and thereby give FERC greater ability to dictate the shape of RTO-governance arrangements and their substantive outcomes. Or it could even go so far as to consider whether to restructure RTOs more thoroughly, making them publicly governed and accountable through more classic channels of administrative law.[445]

Of course, there is a glaring challenge to tinkering too greatly with RTOs, either at FERC or through Congress: They remain voluntary membership organizations. If utilities do not like changes made in the degree of public oversight of RTOs, they retain the right to exit. Because of this exit threat, and because the regions not currently participating in RTOs are even worse than their organized counterparts, many respected voices within the energy policy community have begun to call for FERC to revisit the idea of making RTO membership mandatory.[446]

If FERC were to heed this call, it would be entering uncharted legal terrain. It has never been determined whether the agency has the legal authority to require RTO membership.[447] Given the increasing number of studies that show clear economic gains to RTO membership,[448] however, we believe FERC at least has a strong argument that mandating RTO participation is within its authority to ensure "just and reasonable" rates. The counterargument is that section 202(a) of the Federal Power Act specifically authorizes FERC to "promote and encourage" voluntary interconnection within regional districts—perhaps although not definitively foreclosing more muscular action on the part of the agency.

444. See Cal. Indep. Sys. Operator Corp. v. FERC, 372 F.3d 395, 396 (D.C. Cir. 2004) (addressing FERC's authority over board composition); NRG Power Mktg. v. FERC, 862 F.3d 108, 110 (D.C. Cir. 2017) (addressing FERC's authority to require amendments to tariff filings).

445. California's ISO is already structured in this public manner. *See* Welton, *supra* note 142, at 229-30.

446. *See* Letter from Former FERC Commissioners to Richard Glick, Chairman, FERC, et al. 1-2 (June 2, 2021), https://perma.cc/9DP2-9LU6. *But see* Jasmin Melvin, *Ex-state Utility Regulators Caution FERC Against Upending Voluntary RTO Regime*, S&P GLOB. (June 25, 2021, 3:25 PM UTC), https://perma.cc/P6TA-5DSN (reporting on a response letter urging FERC to do the opposite).

447. FERC abandoned efforts in the early 2000s to mandate RTOs for political reasons as well as legal uncertainty. *See* Harrison & Welton, *supra* note 24, at 2.

448. *See* GIMON ET AL., *supra* note 433, at 9.

Legal authority aside, there are careful political considerations that must enter any decision about whether FERC or Congress should mandate RTOs. As we have catalogued above, current RTOs are far from perfect. If not coupled with governance reforms, a requirement that all states join RTOs could end up setting some states back on their clean-energy goals, should their newly formed RTO prove resistant to integrating renewable energy thoroughly into its markets. Therefore, we think it imperative that FERC and Congress focus first on reforming existing RTOs to allow them to live up to their potential as mediators among the energy-governance silos. Only then should reformers consider whether mandatory membership would be an advisable or necessary accompanying shift.

Conclusion

Building a cleaner, more reliable grid is central to the fight against climate change. The grid cannot remain reliable under conditions of climate change without a commitment to decarbonization through clean energy. Thus, politicians' resort to the fear of blackouts as an objection to ambitious climate action is a dangerous stunt.

As this Article demonstrates, however, current institutional arrangements in U.S. energy law exacerbate this misperceived tension between clean energy and reliability by disaggregating responsibility across actors and scales. We have argued that policy and governance reforms are available to remediate these tensions without dramatically upending the central features of our disaggregated energy governance regime. These reforms should be priorities for those seeking to advance climate policy in the United States, given the central importance of the electricity grid to climate stabilization.

As we close, it is worth reemphasizing that a clean, reliable grid is crucial not only as a matter of sound economic policy and climate politics, but also from an equity perspective. The technical nature of conversations about grid reform often serves to obscure its social stakes. But make no mistake: The transition to a clean, reliable grid is fundamentally a matter of justice. The fossil fuel–based grid has too long disproportionately harmed low-income communities and communities of color.[449] Going forward, wealthy Americans might be able to insulate themselves from the risks of climate change and grid failure, but the vast majority of Americans will be rendered increasingly vulnerable to both challenges over time. Thus, although the clean-energy transition presents justice-related challenges of its own,[450] decarbonization—

449. *See supra* notes 33-34 and accompanying text.

450. Shelley Welton & Joel Eisen, *Clean Energy Justice: Charting an Emerging Agenda*, 43 HARV. ENV'T L. REV. 307, 310-11 (2019) (charting the justice challenges presented by the clean-energy transition).

designed and implemented in a matter that protects low-income ratepayers from major rate increases—remains a critical foundation of a more just future.

The reforms we have proposed to energy markets, energy governance, and transmission planning and siting will not remediate all of these inequities—but they are a vital step in the right direction. A *nationally* reliable, clean, interconnected grid would bring less expensive renewable energy to communities disproportionately facing energy poverty and the health impacts of fossil fuels. And a legal regime that appropriately values the contributions of clean energy to reliability will empower communities to pursue cleaner, more reliable energy sources, including microgrids, distributed energy resources, and energy storage. If our institutions can deliver it, such a grid will ultimately help ensure that all communities—not just privileged ones—maintain electricity services in the face of the weather extremes that climate change is already delivering to our doors.