Lunch Conversation

State Clean Energy Policies at Risk: Courts Should Not Preempt Zero Emission Credits for Nuclear Plants

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In 2016, the Illinois Legislature and New York Public Service Commission (PSC) enacted nearly identical policies to induce economically struggling nuclear power plants to continue operating. Competing power generation companies filed suits in federal district courts, arguing that the states' policies are preempted by the Federal Power Act (FPA) and violate the dormant Commerce Clause. Both courts dismissed all claims,[1] and the generators have appealed those decisions to the Seventh and Second Circuit Courts of Appeal, respectively.[2] Decisions are expected in the first half of 2018.

The disputes over the states' Zero Emission Credits (ZECs) for nuclear plants are just the latest controversies about the roles of states and the federal government in overseeing the electricity industry.[3] Recent federalism cases highlight the incongruity of applying the New-Deal-era FPA to today's dynamic and evolving industry.[4] Fossil-fuels proponents have also seized on the increasing overlap between state regulation of the generation resource mix and interstate power markets to argue that state clean energy policies overstep the limits of state authority that the dormant Commerce Clause establishes.[5]

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1. Coal. for Competitive Elec. v. Zibelman, 272 F. Supp. 3d 554 (S.D.N.Y. 2017), *appeal docketed*, No. 17-2654 (2d Cir. Aug. 25, 2017); Vill. of Old Mill Creek v. Star, No. 17 CV 1163, 2017 WL 3008289 (N.D. Ill.), *appeal docketed*, No. 17-2445 (7th Cir. July 18, 2017).

2. *See Coal. for Competitive Elec.*, 272 F. Supp. 3d 554.; *see also* Elec. Power Supply Ass'n v. Star, No. 17 CV 1163, 2017 WL 3008289, *appeal docketed*, No. 17-2455 (7th Cir. July 18, 2017).

3. *See, e.g.,* Conn. Light & Power Co. v. Fed. Power Comm'n, 324 U.S. 515 (1945); Fed. Power Comm'n v. S. Cal. Edison Co., 376 U.S. 205 (1964); Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190 (1983); New York v. F.E.R.C., 535 U.S. 1 (2002).

4. F.E.R.C. v. Elec. Power Supply Ass'n, 136 S. Ct. 760 (2016); *see* Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288 (2016).

5. *See, e.g.*, Energy & Env't Legal Inst. v. Epel, 793 F.3d 1169 (10th Cir. 2015); North Dakota v. Heydinger, 825 F.3d 912 (8th Cir. 2016).

The ZEC cases are particularly significant for delineating the boundaries of authority between state and federal regulators. States designed the policies to adhere to the limits of state authority outlined in a trio of Supreme Court energy federalism cases decided in 2015–2016. This bounty of new case law has delighted energy law scholars and inspired voluminous interpretations,[6] but only three federal courts have applied their holdings to electricity regulation cases.[7] Decisions by the Second and Seventh Circuits on ZECs could set precedent that defines the industry's governance for decades.

These decisions may also be consequential for the future of state climate action. A broad ruling against the states could invite litigation about state renewable portfolio standards and emission allowance programs, such as the Regional Greenhouse Gas Initiative cap-and-trade program that covers power generators in nine Northeastern states. If these well-established, market-based programs are found to be incompatible with federal regulation, states might retreat to "command-and-control"-type policies that entirely ignore the interstate nature of the electric grid and today's power markets. This result would likely leave consumers, and the environment, worse off. On the flip side, decisions upholding the ZEC policies would implicitly affirm the legality of an array of long-standing state clean energy policies that have never been challenged on preemption grounds. It would also bolster the legal defensibility of more recent policies, such as Maryland's offshore wind credit program,[8] and could encourage states to enact new clean energy policies.

This article argues that the FPA does not preempt ZECs. These programs adapt traditional state authority over power generation and utility portfolios to today's restructured electric grid. Courts should reject plaintiffs' requests to enlarge the scope of FERC's exclusive authority over wholesale rates and should conclude that ZECs, like other state clean energy programs, do not conflict with FERC's regulatory regime.

This article begins by briefly recapping the evolution of state and federal roles in regulating the electric industry. After introducing the structure and purpose of state ZEC policies, the paper argues that they are not preempted by the text of the FPA or the Supreme Court's most recent decision about FPA preemption, *Hughes v. Talen*. Finally, the paper rejects conflict preemption claims because FERC has the authority and expertise to reconcile state ZEC policies with its wholesale market regulation.

6. *See, e.g.*, Jim Rossi, *The Brave New Path of Energy Federalism*, 95 TEX. L. REV. 399 (2016); Joel B. Eisen, *Duel Electricity Federalism is Dead, But How Dead, and What Replaces It?* 8 GEO. WASH. J. OF ENERGY AND ENVTL. L. 3 (2017); Amy L. Stein, *Regulating Reliability*, 54 HOUS. L. REV. 1191 (2017); Matthew R. Christiansen, *FERC v. EPSA: Functionalism and the Electricity Industry of the Future*, 68 STAN. L. REV. ONLINE 100 (2016); Steven Ferrey, *The Medium is the Message*, 35 VA. ENVTL. L. J. 213 (2017); Ari Peskoe, *Easing Jurisdictional Tensions by Integrating Public Policy in Wholesale Electricity Markets*, 38 ENERGY L. J. 1 (2017).

7. *See* Allco Finance Ltd. v. Klee, 861 F.3d 82 (2d Cir.), *cert. denied*, 138 S. Ct. 926 (2018); *see also Coal. for Competitive Elec.*, 272 F. Supp. 3d 554; Vill. of Old Mill Creek v. Star, No. 17 CV 1163, 2017 WL 3008289 (N.D. Ill.), *appeal docketed*, No. 17-2445 (7th Cir. July 18, 2017).

8. *See* MD. PUB.SERV. COMM'N, ORDER NO. 88192, Case No. 9431 (2017).

Although beyond the scope of this article, it is important to mention that courts might not decide the preemption issue at all. Both states argue that under the 2015 Supreme Court decision *Armstrong v. Exceptional Child Center*,[9] the FPA precludes private preemption challenges. If courts accept this argument, private parties would not be able to bring FPA preemption challenges to federal courts.

REGULATING ELECTRIC POWER: A BRIEF HISTORY

Prior to the 1980s, investor-owned utilities generated three-quarters of the nation's power.[10] These utilities are subject to extensive state regulation pursuant to century-old public utility laws. Under this industry structure, utilities built plants in their own monopoly service territories to meet local consumer demand. Utilities financed power plant construction with securities approved by state regulators and earned a regulated rate of return on these investments through state-regulated retail rates. State regulators thus enjoyed substantial control over power plant construction and operation.

Through the 1950s, regulation of power generation was relatively uncontroversial.[11] Consumers paid less for power the more they used, as utilities captured economies of scale.[12] To the extent that utilities had excess generating capacity beyond what they needed to serve local consumers, they could trade power with neighboring utilities. These residual wholesale sales were under the exclusive jurisdiction of federal regulators pursuant to the FPA. Enacted in 1935, the statute filled a regulatory gap by providing FERC with jurisdiction over wholesale sales in interstate commerce, but explicitly reserves to states jurisdiction over matters that they had been actively regulating, including "generation facilities."[13]

By the 1970s, several factors combined to transform the electric power industry from a long-run decreasing cost industry into a long-run increasing cost industry.[14] Oil and natural gas price spikes and billions of dollars in cost overruns for nuclear power plants contributed to massive consumer rate increases and underscored the economic significance of fuel choices. With heightened political attention on the industry, state regulators became increasingly interventionist. One regulatory response was requiring utilities to

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9. *See* Armstrong v. Exceptional Child Ctr., 135 S. Ct. 1378, 1387–88 (2015).

10. Government-owned and rural cooperatives generated the remainder. RICHARD HIRSH, POWER LOSS 279 fig.A-2 (1999).

11. One notable exception was whether the Federal government should own and operate power plants that make wholesale sales. *See* Ashwander v. Tenn. Valley Auth., 297 U.S. 288 (1936); *see also* Tenn. Elec. Power Co. v. Tenn. Valley Auth., 306 U.S. 118 (1939).

12. HIRSH, *supra* note 10, at 48 fig.2.1; *see* Carolyn Brancato, *New Approaches to Current Problems in Electric Utility Rate Design*, 2 COLUM. J. ENVTL. L. 40 (1975).

13. 16 U.S.C. § 824(b) (2015).

14. *See* Brancato, *supra* note 12, at 40–41 ; *see* Paul L. Joskow, *Regulatory Failure, Regulatory Reform, and Structural Change in the Electrical Power Industry*, BROOKINGS PAPERS ON ECON. ACTIVITY 125, 136–39 (1989).

engage in "integrated resource planning."[15] Rather than meeting all demand with utility-constructed power plants, regulators and utilities endeavored to build an efficient portfolio of demand- and supply-side resources that included wholesale power purchases and energy-saving programs. Integrated resource planning expanded the scope of state regulation to include the portfolio of resources that the utility was drawing from to provide electric service.

The rising cost of producing power motivated some utilities to regionalize the industry. For example, in the early 1970s, utilities in New England and the mid-Atlantic integrated their systems to economically optimize power plant dispatch across the region.[16] Their goal was to reduce each utility's need for new capacity and minimize overall operating expenses. Across the country, utilities formed joint ventures to construct new power plants, particularly nuclear-powered facilities, that were sized to meet regional demand rather than just the needs of a single utility's consumers.[17] While states retained exclusive jurisdiction over the siting and construction of these regional facilities, FERC and state regulators each had authority over certain aspects of the plants' financing.[18]

By the early 2000s, reforms at the state and federal levels led to the creation of independent power producers, non-utility companies that own and operate power plants and rely on FERC-regulated wholesale rates, rather than state-regulated retail rates, for revenue. These generators typically sell their power at wholesale either through contracts with utilities or through FERC-regulated regional markets. Through a series of orders in the late 1980s and 1990s, FERC facilitated the creation of these interstate power markets. FERC-regulated regional market operators (RTOs or ISOs such as PJM and New York ISO) use auctions to efficiently dispatch regional generators and demand-side resources and keep the grid in balance. FERC approves all market rules and adjudicates disputes about rules and their implementation. This role provides FERC with substantial influence over the price of power.

Meanwhile, approximately a dozen states, including New York and Illinois, broke apart their vertically integrated utilities in the late 1990s and early 2000s.[19] This industry restructuring separated power generation from its delivery by requiring or incentivizing utilities to sell their power plants to corporate affiliates or independent companies. State restructuring laws seeded

15. *See* Bruce Biewald & Rachel Wilson, *Best Practices in Electric Utility Integrated Resource Planning*, SYNAPSE ENERGY ECONOMICS (June 2013), http://www.raponline.org/wp-content/uploads/2016/05/rapsynapse-wilsonbiewald-bestpracticesinirp-2013-jun-21.pdf.

16. *See Our History*, ISO-NEW ENGLAND, https://www.iso-ne.com/about/what-we-do/history (last visited March 14, 2018); *see also* PJM/MISO Joint Board–FERC, *Statement by Phillip J. Harris, President and CEO of PJM Interconnection* 2 (Nov. 21, 2005), https://www.ferc.gov/EventCalendar/Files/20051120152440-Harris,%20PJM.pdf.

17. *See, e.g.*, Miss. Power v. Miss. ex rel. Moore, 487 U.S. 354, 357–61 (1988).

18. *See id.* at 357–58.

19. Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring*, ENERGY INSTITUTE AT HAAS 7, 15–16 (May 2015) https://ei.haas.berkeley.edu/research/papers/WP252.pdf.

the new FERC-regulated interstate markets with consumer demand and non-utility power suppliers. "Wires-only" utilities, which remained under the supervision of state utility regulators, had to procure power through wholesale markets to meet the demand of their ratepayers.

As the scope of interstate markets expanded, and power generators increasingly earned revenue from FERC-regulated markets rather than state-set retail rates, state regulators lost considerable leverage over power plant investments. But states did not cede control over utility portfolios. To the contrary, both restructured and traditionally regulated states enacted renewable portfolio standards (RPS) that require utilities to demonstrate that a certain amount of the energy they sell to consumers is derived from renewable power. In most states, utilities comply by acquiring Renewable Energy Credits (RECs), certificates that represent the environmental attributes of a quantity of electricity.[20] Renewable energy generators earn revenue from FERC-regulated wholesale sales and through sales of state-created credits. By requiring utilities to purchase RECs from renewable generators, states incentivized the construction of new generation capacity that met their environmental and energy supply policy goals.

Utilities' REC purchases complement energy transactions on the restructured grid. A utility buying energy from a market operator purchases undifferentiated energy, not energy from a specific generator. RECs serve an accounting function, allowing utilities (and other consumers) to take credit for renewable energy generation even though they are not actually consuming it or purchasing it directly from the generator. Although state RPS laws are relatively new in the context of the one-hundred-year history of state utility regulation, they are an integral piece of the governance structure of today's electric grid. By creating a commodity that represents the environmental attributes of electric power, states are able to use a market-based mechanism to exercise control over utility portfolios and influence the mix of resources selling energy at wholesale.

While wholesale power markets have transformed from residual utility-to-utility sales regulated on a cost-of-service basis to regional auction markets governed by RTO/ISOs' complex and voluminous rules, FERC's statutory authority is largely unchanged. The core provisions of the FPA, largely intact since they were passed by Congress in 1935, require FERC to ensure that wholesale rates are "just and reasonable" and not "unduly discriminatory."[21] The Supreme Court has recently explained that FERC "undertakes to ensure 'just and reasonable' wholesale rates by enhancing competition—

20. Depending on the state law, RECs may instead certify that a quantity of electricity was generated by a specific technology. Ari Peskoe, *Emission Rate Credits in the Clean Power Plan*, HARVARD ENVIRONMENTAL LAW PROGRAM 4 (Oct. 2015), http://environment.law.harvard.edu/wp-content/uploads/2015/08/Emission-Rate-Credits-in-the-Clean-Power-Plan.pdf.

21. 16 U.S.C. § 824d(a) (1978); 16 U.S.C. § 824e(a) (2005).

attempting . . . 'to break down regulatory and economic barriers that hinder a free market in wholesale electricity.'"[22]

When FERC acts to improve the wholesale market, it has "expansive" authority and may account for a range of industry practices that "directly affect" wholesale rates.[23] While courts are reluctant to cut off FERC's jurisdiction, recent Supreme Court decisions also recognize that the FPA is a "collaborative federalism statute[that] envisions a federal-state relationship marked by interdependence."[24] Under the FPA, "federal and state powers [are] 'complementary'"[25] and "marked by interdependence"[26] States "may regulate within the domain Congress assigned to them even when their laws incidentally affect areas within FERC's domain."[27] When they do, it is "squarely within FERC's jurisdiction" to "approv[e wholesale market] rules that prevent the state's choices from adversely affecting wholesale [] rates."[28]

ZERO EMISSION CREDITS BENEFIT LOCAL NUCLEAR PLANTS

In August 2016, the New York PSC enacted a ZEC program to benefit economically struggling nuclear plants. According to the PSC, low wholesale power prices challenge the financial viability of nuclear plants and could lead to their premature retirement.[29] The PSC concluded that the ZEC program "is the best way for the State to preserve the nuclear units' [emission-free] environmental attributes while staying within the State's jurisdictional boundaries."[30]

New York's ZEC program is identical in structure to RPS programs. The PSC's order designates nuclear power plants that generate ZECs, sets the ZEC price, and requires a state agency to procure ZECs from those facilities for twelve years. Each New York utility must purchase ZECs from the state agency in proportion to its share of total electric sales. The PSC pegged the ZEC price to the social cost of carbon, as calculated by an Obama-era federal government interagency working group. The PSC can adjust the price downward in contract

22. F.E.R.C. v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 768 (2016) (quoting Morgan Stanley Capital Grp. Inc. v. Pub. Util. Dist. No. 1 of Snohomish City, 554 U.S. 527, 536 (2008)).

23. *Id.* at 776; *see* Joel B. Eisen, *FERC's Expansive Authority to Transform the Electric Grid*, 49 U.C. DAVIS L. REV. 1783 (2016); *see also* Rossi, *supra* note 6; Ari Peskoe, *Easing Jurisdictional Tensions by Integrating Public Policy in Wholesale Electricity Markets*, 38 ENERGY L. J. 1 (2017).

24. Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1300 (2016) (Sotomayor, J., concurring).

25. *Elec. Power Supply Ass'n*, 136 S. Ct. at 780 (quoting FPC v. La. Power & Light Co., 406 U.S. 621, 631 (1972)).

26. *Hughes*, 136 S. Ct. at 1300 (Sotomayor, J., concurring); *see also* Oneok, Inc. v. Learjet, 135 S. Ct. 1591, 1601 (2015) ("Petitioners and the dissent argue that there is, or should be, a clear division between areas of state and federal authority in natural-gas regulation. But that Platonic ideal does not describe the natural gas regulatory world.").

27. *Hughes*, 136 S. Ct. at 1298.

28. N.J. Bd. of Pub. Utils. v. FERC, 744 F.3d 74, 98 (3d Cir. 2014).

29. N. Y.PUB. SERV. COMM'N, ORDER ADOPTING A CLEAN ENERGY STANDARD, Case 15-E-0302 at 45 (2016).

30. *Id.* at 20.

years three through twelve if wholesale power and capacity prices in New York are projected to increase above a reference value.[31]

In December 2016, the Illinois Legislature passed essentially the same ZEC program.[32] Illinois' ZEC price is also based on the social cost of carbon and can be adjusted downward if projected energy and capacity prices in the FERC-regulated PJM and MISO markets exceed a reference value.

Both ZEC programs were part of broader efforts to reduce greenhouse gas emissions from the states' power mixes. In New York, the PSC's order also increased the state's RPS to 50 percent renewable energy by 2030. According to the PSC, "the independent renewable resource and ZEC obligations . . . each contribute uniquely to serving the long-term goal of achieving a largely de-carbonized energy system by the middle of the century."[33] New York ZECs are intended "to avoid backsliding in the State's efforts to reduce carbon emissions."[34] The Illinois legislation, known as the Future Energy Jobs Act, increased that state's RPS target, expanded utility energy efficiency mandates, and created a new solar energy program.

Shortly after the programs were enacted, coalitions of electric generators filed lawsuits in federal district courts in New York and Illinois. The suits allege two Constitutional infirmities with the ZEC programs. First, they assert that the FPA preempts ZECs because they intrude on FERC's exclusive *field* of wholesale ratemaking and *conflict* with FERC's market-based regulatory regime. Second, they claim that by selecting only in-state plants to receive ZECs, the states are impermissibly discriminating against out-of-state businesses and burdening interstate markets in violation of the dormant Commerce Clause.

Both courts dismissed all claims on the merits and on procedural grounds. Below, I argue that courts should reject preemption claims on appeal.

ZECs Are Not Field Preempted by FERC's Exclusive Jurisdiction over Wholesale Power Rates

The Supreme Court has repeatedly stated that FERC has *exclusive* jurisdiction over rates for electric energy sold at wholesale in interstate commerce.[35] The FPA "'leaves no room either for direct state regulation of the prices of interstate wholesales' or for regulation that 'would indirectly achieve the same result.'"[36] A court will preempt any state action that it finds intrudes on this exclusive federal field.

31. *Id.* at 51.
32. 20 ILL. COMP. STAT. 3855/1-75 (2017)
33. ORDER ADOPTING A CLEAN ENERGY STANDARD, *supra* note 29, at 20.
34. *Id.* at 45.
35. 16 U.S.C. § 824(b) (2015); Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1291 (2016); Nantahala Power & Light Co. v. Thornburg, 476 U.S. 953, 966 (1986).
36. F.E.R.C. v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 780 (2016) (quoting Northern Natural Gas Co. v. State Corporation Comm'n of Kan., 372 U.S. 84, 91 (1963)).

Many aspects of power generation – such as plant siting and operations and environmental standards – are clearly within state authority and beyond the reach of FERC.[37] But state restructuring laws complicated the jurisdictional picture. By moving power sales entirely out of the retail rate construct and forcing plants to sell at wholesale, states linked power generation to wholesale sales. In restructured states, traditional areas of state concern necessarily implicate FERC-jurisdictional wholesale sales.

For instance, in 2017 the Second Circuit rejected a field preemption challenge to a Connecticut law that requires utilities to solicit proposals for new renewable generation and sign contracts with winning bidders. Because Connecticut is restructured, utilities must contract for power, including for renewable power mandated by state law. The Second Circuit panel concluded that it is "settled law" that states may "specify[] the sizes and types of generators that may bid" in to a utility procurement for wholesale energy, despite the direct effects those choices have on the resulting FERC-regulated wholesale contracts and the indirect effects those contracts may have on rates in FERC-regulated interstate markets.[38]

While states can mandate that utilities contract for power from specified generation technologies, no court has decided whether states may offer financial incentives to generators themselves. By requiring utilities to purchase RECs from eligible generators, RPS laws provide renewable generators with revenue on top of what they earn from FERC-jurisdictional wholesale sales. But RPS laws have never been challenged on preemption grounds.

ZEC opponents attack the RPS policy structure and argue that it is preempted based on a straightforward reading of the FPA. Section 205 is one of the core provisions of the FPA. It stipulates that "[a]ll rates and charges made, demanded, or received . . . for or in connection with the . . . sale of electric energy subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable."[39] The plaintiffs argue that because an eligible nuclear generator sells a ZEC to the state for each megawatt-hour of energy it generates and sells at wholesale, ZECs are payments "received" by nuclear generators "in connection with" their wholesale sales of electric energy.[40] Plaintiffs reason that ZECs are therefore under FERC's exclusive jurisdiction, and the state programs must be preempted.

Plaintiffs' proposed expansion of FERC's exclusive authority has no limiting principle that would prevent FERC's exclusive jurisdiction from similarly swallowing up RECs. Although no court has ever ruled precisely on

37. *See* § 824(b) (reserving to states authority over generation facilities).

38. Allco Finance Ltd. v. Klee, 861 F.3d 82 (2d Cir.), *cert. denied*, 138 S. Ct. 926 (2018).

39. 16 USC 824d(a) (1978).

40. Appellants' Initial Brief at 39–41, Elec. Power Supply Ass'n v. Star, No. 17-2455 (7th Cir. Aug 28, 2017); Appellants Initial Brief at 29–30, Coal. for Competitive Elec.. v. Zibelman, No. 17-2654 (2d Cir. Oct. 13, 2017).

this issue,[41] FERC itself has held that it does not have exclusive jurisdiction over all REC sales. In 2012, FERC determined that when RECs are sold "independent[ly] of a wholesale electric energy transaction . . . the charge for the [] RECs is not a charge in connection with a wholesale sale of electricity."[42] Both the Illinois and New York district courts were reluctant to disturb FERC's finding. The Illinois court found that "FERC's conclusion that it is possible to unbundle an environmental attribute credit from the sale of electricity without stepping on FERC's toes is persuasive when applied to ZECs."[43]

Classifying state-created ZECs or RECs as FERC-jurisdictional payments would inject uncertainty into REC markets and invite litigation about RPS laws. It could also force FERC to regulate REC sales, and it might frustrate FERC's ongoing efforts to harmonize its market regulation with state policies that select cleaner generation.[44] Destabilizing how states and FERC have understood this key jurisdictional issue would be inconsistent with how the Supreme Court has interpreted the FPA.

In a 2002 decision about a FERC order that enabled the creation of today's wholesale markets, the Court held that FERC "had discretion to decline to assert [] jurisdiction [over certain transactions], in part because of the complicated nature of the jurisdictional issues."[45] The Court concluded that FERC had made a "statutorily permissible policy choice"[46] to limit the scope of its authority, even though it arguably could have asserted jurisdiction over certain state-regulated transactions. That principle applies with equal force here. Even if FERC could assert jurisdiction over RECs and ZECs, the FPA does not compel it to do so.

The delicate nature of preemption under the FPA reinforces the principle that courts should tread lightly. In *Hughes*, Justice Sotomayor's concurrence explains that courts evaluating FPA preemption claims "must be careful not to confuse the 'congressionally designed interplay between state and federal

41. Reviewing FERC orders on the Public Utility Regulatory Policies Act of 1978 – which requires utilities to purchase energy from certain renewable generators – the Second Circuit concluded that FERC's orders do "not evince an intent to occupy the relevant field—namely, the regulation of renewable energy credits." Wheelabrator Lisbon, Inc. v. Conn. Dep't. of Pub. Util. Control, 531 F.3d 183, 190 (2d Cir. 2008).

42. *WSPP, Inc.*, 139 FERC ¶ 61,061 P 24 (2012).

43. Vill. of Old Mill Creek v. Star, No. 17 CV 1163, 2017 WL 3008289, at *13 (N.D. Ill.), *appeal docketed*, No. 17-2445 (7th Cir. July 18, 2017); *see also* Coal. for Competitive Elec., 272 F. Supp. 3d at 573 ("The death knell for Plaintiffs' field preemption argument is their failure to distinguish ZECs from RECs . . . If RECs are not preempted . . . then the Court fails to see how ZECs are.").

44. In May 2017, FERC convened a conference on the interaction between RTO markets and state policies. FERC hoped the conference would foster further discussion regarding the development of regional solutions in the Eastern RTOs that "reconcile the competitive market framework with the increasing interest by states to support particular resources or resource attributes." Notice of Technical Conference, Notice Inviting Post-technical Conference Comments (May 23, 2017) (F.E.R.C. Docket No. AD17-11-000).

45. New York v. F.E.R.C., 535 U.S. 1, 28 (2002).

46. *Id.* [45](quoting Transmission Access Policy Study Grp. v. FERC, 225 F.3d 667, 694–95 (D.C. Cir. 2000).

regulation' for impermissible tension that requires preemption under the Supremacy Clause."[47] Although sales of ZECs and RECs may affect FERC-regulated wholesale rates, those effects do not necessarily transform state-created credits into FERC-jurisdictional products sold "in connection with" wholesale energy. As the Court explained decades ago in a decision about the companion Natural Gas Act, "the breadth and complexity of [FERC's] responsibilities demand that it be given every reasonable opportunity to formulate methods of regulation appropriate for the solution of its intensely practical difficulties."[48] In this case, courts should defer to FERC's determination that when state-created credits are sold separately from their associated energy, as ZECs are, they are outside the scope of FERC's authority.

Plaintiffs' novel reading of the FPA, if accepted, would frustrate FERC's long-standing efforts to accommodate state RPSs.[49] For example, in February 2017, FERC drew a distinction between its "responsib[ility] for maintaining well-functioning markets" and state "jurisdiction over . . . renewable resource targets and renewable portfolio standards."[50] In that order, FERC found that an ISO New England tariff provision that exempted renewable resources from certain bidding rules "balances [FERC's] responsibility to promote economically-efficient prices, while accommodating states' ability to pursue legitimate policy objectives."[51] This sort of technical judgment about squaring wholesale market rules with state clean energy policies is at the heart of FERC's regulatory mission. As the Supreme Court has explained, FERC "must be permitted . . . to adapt [its] rules and policies to the demands of changing circumstances."[52] Courts should reject ZEC opponents' efforts to prevent FERC from harmonizing its regulation of interstate markets with state policies that advance legitimate environmental goals.

ZECS ARE NOT PREEMPTED BY THE SUPREME COURT'S 2016 *HUGHES* DECISION.

Plaintiffs also argue that the states' ZEC programs are preempted because they are "indistinguishable" from the program that the Supreme Court

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47. Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1300 (quoting Nw. Cent. Pipeline Corp. v. State Corp., Comm'n of Kan., 489 U.S. 493, 518 (1989)).

48. In re Permian Basin Area Rate Cases, 390 U.S. 747, 790 (1968).

49. *See, e.g., California Indep. Sys. Operator*, 119 FERC ¶ 61,061 at P 86 (2007); *California Indep. Sys. Operator*, 118 FERC ¶ 61,226 at PP 6, 14 (2007); *Int'l Transmission Co.*, 120 FERC ¶ 61,220 at PP 23–25 (2007); *S. California Edison*, 121 FERC ¶ 61168 at PP 3, 6, concurrences (2007); *New York Indep. Sys. Operator*, 122 FERC ¶ 61,211 at P 112 (2008); Order No. 1000, 136 FERC ¶ 61,051 at P 81 (2011); *Midcontinent Indep. Sys. Operator*, 133 FERC ¶ 61,221 at P 190 (2010); Order No. 764, 139 FERC ¶ 61,246 at PP 19–21 (2012); Order No. 792, 145 FERC ¶ 61,159 at P 25 (2013); *New York Pub. Serv. Comm'n. v. New York Indep. Sys. Operator,* 153 FERC ¶ 61,022 at P 51 (2015).

50. *ISO New England*, 158 FERC ¶ 61,138 at P 9 (2017).

51. *Id.* at P 68; *see also New York Indep. Sys. Operator*, 122 FERC ¶ 61,211 at P 112 (2008); *New York Pub. Serv. Comm'n. v. New York Indep. Sys. Operator,* 153 FERC ¶ 61,022 at P 51 (2015).

52. *In re Permian Basin Area Rate Cases*, 390 U.S. at 784.

preempted in *Hughes*.[53] In his companion article, Joel Eisen crafts a preemption test based in part on a phrase in *Hughes* that suggests state programs may not be "tethered" to wholesale markets.[54] Neither argument provides a basis for preempting ZECs.

In *Hughes*, the Court held that the FPA preempted a Maryland Public Service Commission Order. The relevant order was the result of Maryland's multi-year effort to induce construction of a new natural gas power plant. State regulators solicited proposals from developers and then ordered each utility to sign a contract-for-differences with the plant. Under the contracts, the utilities paid the plant the difference between PJM prices for energy and capacity and prices set by the developer and approved by the state, so long as the plant bid into and cleared the PJM market. The effect of these contracts was to guarantee the plant selling its entire output to PJM that it would receive the price the state set, regardless of FERC-regulated PJM rates.

The Court concluded that the state-mandated contracts "operate[] within the [FERC-regulated] auction."[55] The contracts traded nothing of value between the parties, but rather mandated that utilities and the plant exchange money based on PJM prices. The Court's rationale is somewhat confusingly explained in the opinion's last paragraph:

We reject Maryland's program only because it disregards an interstate wholesale rate required by FERC. . . Nothing in this opinion should be read to foreclose Maryland and other States from encouraging production of new or clean generation through measures "untethered to a generator's wholesale market participation." *Brief for Respondents* 40. So long as a State does not condition payment of funds on capacity clearing the auction, the State's program would not suffer from the fatal defect that renders Maryland's program unacceptable.[56]

In the first sentence, the Court finds fault "only" with the state's "disregard" for the FERC-regulated rate. The final sentence, however, ignores that the state program supplants the wholesale rate and concludes that the contracts' "fatal defect" is the requirement that the plant clear the FERC-regulated auction. Although all three federal courts that have interpreted *Hughes* have concluded that the a "fatal defect" language is controlling,[57] any remaining ambiguity in the Court's final paragraph is irrelevant for ZECs because they trip neither of the Court's concerns.

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53. Appellants' Initial Brief at 41–51 , Elec. Power Supply Ass'n v. Star, No. 17-2455, (7th Cir. Aug 28, 2017); Appellants Initial Brief at 30–40, Coal. for Competitive Elec. v. Zibelman, No. 17-2654, (2d Cir. Oct. 13, 2017).

54. Joel B. Eisen, *The New (Clear?) Electricity Federalism: Federal Preemption of States' "Zero Emissions Credit" Programs*, 44 ECOLOGY L.Q. CURRENTS (2018).

55. Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1299 (2016)

56. *Id.*

57. *See* Allco Finance Ltd. v. Klee, 861 F.3d 82, 100 (2d Cir.), *cert. denied*, 138 S. Ct. 926 (2018); Coal. for Competitive Elec. v. Zibelman, 272 F. Supp. 3d 554, 571 (S.D.N.Y. 2017), *appeal docketed*, No. 17-2654 (2d Cir. Aug. 25, 2017); Vill. of Old Mill Creek v. Star, No. 17 CV 1163, 2017 WL 3008289, at *13 (N.D. Ill.), *appeal docketed*, No. 17-2445 (7th Cir. July 18, 2017).

First, ZECs (and RECs) do not "disregard an interstate wholesale rate required by FERC." ZECs represent the environmental attributes of power, which an economically rational market should value, but FERC-regulated markets do not. By pricing ZECs based on the social cost of carbon, the states are approximating the actual benefits of the program (as best we can measure them). This price does not ignore or supplant the FERC-regulated price for power or capacity; it pays for an entirely separate product.

Second, the ZEC programs do not "condition payment of funds" on nuclear plants selling through any particular market. There simply is no such provision in the programs' rules. Plaintiffs argue that the bid-and-clear condition is embedded in FERC-approved market rules that require plants to sell to wholesale market operators, thus obviating the needs for New York and Illinois to specify that condition. But the law of preemption is about state action, and it would flip the doctrine on its head to conclude that a state program can be preempted by a complementary (and not conflicting) Federal regulation. Indeed, the *Hughes* Court identified the *state's* clearing requirement as the program's "fatal defect."

Eisen argues that the district courts were incorrect to read this language literally.[58] But for Maryland, this bid-and-clear requirement was critical for the cost-effectiveness of its program. The state-mandated contracts contemplated that the plant would earn the vast majority of its revenue by selling to PJM.[59] Utilities (and by extension ratepayers) would then pay what was expected to be relatively a small amount to true-up any difference between the plant's PJM revenues and the state-approved contract price. Had the contracts not included the bid-and-clear requirement, utilities could have been on the hook for the entire contract price. The "clearing" requirement was fundamental to the state's scheme of replacing the FERC-regulated rate with a state-determined price. No such concern exists with regard to ZECs, whose prices are capped at the social cost of carbon.

Plaintiffs and Eisen also argue that the states' ZEC price formula is a basis for preemption under *Hughes*. Both states set the price initially at the social cost of carbon. New York adjusts the price downward if forecasted energy and capacity prices in a particular New York market region increase above $39. Illinois similarly adjusts the price downward if a composite of forecasted energy prices and actual capacity prices in two regional markets exceeds $31.40. Plaintiffs assert that the ZEC price "varies in almost exactly the same manner that the contracts for differences in *Hughes* operated, shrinking as rates rise and growing as rates thereafter fall, to make up the difference between supposedly inadequate wholesale market rates and the rate [the state] thinks the

58. Eisen, *supra* note 54.
59. PPL Energyplus, LLC v. Nazarian, 974 F. Supp. 2d 790, 822 (D.Md. 2013).

generators should receive."[60] Eisen views the price adjustment as an impermissible "tether" between the state's policy and FERC-regulated rates.[61]

Resting preemption entirely on these adjustments would lead to an odd result. This argument concedes the legality of the ZEC program initially when the ZEC price is set at the social cost of carbon, and would find the program invalid only if FERC-regulated market prices increase above the reference values ($39 or $31.40). Under this theory, a state would be allowed to price an environmental credit based on the social cost of carbon (or some other metric), but forbidden from reducing that price if the beneficiary of the credits earns greater revenue due to higher wholesale power prices.

These credit price adjustments are distinguishable from the contracts in *Hughes*. Unlike Maryland's contract price, the ZEC adjustments are not tied to actual revenue earned by any specific plant. Rather, the ZEC formulas account for a general forecasted increase in wholesale market prices without calculating the precise revenue effect for each ZEC-eligible plant. The ZEC price adjustments therefore do not "disregard[] *an interstate wholesale rate*." Rather, the adjustments account for wholesale market conditions by reducing the price of the credit without changing any generator's compensation for FERC-jurisdictional energy or capacity.

These adjustments are consistent with how a few states cap REC prices. Many RPSs allow utilities to pay alternative compliance payments (ACP) in lieu of surrendering RECs. ACPs are typically set by statute, can be adjusted by regulators, and set a ceiling for REC prices used for compliance in that state. States have various adjustment methodologies, and many tie ACPs to REC prices or inflation, but some account for wholesale market conditions. For example, Oregon law requires regulators to set an annual ACP based in part on the cost of renewable energy and rates in Oregon utilities' wholesale contracts.[62] New Jersey accounts for "changing conditions in the environment, the energy industry and markets."[63]

As a practical matter, ZECs and RECs are both "tethered" to wholesale rates. For ZECs, the price adjustment is embedded administratively in the price formula. For RECs, the tether is explicit when ACPs are based on wholesale rates and otherwise implicit. States created RECs when renewable energy was significantly more expensive. RECs were intended in part to make up the difference between a developer's costs and the revenues it would earn from wholesale energy and capacity sales. RECs and ZECs both provide revenue to resources that would otherwise be uneconomic. In addition, as New York regulators note in the order creating ZECs, REC prices are expected to vary

60. Appellants Initial Brief at 38, Coal. for Competitive Elec. v. Zibelman, No. 17-2654, (2d Cir. Oct. 13, 2017).

61. Eisen, *supra* note 54.

62. OR. REV. STAT. § 469A.180 (2007).

63. N.J.A.C. § 14:8-2.10 (2017).

inversely with wholesale market rates – when energy prices are low, REC prices tend to be high and vice-versa.[64]

The ZEC price adjustment thus mimics how REC prices change in response to wholesale rates. Preempting ZECs due to the adjustment would tell states that they may not explicitly account for wholesale market conditions but may continue to do so implicitly by setting ACPs and establishing utility demand for credits.[65] Other indirect mechanisms, such as credit price adjustments based on in-state utility costs for wholesale power purchases, may be sufficiently attenuated from wholesale rates and rooted in consumer protection. Ultimately, preempting a credit price adjustment as an impermissible "tether" overlooks the interconnectedness of state and federal regulation[66] and would invite litigation about other state policies.

ZECs Do Not Conflict with FERC's Market-Based Regulatory Regime

Plaintiffs allege that the states' ZEC programs are invalid under conflict preemption principles. In general, courts find conflict preemption when a state law "stands as an obstacle to the accomplishment and execution of the [Congress'] full purposes and objectives."[67] Plaintiffs complain that by keeping otherwise uneconomic plants in the market, ZECs frustrate FERC's efforts to set rates through competitive markets and distort FERC-approved just and reasonable rates.

Courts should reject this theory that market effects provide a basis for preemption. As the Third Circuit held in a case about a New Jersey program that was nearly identical to the program at issue in *Hughes*, "the law of supply-and-demand is not the law of preemption. When a state regulates within its sphere of authority, the regulation's incidental effect on interstate commerce does not render the regulation invalid."[68] Numerous state policies, ranging from clean energy mandates to taxes, have effects on interstate power markets. Whether any of these policies "conflict" with FERC's markets is best addressed in the first instance by FERC, rather than a federal court.

Plaintiffs' primary concern about the ZECs' effects is that they will suppress capacity market prices. FERC has explained that "competitive offers [in a capacity market] are expected to reflect going-forward costs as adjusted for revenues that are consistent with revenues earned in competitive markets." Because ZEC-eligible plants will earn revenue from ZEC sales, they may

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64. ORDER ADOPTING A CLEAN ENERGY STANDARD, *supra* note 29, at 127.

65. GALEN BARBOSE, U.S. RENEWABLE PORTFOLIO STANDARDS: 2017 ANNUAL STATUS REPORT 30 (Jul. 2017) ("REC prices are a function of ACP rates and current/expected supply-demand balance.").

66. *See* OneOK, Inc. v. Learjet, 135 S. Ct. 1591, 1601 (2015) ("Petitioners and the dissent argue that there is, or should be, a clear division between areas of state and federal authority in natural-gas regulation. But that Platonic ideal does not describe the natural gas regulatory world.").

67. Hines v. Davidowitz, 312 U.S. 52, 66–68 (1941).

68. PPL Energyplus v. Solomon, 766 F.3d 241, 255 (3d Cir. 2014) (citing Nw. Cent. Pipeline v. State Corp. Comm'n of Kansas, 489 U.S. 493, 514 (1989)).

submit lower offers into the capacity market than they otherwise would. These lower offers may then result in lower market-clearing prices received by all sellers.

The very same plaintiffs that filed lawsuits in federal courts have also filed complaints at FERC asking it to ensure that capacity market rules protect against this outcome.[69] Plaintiffs' conflict preemption claim would short-circuit FERC's processes. FERC has authority to address potential market distortion and has considerable expertise and discretion in determining how to do so. Courts should decline to address this argument, and only rule on a conflict preemption claim if plaintiffs allege that the states' policies conflict with FERC's eventual orders on ZECs.

CONCLUSION

Zero Emission Credits are consistent with state authority over utility portfolios and do not intrude on FERC's jurisdiction over interstate power sales. Many state programs shape the mix of resources on the grid by providing incentives for clean power or adding costs to pollution. By design, these programs, including ZECs, affect FERC-jurisdictional rates. But the law of preemption is not an economic test. These incidental effects do not constitute state regulation of wholesale sales. To the extent that ZECs have adverse consequences on wholesale markets, FERC has the technical expertise and legal authority to address them.

69. *See* FERC Dockets No. EL16-49-000; EL13-62-000.

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REGIONAL IMPLICATIONS OF NATIONAL CARBON TAXES

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This paper examines impacts of nationally-imposed carbon taxes on different regions of the United States. The goal is to see what can be learned about the drivers of regional political support for and opposition to such measures. Whether at the state, regional or national levels, carbon taxes are one option for reducing greenhouse gas emissions; several state and regional programs are already under way and lowering emissions. This analysis uses a U.S. regional version of the DIEM computable general equilibrium model to explore relationships between carbon taxes, emissions, and economic growth. One area of emphasis is how the distribution of impacts may be affected by differences in regional household spending patterns, the types of industries and electricity generation situated in those regions, and the locations of energy production and energy-intensive manufacturing. The modeling also explores how carbon tax revenues can be used to offset impacts on regional factor earnings.

Keywords: Climate policy; carbon taxes; CGE.

1. Overview

Carbon taxes are one of the options under consideration for reducing greenhouse gas emissions in the United States, whether at the state, regional or national levels, and several such programs are already under way. A number of recent modeling studies have looked at the economic implications of these proposals, which can lead to broad macroeconomic adjustments as firms and households seek to lower their emissions and adapt to higher energy prices. Concerns exist that these impacts — or the incidence of a carbon tax — may not be distributed evenly across the economy. There is the potential for the distributional impacts of carbon taxes to be regressive, i.e., they may have more adverse impacts on low-income households that spend a larger share of their income on energy than higher-income households. Firms are concerned about how their competitive positions may be negatively impacted both domestically and globally, especially among energy-intensive, trade-exposed (EITE) industries. The drivers behind regional variations in impacts will also be critical in determining the political feasibility of such policies.

Carbon taxes have the potential to raise substantial amounts of revenue. Studies have shown that how these revenues are used can have impacts that are larger than those of the carbon tax itself. Capital taxes reduce investment, personal income taxes lower the labor supply and distort consumption choices, and payroll taxes also reduce returns to working and thus lower economic activity. Using carbon tax revenues to lower distortions from these existing taxes (known as revenue recycling or tax swaps) can reduce overall inefficiencies caused by the tax system. This benefit, or double dividend — which occurs in addition to any benefits associated with lowering emissions — can be significant. However, most modeling work indicates that there is a policy trade-off between household distributional or equity concerns and any economic efficiencies gained by lowering existing taxes.

This paper focuses on the potential regional differences in the impacts of carbon taxes. Such differences have the potential to drive support for and opposition to instituting the policy. The paper uses a U.S. regional version of the DIEM computable general equilibrium model to explore the relationships among carbon taxes, emissions, and economic growth. Among the factors considered in the modeling are regional differences in industrial production and electricity generation, household spending patterns, and the locations of energy production. The modeling also explores how various ways of using carbon tax revenues could be used to offset policy impacts and how these options affect any region-specific impacts.

1.1. *Findings on emissions reductions under a national carbon tax policy*

In the absence of new policies, or very low gas prices, CO_2 emissions are likely to increase — or at least not decrease. Carbon taxes are one way to change this outcome. Taxes lower emissions through adjusting the economics of different production technologies, household consumption and vehicle choices, and the viability of options for electricity generation. The size and speed of these adjustments will depend on the initial carbon tax level and its growth rate over time:

- **A \$25/ton carbon tax results in significant emissions reductions in the near term:** Whether the carbon tax remains relatively constant after 2020 or continues to increase, emissions from electricity generation are reduced by one-third from baseline levels by 2025 and by 15% for the economy as a whole. If the tax rate only rises by 1% per year going forward, the pace of additional reductions slows in the future years. If the rate were to increase by 5% per year, emissions would continue to decline through 2050.
- **A \$50/ton carbon tax provides even larger emissions reductions in the near term:** While the \$50/ton tax continues to provide more reductions in the future than a lower tax rate, overtime these reductions become more difficult as few emissions

remain and the gap between it and the \$25/ton tax narrows. Decarbonization of the economy is not achieved by 2050 under the higher tax rate, however, caution should be used when interpreting the long-term model findings as it is easy to underestimate structural shifts in technology as taxes encourage new methods of production and consumption of goods.

- **Revenues from carbon taxes can be substantial:** A \$25/ton tax generates around \$120 billion annually when the tax is imposed, while a \$50/ton tax provides slightly less than twice that amount of revenue. If tax rates are relatively steady, returns stay fairly constant, but if tax rates increase at 5% per year, these receipts continue to increase.

1.2. *Findings on macroeconomic impacts of a national carbon tax*

The analysis estimates policy costs as changes in GDP, factor prices, and the welfare of households. Across a range of possible carbon tax rates, the modeling broadly finds the following:

- **Costs of a carbon tax policy are quite low for the United States:** GDP growth rates are barely affected by the carbon taxes and may actually increase, depending on how the revenues are used. After 10 years of a \$25/ton carbon tax growing at 5% per year, annual GDP adjustments range from an increase of 0.05% to a decrease of 0.35%. Cumulative welfare costs to households, measured by changes in consumption, are of the same magnitude as these GDP impacts.
- **Factor prices can be affected by the policies:** Existing capital investments are likely to experience the most significant decreases in returns due to their limited ability to adjust to a lower-carbon economy. Implications of carbon taxes for new investments and labor income are less clear cut and depend on how carbon revenues are used.
- **Methods of using (recycling) carbon tax revenues can have larger impacts on the economy than the carbon taxes themselves:** Lump-sum recycling through direct payments to households has the fewest benefits for the economy (it may provide the most benefits to low-income households however). Using revenues to lower marginal labor taxes can increase real wage rates and help offset the economic impacts associated with adjusting to a lower-carbon future. Recycling revenues through lowering capital taxes may provide the most benefits to households as a whole, but this approach is expected to be regressive and benefit high-income households that own capital more than low-income households.

1.3. *Findings on regional impacts of a national carbon tax*

National impacts tend to obscure significant differences at the regional level. The analysis looks at how nine regions of the United States may be affected by carbon taxes. Across these regions, which have very different energy consumption and production patterns, the modeling broadly finds the following:

- **Regional impacts vary significantly depending on the structure of local economies:** The Northeast and West Coast are less energy intensive and have lower dependence on fossil generation than other parts of the nation, putting them in a good position to respond to carbon taxes. Both GDP impacts and household welfare costs of carbon policies follow these trends.

- **Regional factor prices tend to follow the regional economic structures:** Impacts on labor productivity and returns to existing capital stocks follow the same pattern in which the Northeast and West Coast see the smallest impacts and the middle of the country has larger adjustments.
- **National approaches to recycling of tax revenues does not address regional disparities:** While recycling options can lower policy costs (or eliminate them in some parts of the country), they do not change any regional advantages (or disadvantages) as areas adjust to carbon taxes.
- **How capital ownership is distributed around the country matters:** Most analyses assume that all capital is fully pooled across the country through national capital markets, thus dispersing policy costs across regions. To the extent that capital is locally owned — perhaps because of the rise in importance of pass-through business entities — regional variations will be exaggerated.

The remainder of this paper discusses the literature on these topics, describes the DIEM model structure and assumptions that have the largest influences on results, defines the policy scenarios investigated, and examines the model findings for a range of possible starting carbon taxes and growth rates.

2. Background

A number of recent studies have looked at the economic implications of carbon tax proposals. Several modeling approaches have been used to investigate implications for specific industries, the economy as a whole, and households in particular. Partial equilibrium (PE) analyses tend to focus on particular industries such as electricity (e.g., Burtraw *et al.*, 2009) or particular areas of interest such as household distributional impacts (e.g., Dinan, 2012) or EITE industrial competitiveness (e.g., Aldy and Pizer, 2011). Household-level models in the PE framework look at distributional issues related to the "use-side" of income impacts related to carbon taxes with a fair amount of detail. These models examine how final users of goods (households) are affected by price increases associated with carbon taxes. Impacts of prices are traced through input–output data reflecting industrial production techniques, assuming that there is full pass-through of the carbon tax burden to households. The price increases of goods and services are combined with BLS Consumer Expenditure Survey (CEX) data on annual consumption patterns for different income groups to get distributional impacts of the carbon tax (e.g., Mathur and Morris, 2012). Household PE model results are a static representation of short-term distributional impacts of carbon taxes and provide revenue estimates, but do not usually estimate reductions in emissions or changes in macroeconomic variables such as GDP or any benefits of revenue recycling options.

Other models use a computable general equilibrium (CGE) approach that covers the entire economy and can simultaneously examine both the "use-side" of income spent on final consumption goods and any "source-side" effects where carbon taxes affect income sources (labor and capital earnings). This approach reflects the fact that producers cannot pass the full burden of a carbon tax through to households. The modeling indicates that "source-side" income effects can have as significant implications for distributional equity as the "use-side" of changes in household purchase prices. Because of their broad structure, CGE models typically have less detail on different classes of households than PE models, although some studies have combined CGE models with more detailed CEX data on household purchases. Compared with static PE household analyses, CGE models have many more structural assumptions affecting estimated results including: how adjustment dynamics and household generations over time are modeled, the mobility of capital across industries (and, in some cases, regions), labor supply elasticities that control how easily workers enter and leave the work force, energy substitution elasticities that control energy efficiency improvements, and how international trade is represented. CGE models can provide estimates of changes in emissions, tax revenues, macroeconomic impacts and benefits of revenue recycling through other taxes, and household distributional issues.

Several previous organized modeling studies have looked at carbon tax issues. The Stanford Energy Modeling Forum (EMF) coordinated eight models in the EMF24 study (US Technology and Climate Policy Strategies)[1] to look at GHG emissions caps, which are functionally similar in CGE models to carbon taxes. Fawcett *et al.* (2015) reported that, on average across the different models and assumptions, a tax rate of \$41/ton in 2020 would reduce emissions to 83% of 2005 levels in 2020 and a tax of \$192/ton in 2050 would reduce emissions to 50% of 2005 levels. There was, however, substantial variation across models on the tax rate needed to achieve these levels of reductions.

In 2015, a special issue of the National Tax Journal published five studies that use a carbon tax to raise revenue which can be used to reduce personal or corporate tax rates, or the federal debt. All the papers show that the economic impacts of a carbon tax would depend on how the revenues are used. McKibbin *et al.* (2015) find that in most cases a carbon tax reduces GDP, however, if revenues are used to lower capital taxes, emissions decline while GDP actually increases. Jorgenson *et al.* also finds that capital tax recycling can increase GDP and is also welfare improving (i.e., a "strong" double dividend). Rausch and Reilly (2015) do not find a "strong" double dividend, consistent with previous modeling efforts in the literature. Other recycling options have more mixed results, although lump-sum rebates to households are usually the least efficient as they forgo the opportunity to reduce other tax distortions. Williams *et al.* (2015) use a dynamic, overlapping generation (OLG) model combined with a more detailed household model and find that, while carbon taxes are regressive, accounting for the

[1]https://emf.stanford.edu/projects/emf-24-us-technology-and-climate-policy-strategies.

taxes' effects on income ("source-side") can substantially reduce the estimated regressivity. In general, cutting capital taxes tends to benefit high-income households, lump-sum recycling benefits low-income households, and labor or personal income tax recycling falls in-between those two options.

Other organizations such as Brookings, the Congressional Budget Office (CBO), Massachusetts Institute of Technology (MIT), and Resources for the Future (RFF) have also been extensively involved in modeling carbon taxes over the years. Across all the studies, a number of important — and at least somewhat consistent (though with outliers) — findings have emerged:

- **Emissions reductions can be significant** — Carbon taxes in the \$10–\$40/ton range can lower emissions by 15%–30% over the next 5–10 years. Hafstead and Kopp (2016) estimate that a carbon tax priced at the estimated social cost of carbon of \$45/ton and growing at 2%/year can reduce emissions in 2030 to 43% below 2005 levels.
- **Carbon tax revenues can be substantial** — in spite of the emissions reductions, the tax base of remaining emissions remains large enough to generate \$1–\$2 trillion over a decade. These new revenues can represent a significant fraction of CBO's estimates of government revenue streams or deficits (CBO, 2016). However, note that the Joint Committee on Taxation and the CBO, based on modeling in this area, are inclined to assume that net revenues are lower than gross revenues by 25% (the "haircut" needed to account for reductions in other tax revenue sources and increases in purchase prices for government goods caused by a carbon tax).[2]
- **Macroeconomic impacts from a carbon tax are generally modest** — Williams and Wichman (2015) review estimates of GDP impacts and find that most cluster between 0.5% and 0.7% declines by 2040 (with outliers).
- **Revenue recycling through other taxes can lower policy costs** — impacts on GDP and overall household consumption can be significantly reduced through lowering existing taxes.
  - Generally, the most economically efficient recycling option is to lower corporate/capital taxes, followed by personal income taxes and payroll taxes. Some studies reorder some of these tax types, depending on model structures and assumptions.
  - Lump-sum recycling through direct payments to households can be significantly less efficient since it gives up the opportunity to lower existing distortions.
  - Lowering the deficit/debt can also be effective, assuming that capital/labor taxes would have been raised in the future to meet debt payments. Some studies also explore the possibility for reducing interest rates by lowering government borrowing.
- **Carbon taxes by themselves can be regressive** — they can impose disproportionate burdens on low-income households because they spend a higher share of their income on energy.

[2]Rausch and Reilly (2012) estimate a haircut closer to 30%, although it varies.

  - PE studies that focus on the "use-side" of income (i.e., spending on household goods that have risen in price) tend to see this effect.
  - CGE models also see this, however, some studies indicate that effects on "source-side" of income (changes in capital and labor earnings) can be progressive.
  - How policy costs are measured can influence these results — annual income versus some proxy for lifetime income such as annual consumption.

- **Uses of carbon tax revenue have more important distributional effects than the tax itself**
  - Distributional impacts tend to run counter to economically efficient recycling options.
  - Lump-sum rebates to households are progressive (but economically inefficient).
  - Lowering income taxes does not benefit the lowest-income groups that pay few taxes — other options such as the Earned Income Tax Credit (EITC), Supplemental Nutrition Assistance Program (SNAP), or Low Income Home Energy Assistance Program (LIHEAP) can help low-income households. Mathur and Morris (2012) suggest that using 11% of the revenues from a $15/ton carbon tax can keep the poorest two deciles whole.
  - Payroll tax or personal income tax reductions are more regressive than lump-sum recycling (the degree of regressivity varies across studies).
  - Capital or corporate tax recycling is likely to provide the most benefits to upper-income households, making it the most regressive but most economically efficient option.
  - OLG modeling indicates that generational equity issues can also be important (Williams *et al.*, 2015).

In spite of this recent literature, there remain a number of open questions regarding the modeling of carbon tax impacts, whether it is where model results disagree on important issues such as the details of distributional impacts or where topics are relatively unexplored. Among these questions are: how will estimated impacts change when model forecasts are updated to current economic and energy-market conditions, how sensitive are results to model structure and assumptions, and how will carbon tax impacts and distributional outcomes vary across regions of the country.

Economic conditions have changed dramatically in recent years. Even though GDP growth and tax receipts have been relatively robust, CBO (2016) projections indicate that the federal budget deficit is likely to continue increasing over the next decade. This may motivate carbon taxes as a new source of government revenues as a way to reduce deficits or offset increases in other types of taxes since, depending on the carbon tax chosen, they could raise $100–$200 billion dollars annually.

The amount of revenue raised by a carbon tax will depend on emissions in the economy, as they form the tax base for the policy. Low baseline emissions (in the absence of a carbon tax) will lower the prospective tax base for a policy regime.

Conversely, low natural gas prices, which have already reduced economy's reliance on coal, may leave only higher-cost abatement activities available to reduce emissions, thus making a carbon-tax policy more costly by lowering economic activity. The level of emissions and the costliness of remaining reduction opportunities will affect both the revenues raised by carbon taxes and the impacts of reductions on the economy.

The choices made by modelers regarding model structure will also affect the types of insights gleaned from policy investigations. Processes such as the Stanford EMF32 study that compare policy results across a range of models are helpful in illuminating how different model assumptions may affect findings. While there is some literature on the distributional impacts of carbon taxes as discussed above, more work is needed to sort out varying findings across studies.

Along with unanswered questions about how recent changes in the economy and emissions will affect carbon taxes, another area of interest is how impacts of the taxes will be distributed around the country. Some recent literature has indicated that regional variation is not a significant factor (e.g., Mathur and Morris, 2012; Carbone *et al.*, 2013; Williams *et al.*, 2015). However, most PE or CGE models used to look at regional variation start with a national structure that estimates a single change in factor market earnings (national-level wage rates and capital returns) and then use CEX data to share impacts out to more disaggregated households at the state or regional level. Thus, they cannot account for potential differences in carbon tax impacts across regional income sources. Other model results such as Rausch *et al.* (2011) that account for differences in regional income suggest that regional distributional issues may be more important than expected.

This analysis will seek to provide new information on potential carbon-tax policy impacts by exploring the issues using a CGE model with a structure that is different from others, as is described in more detail in the next section. Features of the model's capital structure can influence how carbon taxes affect both capital and labor earnings. The model also has the ability to look at changes in regional income and model assumptions driving these results. The distribution of policy impacts across income sources and regions may play an important role in the political feasibility of such environmental policies.

3. Model and Assumptions

To evaluate the results of a carbon-tax policy analysis, it is first necessary to understand the type of model being used in the analysis, its main assumptions, and the model structure that drives the results. This section highlights these features of an updated version of the Dynamic Integrated Economy/Energy/Emissions Model (DIEM) used in this analysis, developed at Duke University's Nicholas Institute for Environmental Policy Solutions.[3]

[3]See Ross (2014a,b) for documentation of the previous version of DIEM, using older assumptions with a lower level of detail.

DIEM includes a macroeconomic or computable general equilibrium component (DIEM-CGE) and an electricity dispatch component that provides a detailed representation of U.S. regional electricity markets (DIEM-Electricity). This analysis focuses on the macroeconomic side of DIEM, which is a dynamic multi-region, multi-sector CGE model of the global and U.S. regional economies. It is designed to look at a wide range of domestic and international policies related to the economy, energy, trade, and greenhouse gas (GHG) emissions. The CGE component combines a consistent theoretical framework with real-world data on how economies are structured, firms' production technologies, trade and investment decisions, and households' income and spending patterns in order to estimate how changes in one part of the economy will flow through to all other areas.

While DIEM's broad structure is similar to other energy-related CGE models, equations in DIEM place a special emphasis on how capital can be substituted for energy in order to achieve improvements in energy efficiency. These responses are calibrated to forecasts from the U.S. Energy Information Administration's (EIA) National Energy Modeling System (NEMS). Separately, reactions in the electricity generation sector of the CGE component are calibrated to the changes seen in policy simulations in the DIEM-Electricity model. Using results from the detailed electricity dispatch component of DIEM allows changes in generation across regions and types of generation to be consistent across the two models. However, avoiding a "hard linkage" between the models — which attempts to iterate to a consistent solution across the two models — eliminates concerns with the CGE model's welfare results that arise because of the very different approaches to capital earnings in CGE versus electricity dispatch models.

In the model, a classical Arrow–Debreu equilibrium (Arrow and Debreu, 1954; Arrow and Hahn, 1971) is specified where rational economic agents respond through price-dependent market interactions to reach an equilibrium in which supplies equal demands (for all goods with a positive price). Firms' maximize profits subject to their technology constraints, and households with perfect foresight maximize utility subject to incomes from sales of factors of production equaling their expenditures. Governments collect tax revenue, purchase goods, and transfer money among households. DIEM-CGE is formulated and solved as a mixed complementarity problem (MCP) using the GAMS mathematical programming and optimization software (GAMS, 2012). It is made possible by the use of the MPSGE language (Rutherford, 1999, 2004) that allows the model to be formulated through nested constant-elasticity-of-substitution (CES) equations used to describe firm and household behaviors.

The DIEM-CGE model has two distinct macroeconomic components, Global and U.S. Regional, both of which rely on the same model structure. The two regional models are linked through trade impacts determined by the Global component of the model so that, when examining policy impacts on U.S. regions, it is possible to account for any changes at a global level that affect subnational areas of the United States. Of particular interest in DIEM-CGE are the impacts of energy and GHG policies. Accordingly, the model considers implications of policies for energy consumption and hence carbon dioxide (CO_2) emissions. It also includes five non-CO_2 gases in an endogenous fashion. Economies grow over time as a function of several factors (labor force and labor productivity growth, capital accumulation through investment, changes in supplies of natural resources, and improvements in technology) when establishing a baseline forecast from which predictions of policy impacts can be made.

For this analysis, several DIEM model features will be critical in determining impacts of carbon tax and revenue-recycling policies. Findings will be controlled by the following model data and assumptions:

(1) Energy data and baseline forecasts of economic growth, energy supply and demand.
(2) Capital and labor tax rates.
(3) Capital structure in the model and representation of energy-efficiency improvements.
(4) Labor supply elasticities.
(5) Household consumption patterns and regional ownership of labor and capital.

The starting point for evaluating model results is understanding the energy data and forecasts used in the model. A large portion of the data used in DIEM focus on describing energy production and consumption decisions, especially those related to electricity, and associated GHG emissions levels. This emphasis allows the macroeconomic side of the model, using its internal equations specifying energy- and emissions-reductions options, to evaluate how policies related to energy may affect the broader domestic and global economies. These model inputs combine global economic data from GTAP (Narayanan *et al.*, 2008) and U.S. state-level economic data (IMPLAN, 2012) with energy data and forecast from the World Energy Outlook, WEO (IEA, 2016) and the Annual Energy Outlook, or AEO, for the U.S. (EIA, 2017a). Historical energy data from the State Energy Data System (EIA, 2017c) and the Electric Power Annual (EIA, 2017d) are merged with the historical IMPLAN state-level economic data, which has been updated using current state GDP data from the Bureau of Economic Analysis (BEA, 2017) and population projections from the Census Bureau (Census, 2017). GHG emissions data and forecasts are also included in the model (EPA, 2012, 2017). The historical data, represented as social accounting matrices (SAM), describe a snapshot of industrial output, current production technologies, household income sources and purchase patterns, investment and government decisions, and trade flows around the world. The economic and energy forecasts from the WEO and AEO that provide a baseline or "business-as-usual" (BaU) forecast that is the starting point for policy analyses in the model.

Next, labor and capital tax rates (among others) must be established for the model. Existing taxes and their associated distortions in the economy will affect how carbon taxes interact with the economy and household income and spending. Taxes in the model are collected by government agents in both the global and U.S. regional components of DIEM, who then purchase goods and services, factors of production, and also transfer revenues among households. The types of taxes collected are based on several sources. Both the GTAP global database and the IMPLAN state-level information include some tax rates. GTAP has factor and output taxes, as well as placing a special emphasis on trade tariffs. The IMPLAN data cover FICA taxes on labor earnings, property taxes, and some output taxes. These U.S. data are supplemented with information from the National Bureau of Economic Research's (NBER) TAXSIM model (Feenberg and Coutts, 1993), which provides combined federal and state marginal personal income tax rates by income source and state. These data cover taxes on the different sources of household income; including wages, dividends, interest payments, and long-term capital gains.

Capital income represents a special case, in that it can be subject to double taxation that must be taken into account when estimating capital tax rates for the model. Effective marginal capital tax rates, which affect investment incentives and help determine economic impacts of carbon taxes, are a combination of personal income taxes on capital earnings (from NBER) and corporate income taxes. Over the last couple of decades, the amount of business earnings subject to corporate income taxes has declined as businesses have altered their structures to avoid these taxes. According to the Internal Revenue Service (IRS, 2017), in 2012 63% of business income was taxed as personal income using pass-through forms of organization. This leaves 37% of business earnings subject to the double taxation of corporate taxes and personal income taxes. Calculating an effective capital tax needs to account for this shift in shares.

For capital taxes at the federal level, the Congressional Budget Office (CBO, 2014) has estimated effective marginal capital tax rates (METR), based on business structures, types of assets, and industry-specific rules for depreciation (see Table 1). Such marginal rates represent the highest tax rate paid on the last dollar of capital earnings, and are the rates used to establish the tax distortions in models such as DIEM-CGE. On average, they estimate that C corporations on average face a 31% METR and pass-through entities face a 27% METR. For the DIEM model, these data have been combined with regional data on industry earnings from IMPLAN, and state corporate tax rates (Tax Foundation, 2017a), to estimate regional METR for capital earnings by industry and broad regional groups. A point of comparison for these marginal capital tax rates is the statutory corporate tax rate of around 39% (e.g., Tax Foundation, 2017b). In practice, the Government Accountability Office (GAO, 2013) has estimated that the average corporate income tax rate on profitable businesses is 13% (federal taxes) to 17% (including state, local, and foreign taxes).

The next critical components in determining how carbon taxes will affect the economy and existing taxes are the equations that control energy-efficiency improvements. In DIEM-CGE, there are several factors to consider; first, the representation of capital stock dynamics; second, how production technologies are

Table 1. Estimated capital tax rates by industry and region of the country.

	Electricity (%)	Natural Resources (%)	Petroleum Refining (%)	Agriculture (%)	Manu-facturing (%)	Services (%)	Transport (%)
Northeast	34	30	36	34	38	37	32
Southeast	32	33	40	32	36	35	30
East Central	36	25	32	36	40	39	34
South Central	28	29	37	30	32	30	26
North Central	32	28	37	34	37	36	30
West	32	0	0	33	37	36	31

Source: Author's calculations based on CBO (2014).

represented; and, finally, the calibration of energy-demand elasticities to the capital-dynamics and production-technology equations.

How the evolution of capital stocks over time is represented will determine how quickly the economy can respond to a carbon-tax policy. DIEM-CGE is a forward-looking, fully intertemporal optimization model in which households have perfect foresight and plan ahead to minimize any costs of future policies announced today. However, these dynamics have both short- and long-run components, which accomplished by distinguishing between malleable and nonmalleable capital stocks in the model.

This partial "putty-clay" approach (see Phelps, 1963; Lau *et al.*, 2002) is adopted to separate the two types of capital. Initially, there is an existing "clay" capital stock that depreciates away over time and produces with a Leontief technology based on input shares shown in the historical economic data (i.e., this capital continues to produce with today's technology as shown in the historical GTAP/IMPLAN data in the model without efficiency improvements). Both initially and over time, investments can be made in several types of new malleable, or "putty," capital stocks (i.e., manufacturing, housing, and personal vehicles) that do have options for energy efficiency improvements. The relative shares of "putty" versus "clay" capital in each sector of the economy play a role in determining the ease of energy-efficiency improvements in the short- and long-run.

In the manufacturing sector (and other sectors), the "putty" equations are represented using nested CES equations. Production technologies of firms in the model involve trade-offs among inputs of capital (K), labor (L), energy (E), and material (M) inputs. These CES equations describe how technologies can change in response to increases in energy prices. The DIEM model broadly follows some elements of the approach used in other CGE models focused on energy and environmental policies (e.g., Paltsev *et al.*, 2005), and assumes that a composite KLE good is combined with materials inputs in fixed proportions in the first level of a nested CES function. Elasticities of substitution lower down in the CES structure then control, for example, how easy it is to substitute into capital or labor and out of electricity if the price of electricity rises. If firms are very willing and able to substitute capital or labor for electricity, the price of a firm's output will not change much when electricity prices rise and vice versa. Thus, choice of these elasticities related to energy efficiency is a critical feature determining the model's policy-cost estimates.

Where the DIEM-CGE model structure differs from many other models is in its adoption of an explicit link between capital and energy (the US-REGEN model has a similar structure in the housing sector — EPRI 2017). This link, shown for manufacturing in Fig. 1, separates capital into a value-added component and an energy-services component. Thus, the elasticity between capital and an energy composite in the energy-services nest controls the ease of energy-efficiency improvements in the "putty capital" production technology (value-added elasticities are Cobb-Douglas, following other CGE models). Other sectors in the model adopt a similar capital-energy structure — whether for transportation, household services, or electricity generation (see the appendix for details).

Calibration of DIEM-CGE to desired energy-demand elasticities over the model's forecast horizon has to account for: The presence of malleable and nonmalleable capital, the rate at which the nonmalleable stock depreciates away over time, and the capital-energy substitution options in the production equations illustrated above. This calibration is done for four different sectors of the economy — residential, commercial, industrial, and transportation — based on a combination of energy demand responses in the Annual Energy Outlook and the literature more broadly.[4] Similar to

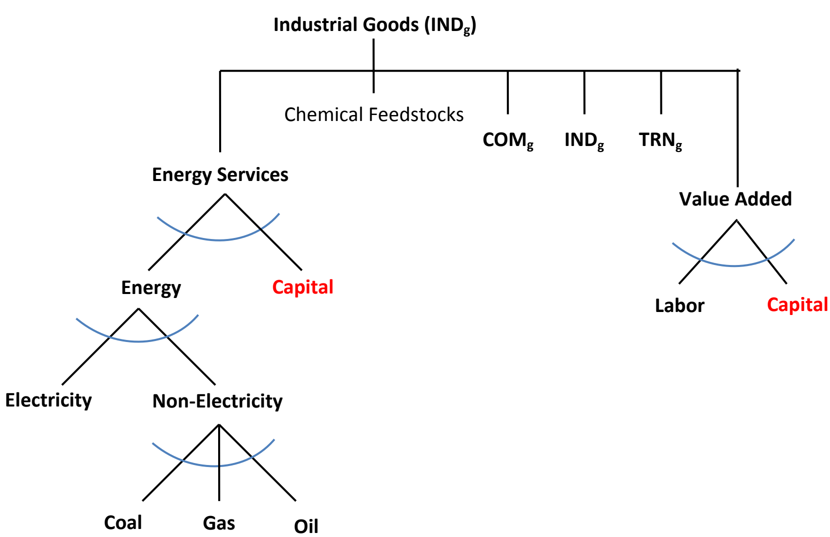

Figure 1. Manufacturing

[4]Energy-substitution options (based on specific technology choices) in electricity generation are calibrated to results from the detailed electricity dispatch component of the model, DIEM-Electricity, as discussed in the appendix.

the approach mentioned in Lanz and Rausch (2011), simulating demand elasticities in DIEM-CGE involves exogenously increasing the price of a single energy type in one of the four broad sectors of the economy and evaluating the change in energy demand. This is accomplished through a tax on the type of energy in each sector, where any tax revenues are returned to households in a lump-sum, nondistortionary fashion to avoid income effects.

Once the historical data on the economy, production technologies, and tax rates are combined with the calibrated CES equations that control policy responses, it is then necessary to choose labor-supply elasticities for the model. The distortions in the economy caused by pre-existing marginal capital and labor taxes are a function of how the labor-supply responds to changes in wage rates in the model. In formulating the DIEM-CGE model, households choose between consumption of good and leisure time when determining intratemporal (within time period) utility. The elasticity of substitution between these two commodities can be calibrated to give a desired labor supply elasticity (Ballard, 2000). Based on the literature, DIEM-CGE is calibrated to have 0.3 (0.05) for the compensated (uncompensated) labor supply elasticities (see Rausch and Mowers, 2012).[5] In choosing these values, measures of the tax distortions (marginal excess burden and marginal cost of public funds) were also assessed.

Finally, the model must include data on regional household consumption patterns and income sources. The IMPLAN state-level data has information on consumption, which have been updated with recent information from the Bureau of Labor Statistic's (BLS, 2016) Consumer Expenditure Survey (CEX). Household income is derived through the sale of factors of production (labor, capital, and natural resources). With the exception of extant (existing) capital that is fixed within a particular sector, labor and capital are assumed to be fully mobile intersectorally. Labor is immobile across regions so that changes in utility for the representative households can be calculated in the model. New capital investments typically earn an expected rate of based on U.S. capital markets (international borrowing and lending over time is also allowed). Across regions of the U.S., households own the labor located within a region and also shares of a pooled account of capital and natural resources where ownership is distributed through national capital markets.

This assumption of pooled national ownership of capital and resources is relaxed in some policy scenarios to investigate regional implications of localized capital ownership. Given that 63% of business income is earned by pass-through entities, there may be difficulties with the standard modeling assumption that national ownership of capital will smooth earnings across regions, and it may be more likely that regional differences in carbon-tax impacts will play an important role in how households

[5]Russek (1996) and Fuchs *et al.* (1998) provide a survey of labor supply elasticities. The elasticities from Rausch and Mowers are similar to those in Bovenberg and Goulder (1996), Goulder *et al.* (1997), Williams (1999), and Parry *et al.* (2000).

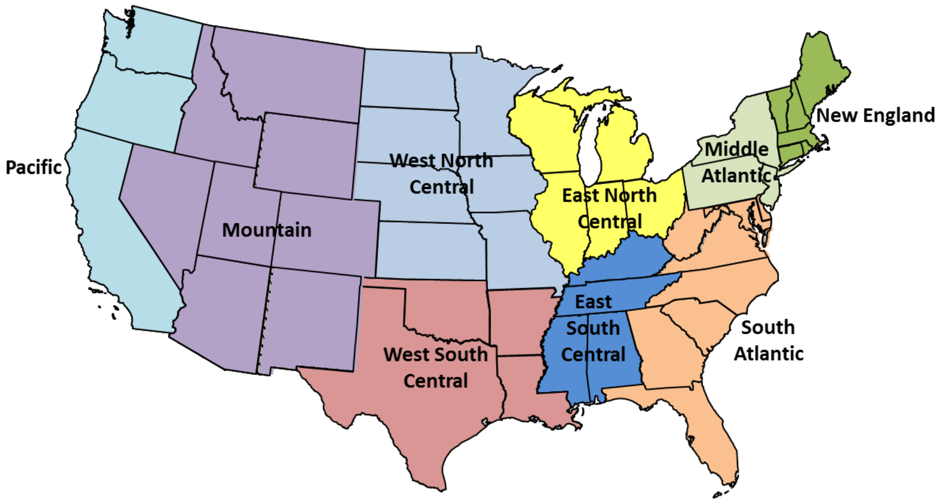

Figure 2. EIA Census regions

respond to such policies. To investigate these possibilities, modeling results are presented for the nine Census regions (Fig. 2).

Variations in regional impacts of carbon taxes will depend in large part on differences in the structure of the economies. Figure 3 shows fossil-fuel energy intensities of the United States and the nine regional economies, measured in Btus of energy per dollar of GDP in 2020. Some regions, largely the East and West Coasts, are

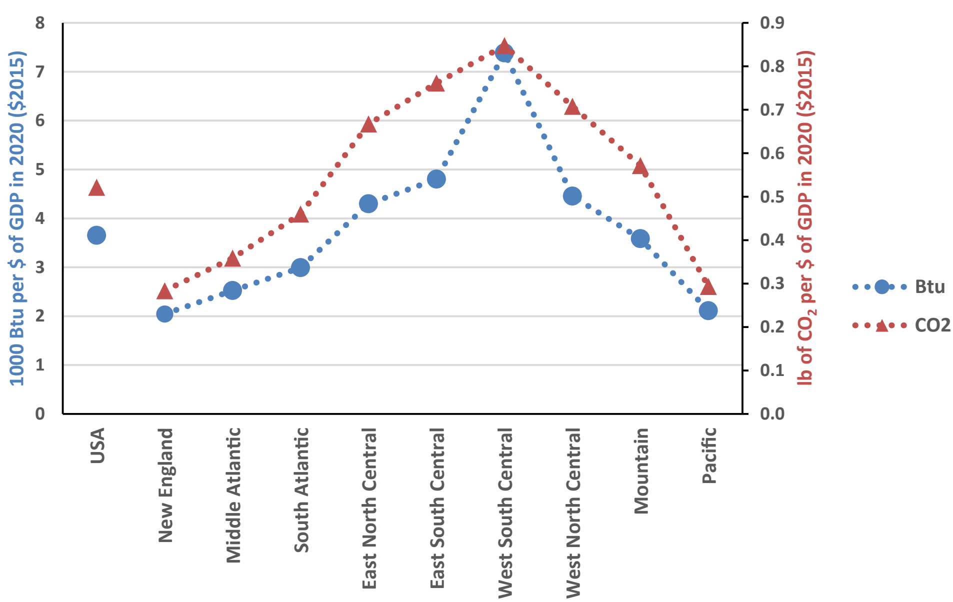

Figure 3. Regional energy and CO_2 intensities in 2020

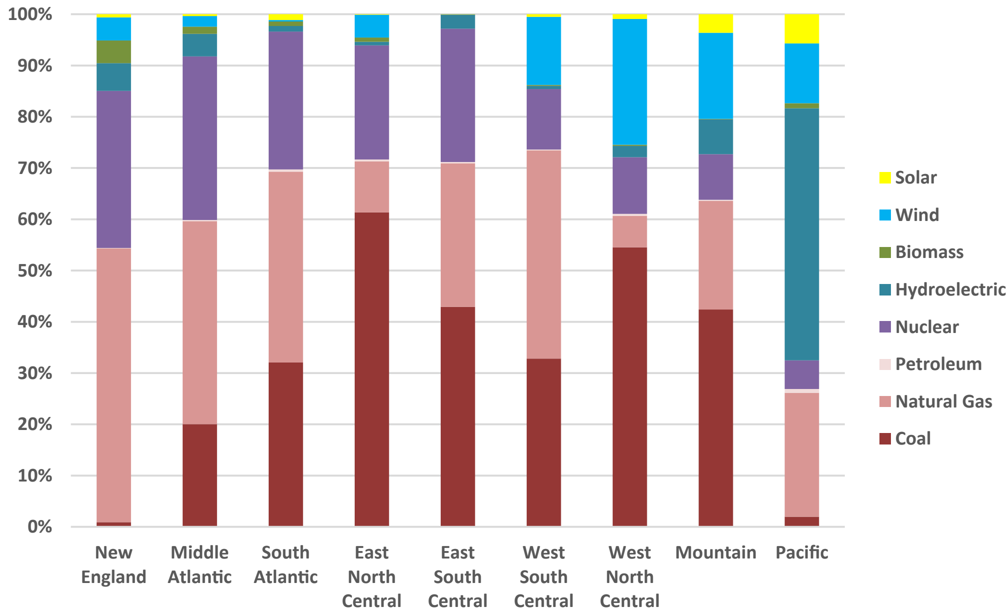

Figure 4. Baseline regional generation shares by type (2020)

significantly less energy intensive than the center of the country. Emissions of CO_2 largely follow the same regional pattern.

A major driver of regional differences in fossil-fuel consumption and CO_2 emissions is the types of electricity generation across the nation. Figure 4 illustrates baseline shares of the different types of generation in 2020. Over the last decade, the generation mix of the country has shifted away from coal and into natural gas. Some regions, however, remain dependent on coal as a major fuel source for generation. This leads to higher emissions, but also potentially cheaper options for reducing emissions.

As with overall energy intensities, coal-fired plants are more predominant in the middle of the country and so less on the coasts. New England has capped CO_2 emissions from electricity for a number of years through the RGGI program. In the Pacific region, California also has policies that restrict fossil generation, combined with significant hydroelectric resources in the Northwest, leading to lower emissions from this component of the regional economies.

Across the nation as a whole, electricity generation represents a large share of current and forecasted emissions (see Fig. 5). This sector is expected to respond relatively quickly to carbon taxes since they can shift the economics of coal versus gas generation, and also shift generation into renewable resources. Other sectors of the economy can have a harder time responding. The figure generally aggregates emissions sources into the categories shown in EIA's AEO 2017, however, it separates personal light-duty vehicles (LDV) from other types of transportation. LDV emissions can be reduced in the model both through efficiency improvements in conventional

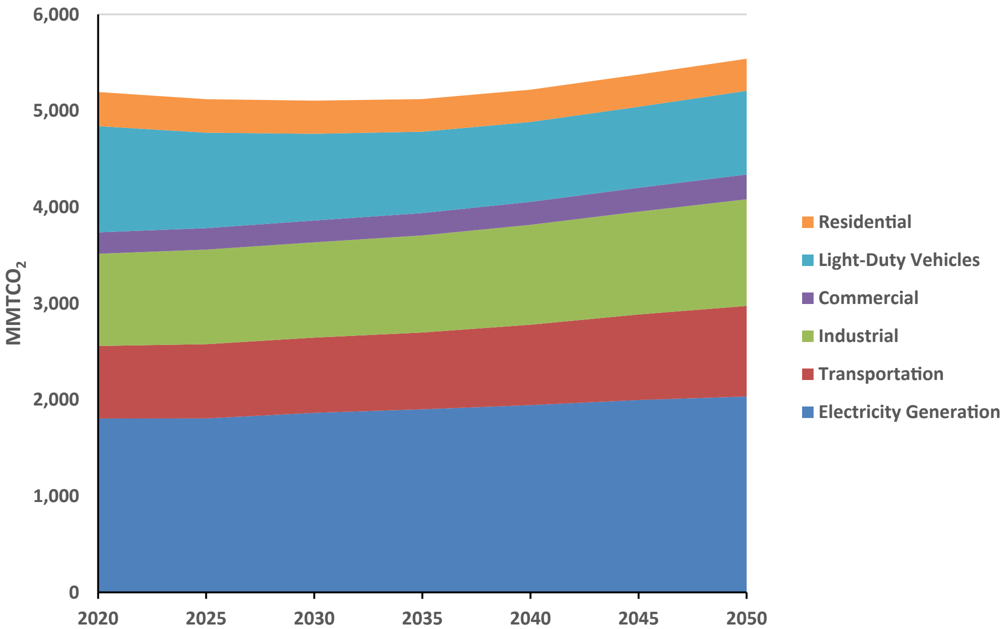

Figure 5. Baseline CO_2 emissions by sector

internal-combustion vehicles and through shifting into lower/nonemitting vehicles such as electric cars. Other sectors of the economy can have a harder time reducing emissions in response to carbon taxes — at least according to the demand elasticities in the AEO forecasts that help inform calibration of policy responses in the DIEM model.

4. Policy Scenarios

Starting from these baseline conditions, the DIEM model is used to explore how pricing carbon emissions will lower emissions, alter macroeconomic conditions, and affect households across the country. The results focus on economy-wide impacts and the ways in which the collected revenues can be used. See Ross (2018, forthcoming) for a detailed investigation of how carbon taxes might affect electricity generation.

Several starting carbon tax levels and growth rates are defined to cover a wide range of possible policy scenarios, all of which begin in the year 2020:

- **"\$25/ton+1%"** — A starting tax of \$25 per ton of CO_2, growing at 1% per year after 2020.

  ⇨ 2030 price of \$28/ton, 2040 price of \$31/ton, 2050 price of \$34/ton

- **"\$25/ton+5%"** — A starting tax of \$25 per ton of CO_2, growing at 5% per year after 2020.

  ⇨ 2030 price of \$41/ton, 2040 price of \$66/ton, 2050 price of \$108/ton

- **"\$50/ton+1%"** — A starting tax of \$50 per ton of CO_2, growing at 1% per year after 2020.
  - ⇨ 2030 price of \$55/ton, 2040 price of \$61/ton, 2050 price of \$67/ton
- **"\$50/ton+5%"** — A starting tax of \$50 per ton of CO_2, growing at 5% per year after 2020.
  - ⇨ 2030 price of \$81/ton, 2040 price of \$133/ton, 2050 price of \$216/ton.

In addition to these core policy scenarios, several revenue recycling options are investigated: lump-sum in which carbon tax receipts are returned to households on a per capita basis, labor-tax recycling in which receipts are used to lower marginal labor tax rates, and capital-tax recycling in which receipts are used to lower marginal capital tax rates. To explore how differential ownership of labor, capital and natural resources may affect regional impacts of carbon taxes, three methods of pooling capital through national markets are considered: 100% pooled national capital, 50% pooled and 50% locally owned, and 100% locally-owned capital. Total government tax receipts are maintained through the federal (and regional) governments retaining enough carbon revenue to offset declines in other tax receipts.

5. Policy Results

The analysis of carbon taxes begins with an examination of emissions projections compared to baselines without the tax policy. Emissions impacts by sector under the policy scenarios are then presented. The analysis next looks at some additional details of emissions trends such as the amount of revenue that might be raised by the policies, before examining policy impacts on factor prices and GDP across the revenue recycling options. Finally, comprehensive welfare measures of the overall policy costs are examined at the regional level.

5.1. *CO_2 emissions and carbon tax revenues*

The main goal of a carbon tax is to reduce emissions across the economy. Figure 6 illustrates how the various carbon tax rates would affect emissions levels, compared with the baseline trend in the absence of a carbon tax or other restrictions on emissions. Either of the starting rates, \$25/ton or \$50/ton, results in a large initial drop as the economy reduces emissions, especially from coal generation, and people anticipate the upcoming carbon taxes.

After 2020, carbon tax rates that increase by 1% per year continue to have some impact on emissions trends, although the effects are relatively minor. Tax growth rates of 5% per year have more substantial effects over time. In 2030, reductions from baseline range from 15%–25% for the \$25/ton taxes and 30%–40% for the \$50/ton taxes. By 2050, emissions differences between a starting tax of \$25/ton and \$50/ton, if they grow at 5% per year, are relatively small, with reductions of 60%–70% from

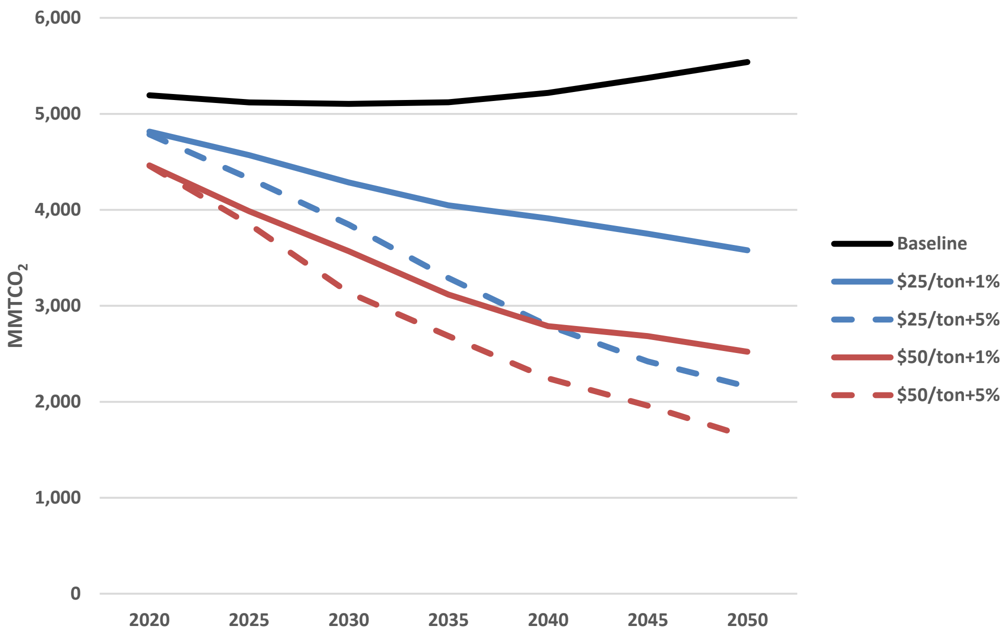

Figure 6. U.S. CO_2 emissions in the baseline and alternative carbon taxes.

baseline. However, neither of the options results in full decarbonization of the economy or reach long-term goals such as an 80% reduction below 2005 levels.

Figure 7 focuses on the $25/ton carbon tax, growing at 5% per year, and illustrates which sectors of the economy are providing the emissions reductions. The electricity sector provides the most reductions with other sectors contributing smaller amounts, depending on how cost effective their reduction options are. The LDV fleet experiences fairly significant adjustments as new types of vehicles replace conventional ICE vehicles, and emissions fall by 60% from baseline levels by 2050 even as vehicle miles traveled increase over time. The industrial sector reduces emissions by close to 50% by 2050, while the residential and commercial sectors have around 25% reductions and the transportation sector (aside from LDV) is less than 20%.

Figure 8 for the $50/ton tax, growing at 5% per year, indicates that, below 2,000 $MMTCO_2$, it becomes increasingly difficult for the model to find cost-effective options to remove emissions from the economy. The electricity sector has been decarbonized quickly and emissions in the personal LDV category have shrunk significantly, however other emissions sources remain. While less than 25% of baseline LDV emissions remain in 2050, more than 50% of residential and commercial emissions are still around, along with almost 75% of baseline transportation emissions.

The most rapid adjustments, and hence reductions in emissions, occur in the electricity industry. Figure 9 illustrates generation shifts across sources in the short- and intermediate term. In the baseline without new environmental policies, coal generation is predicted to maintain a relatively constant share of total U.S. generation for

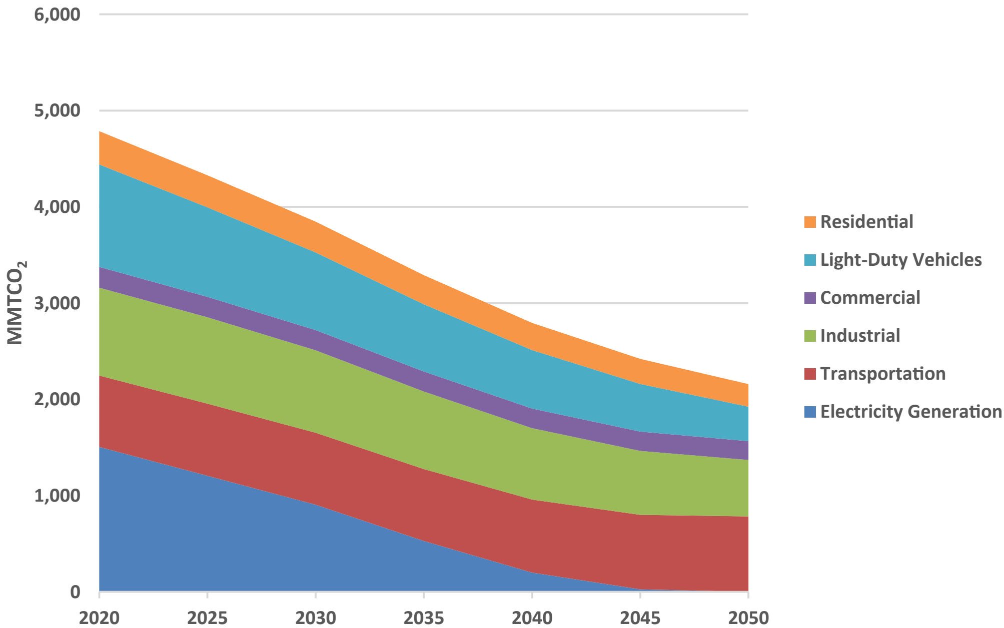

Figure 7. U.S. CO_2 emissions by sector under a $25/ton carbon tax growing at 5%/year

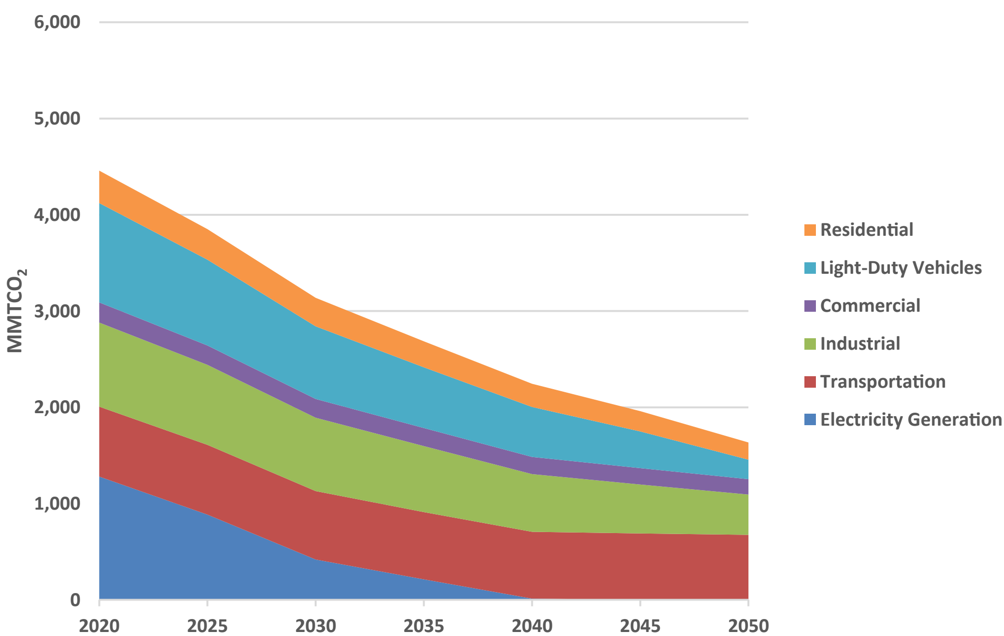

Figure 8. U.S. CO_2 emissions by sector under a $50/ton carbon tax growing at 5%/year

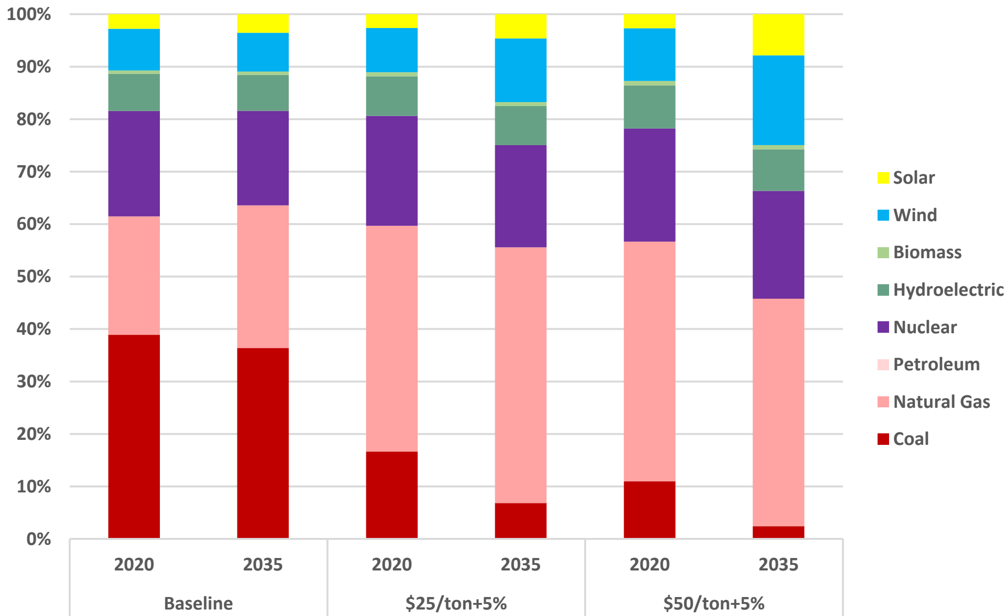

Figure 9. U.S. electricity generation shares: baseline versus alternative carbon taxes

the next couple of decades. Natural gas expands slightly in importance as the result of cheap gas supplies and a few additional coal retirements. Wind and solar grow somewhat in the baseline as construction costs decline (based on AEO 2017 and NREL forecasts).[6] Through 2035, the nuclear share is roughly the same. Any nuclear retirements, assuming a 60-year lifetime, begin to occur around this time and would be replaced with mostly natural gas units, if nuclear licenses are not extended to 80 years.

In the carbon-tax scenarios, coal units retire quite rapidly. In the short term, total electricity supplied to the grid is made up by running existing natural gas units more — maintaining the net load delivered to the grid and avoiding any near-term disruptions or reliability concerns. In the longer term, coal plants continue to retire and are replaced by several types of generation. In the $25/ton scenario, new NGCC units offset much of the decline in coal generation by 2035. Some additional wind and solar generation also enters. In the $50/ton scenario, most coal has left the system. New NGCC with CCS becomes a cost-effective response at these carbon-tax levels. Renewables also play a much bigger role in the system. As in the baseline, penetration of renewables depends on capital-cost assumptions. The standard assumptions in this analysis from AEO 2017 are relatively conservative with regards to improvements in solar photovoltaic (PV) prices. More optimistic price trends for PV and wind prices lead to much larger renewable shares in both the baseline and carbon-tax policy cases (see Ross, 2018, forthcoming).

[6]Renewable penetration is quite sensitive to capital costs and natural gas prices. See Ross (2018, forthcoming) for additional sensitivity analyses of generation choices in the baseline and carbon-tax policy scenarios.

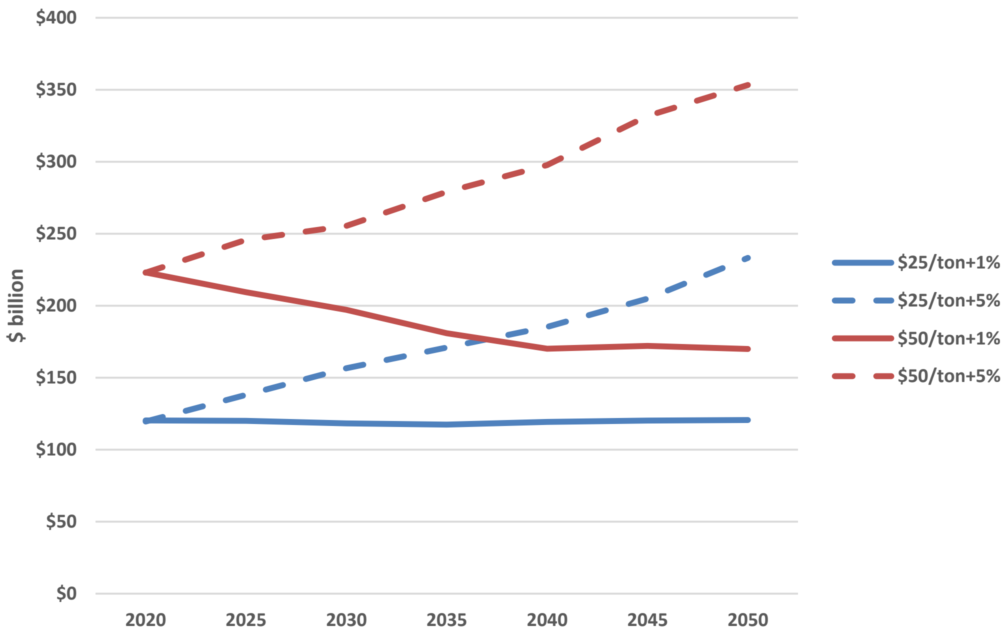

Figure 10. Carbon tax revenues for the alternative tax rates

In addition to providing emissions reductions, carbon taxes have the potential to generate substantial revenues, see Fig. 10 (note the inverse relationship between emissions reduction benefits and carbon tax revenues raised). In spite of the reductions shown in Figs. 7 and 8, the tax base of remaining emissions is large enough to generate (in gross terms prior to any revenues withheld by the government to offset other declines in tax receipts) around $120 billion per year for the lowest $25/ton tax rate, growing at 1% per year. The only option where tax revenues decline over time is the $50/ton tax that grows at 1% per year. The two taxes growing at 5% per year continue to provide more revenue each year through 2050, eventually reaching close to $250 billion per year for the $25/ton tax and more than $350 billion for the $50/ton tax.

5.2. *Macroeconomic impacts*

Over time, there are costs associated with carbon tax policies as the economy adjusts to a lower-emissions future. However, even the largest of these adjustments are trivial compared with the broader growth in the economy. Figure 11 presents the growth rates for baseline growth in the U.S. economy and the four carbon tax options considered, along with several revenue recycling options for the $25/ton case, growing at 5%.

The graph illustrates overall GDP trends and the legend gives the annual growth rates over the 2020–2050 time frame. In the baseline in the absence of a carbon tax, the economy grows at 2.27% per year (based on macroeconomic conditions from the AEO 2017). The highest carbon tax level ($50/ton+5%), after adjustments to energy production and consumption that result in significant declines in emissions, has a growth

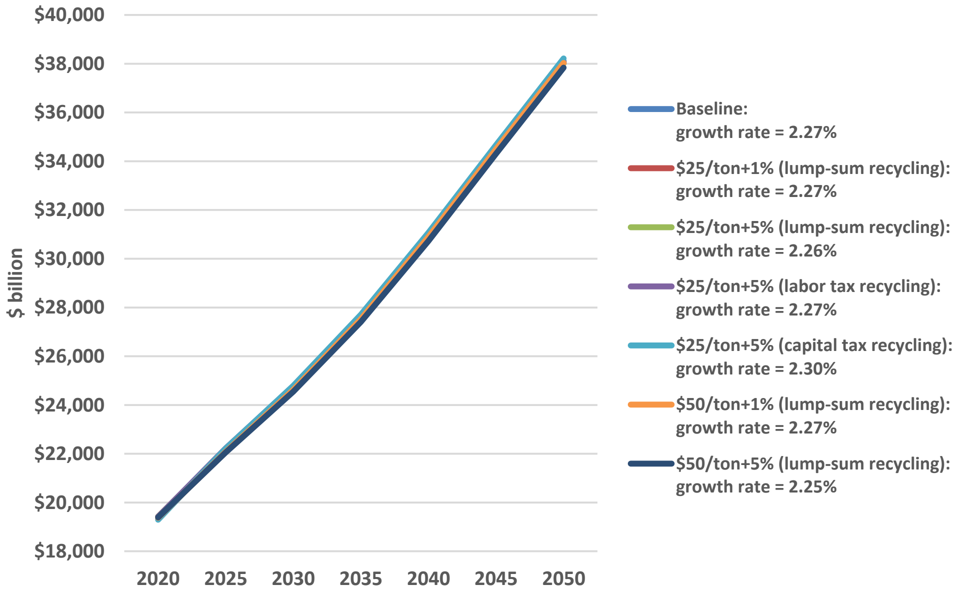

Figure 11. GDP growth in the United States: baseline versus carbon taxes

rate of 2.25% per year over the same time period, leaving the economy in essentially the same position after 30 years of the carbon tax policy. On the other side, the $25/ton+5% case with capital tax recycling has a growth rate slightly higher than the baseline at 2.30% per year, as the reductions in capital taxes result in additional economic growth (welfare for households on average still declines slightly in this case as shown in Fig. 11).

Table 2 presents the graphical information behind Fig. 11 as percent changes in GDP from baseline levels. The lump-sum and labor-tax recycling options for two levels of carbon taxes have similar temporal patterns; impacts in the near term are small and can even be positive as consumption shifts over time. Decreases in GDP grow slightly larger over the next 15–20 years before declining as the economy adjusts more fully to the carbon taxes. Labor-tax recycling has more beneficial effects on GDP

Table 2. U.S. GDP: percent changes from baseline for alternative carbon tax and recycling options.

Tax rate	Recycling	2020	2025	2030	2035	2040	2045	2050
$25/ton+5%	Lump sum	0.04%	−0.27%	−0.35%	−0.42%	−0.44%	−0.38%	−0.26%
	Labor tax	0.02%	−0.05%	−0.10%	−0.17%	−0.21%	−0.17%	−0.07%
	Capital tax	−0.61%	−0.08%	0.05%	0.09%	0.10%	0.16%	0.27%
$50/ton+5%	Lump sum	−0.11%	−0.76%	−0.95%	−1.00%	−1.03%	−0.89%	−0.75%
	Labor tax	−0.13%	−0.35%	−0.52%	−0.60%	−0.66%	−0.55%	−0.42%
	Capital tax	−1.22%	−0.30%	−0.20%	−0.19%	−0.20%	−0.06%	0.09%

than lump-sum recycling as additional labor is encouraged to enter the market in response to increases in wage rates (see Fig. 13).

Capital-tax recycling, however, follows a much different pattern. Short-term losses in GDP are the largest as people shift forward in time in anticipation of coming benefits as the capital tax continues to decline into the future. These short-term losses are mostly experienced by existing capital stocks, as shown in Figs. 14 and 15. In the longer term, capital-tax recycling leads to the smallest GDP losses and has the potential to increase GDP.

The following graphs focus on the $25/ton carbon tax, growing at 5% per year, and examine how any macroeconomic impacts of taxes can be altered by the manner in which the carbon tax revenues are returned to households in the economy. Factor productivity, and hence factor prices, will be affected by adjustments to lower-emissions forms of production, consumption, and electricity generation. In 2030, Fig. 12 suggests that capital returns will decline by less than 0.5% on average. Impacts on overall labor prices, or wage rates, can vary significantly depending on how carbon tax revenues are used.

Unlike for labor, the average declines in capital returns are not divided equally between new capital and existing (or extant) capital that already been invested in industries or other capital stocks such as housing, commercial buildings, or vehicles. By 2030, many of these current, extant investments will have depreciated in value compared to what they are worth today, but some fraction of them will remain in existence. The fixed nature of these less-efficient stocks, based on today's technology, leave them in a more vulnerable position with regards to the taxes. The returns to these

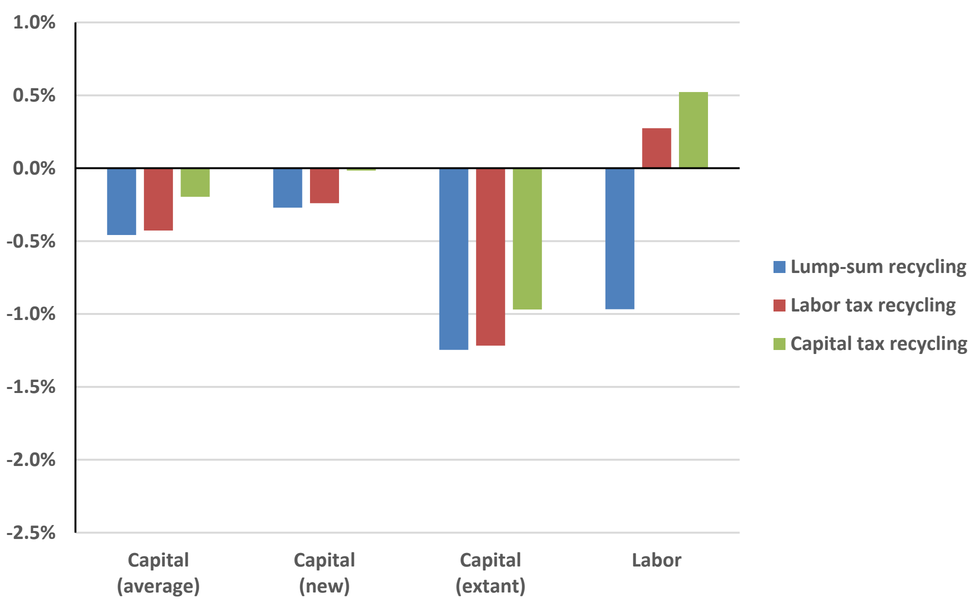

Figure 12. U.S. average factor price impacts in 2030 ($25/ton tax, growing at 5%/year)

current capital stocks are reduced by 1% or more in 2030. (Note that improvements in improving the efficiency of existing buildings, for example, would be considered new capital in the model).

New, more efficient investments installed after the start of the carbon tax policy have significantly smaller declines in productivity, and hence prices, than existing capital investments. This disparity, and the fact that extant capital is fixed in the region of the country where it is currently installed, can result in regional impacts that are different than the U.S. averages. Assumptions about who owns this capital, and overall differences in regional economies and energy consumption, will affect impacts on regional household welfare.

Labor is assumed to be interregionally immobile in the model, i.e., although people will be moving around the country in the future it is assumed they will not change these movements solely in response to the carbon tax policy. This immobility can cause changes in regional wage rates (shown in blue in Fig. 13 for the year 2030) that diverge from the U.S. averages (shown in red). Lump-sum recycling returns carbon revenues directly to households and has few implications for labor productivity (beyond the effects of the carbon taxes themselves). Declines in regional wages shown a pattern similar to the regional energy intensities shown in Fig. 3. The center of the country, which has the most energy production and consumption, has the largest declines in labor productivity as the regional economies adjust to the policy. Both coasts, which are less dependent on energy production and consume less energy today, have smaller adjustments and thus smaller changes in labor prices.

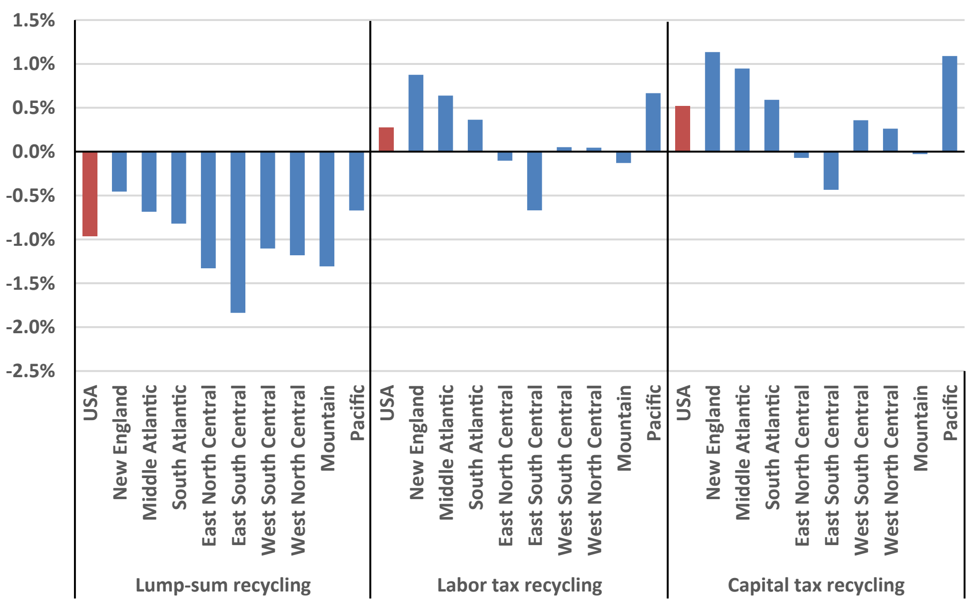

Figure 13. Labor price impacts in 2030 ($25/ton tax, growing at 5%/year)

Recycling carbon revenues through labor taxes reduces the cost of hiring labor and improves its productivity per dollar spent. This gives a roughly proportional scaling up of the labor prices across regions. Wages rise on the two coasts of the country and any declines in the center of the country are mitigated. Effects of the capital tax recycling are similar, although for different reasons. Reducing capital taxes improves capital productivity. This productivity increase also makes labor more valuable as businesses invest more and then hire more people to work for them as a result.

Existing capital represents an interesting case in the modeling because its returns are dependent on economic conditions in the region where it is located, unlike other capital assets that earn the same return across regions (assuming that returns to new, flexible capital are smoothed across the country by well-functioning capital markets). Figure 14 shows how price changes of extant capital follow the same pattern as the overall structure of the regional economies and energy intensities. The two, less energy-intensive coasts have existing capital that is better adapted to a lower energy environment, while the middle of the country with its energy production and higher consumption have larger declines in capital earnings.

Given the fixed nature of the capital stocks, there is limited response to the different revenue recycling options. Lowering labor costs and improving its productivity has little effect on these capital returns. Similarly, since this capital is already in place and can not respond to the policy, lowering the marginal capital tax rate also does not affect its productivity. The slight scaling up of the capital earnings under the capital tax recycling case is the result of an overall improvement in economic conditions under this recycling option, rather than a function of the decline in capital taxes.

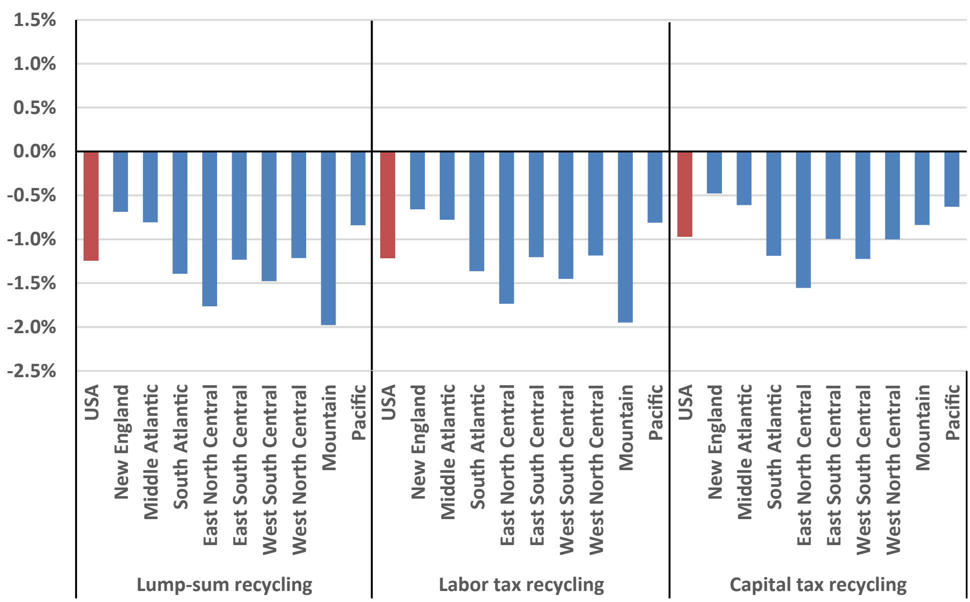

Figure 14. Extant capital price impacts in 2030 ($25/ton tax, growing at 5%/year)

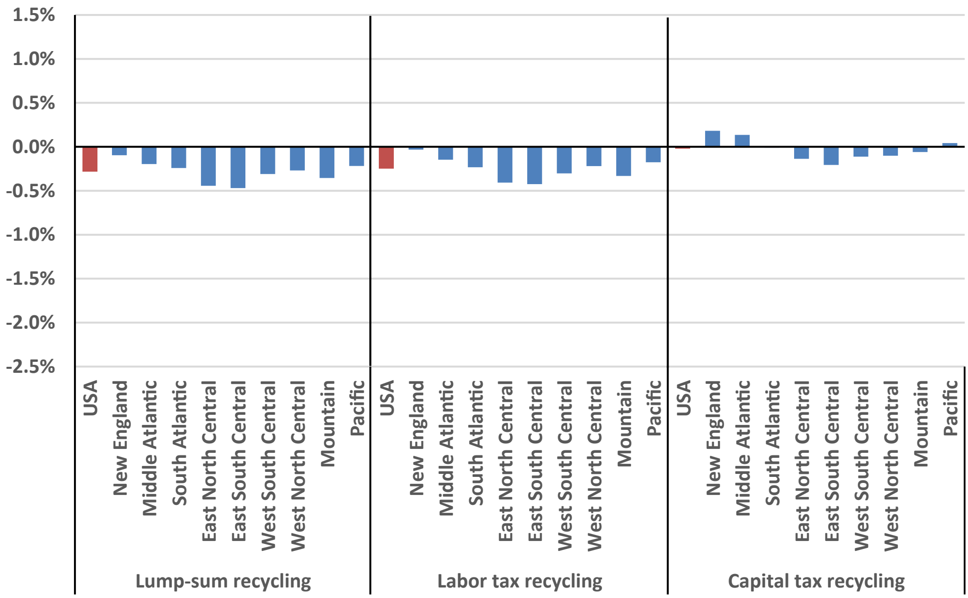

Figure 15. New capital price impacts in 2030 — differentiated markets ($25/ton tax, growing at 5%/year)

Presumably, well-functioning capital markets will equilibrate returns to new capital across the country as investors demand the same capital return regardless of the location of new investments. These average impacts on returns to new investments are shown in Fig. 15 as the red bars for the United States as a whole. The regional bars in the graph pose the question of what might happen to returns to new capital if there were inefficiencies or frictions in capital markets that caused returns to vary across regions. In this extreme case, the effects follow the same regional pattern seen in other carbon tax impacts. All of these impacts are small compared to the losses seen by existing capital or the adjustments in wage rates across the different recycling options.

Figure 16 combines all of these changes in factor earnings, along with other factors, into an overall GDP impact for the different regions of the country in 2030. In almost all cases, the impacts are less than 0.5%, even in the lump-sum recycling case that returns revenues directly to households and thus foregoes the ability to reduce inefficiencies in the economy caused existing tax distortions. To the extent that some regions have larger impacts, they tend to be located in the center of the country.

Recycling revenues through either labor or capital taxes generally scales up the graph, with some regions such as New England and the Pacific Coast experiencing increases in GDP as the result of the carbon tax and other regions seeing smaller declines than before. On average for the United States, there are few GDP impacts for either the labor or capital recycling options that reduce those marginal tax rates.

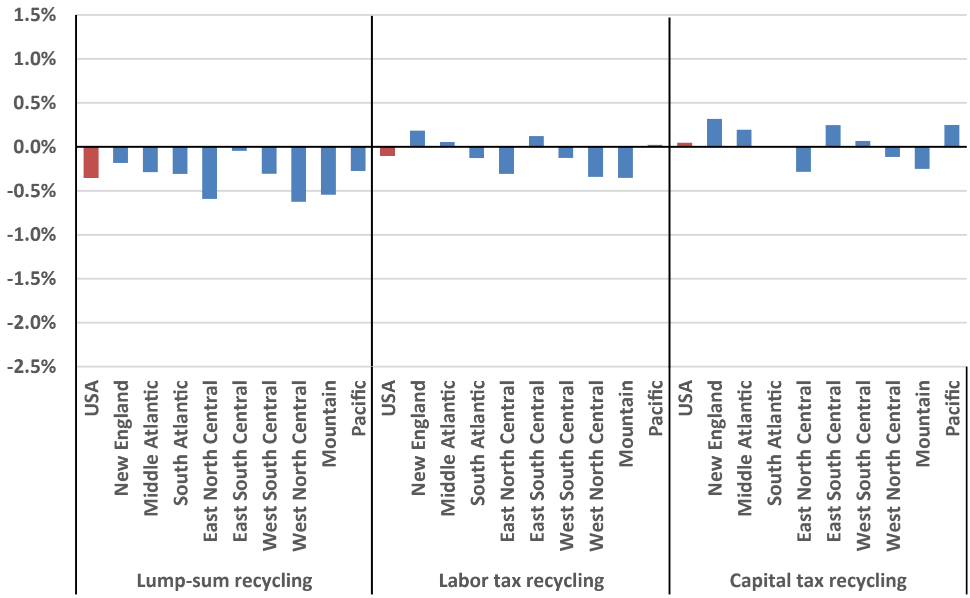

Figure 16. GDP impacts in 2030 ($25/ton tax, growing at 5%/year)

5.3. *Welfare impacts of recycling the carbon tax revenues*

Broader welfare measures of the costs of carbon tax policies follow similar regional patterns to those seen in the factor price and GDP measures. In these broader measures — calculated here as a comprehensive change in household equivalent variation (welfare) that considers changes in income, consumption of goods, and leisure time — there are less likely to be actual improvements from the policies than might be seen in individual factor impacts or even measures of economic activity such as GDP. Welfare impacts also consider all changes over time that result from the policies, rather than emphasize adjustments in a single year. As discussed in Rausch *et al.* (2011) and illustrated in the DIEM results in this paper, regional distributional issues can be more important than expected.

Figure 17 examines how different revenue recycling options can affect household welfare across the regions of the country for a $25/ton carbon tax that grows at 5% per year. For the nation as a whole, the least efficient recycling (lump-sum) leads to a decline in welfare of around 0.3%. Improving the efficiency of the economy by using revenues to lower labor taxes can reduce this U.S. impact to closer to 0.2%. The most efficiencies are achieved by lowering capital tax rates, giving less than a 0.15% decline in welfare. These comprehensive measures show how policy revenues can be used to affect the impacts of the policy, however, for the country none of the options lead to overall increases in welfare, unlike what might be seen in a GDP measure for a particular year as shown in Fig. 16 for 2030.

It is easier for specific regions of the country, which are less affected by the policy, to see improvements in welfare across the recycling options, or at least see small

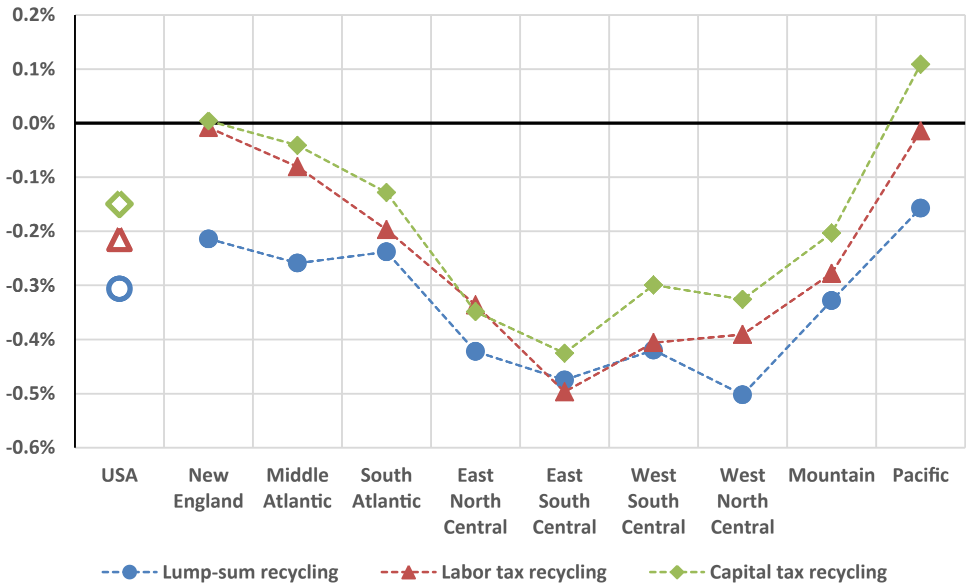

Figure 17. Regional welfare changes for revenue recycling options ($25/ton tax, growing at 5%/year)

declines in welfare. Again, the Northeast (New England and Middle Atlantic) have small declines in welfare, which may be reversed through recycling the revenues in efficient ways. The Pacific Coast is in a similar position since it is energy efficient and also capital intensive (which benefits from any capital tax recycling). The center of the nation tends to have declines on the order of 0.5%, which can be improved but not offset by recycling revenues effectively.

The previous results assume that ownership of capital stocks — whether of existing capital or new investments and regardless of regional location — is spread across the households of the nation through perfect pooling of capital in a national stock market (this assumption is different from the assumption, which is maintained, that expected returns to capital are based on a national interest rate that represents the average value of capital). Figures 18–20 relax this assumption to explore how regional impacts of the policy may be affected if some capital is locally owned. The graphs distinguish between cases in which 100% of capital earnings are pooled across the country in capital markets (the standard assumption in this type of modeling), or if 50% of capital earnings are pooled and 50% are owned locally, or in the extreme if 0% of earnings are pooled — implying that any capital is locally owned, thus accentuating any regional impacts of the policies.

Figure 18 shows how the assumption that 100% of capital earnings are pooled in national capital markets before being distributed to households (in blue) compares to the cases in which less capital is owned jointly across the country. Given than 63% of business earnings are controlled by pass-through entities, it seems reasonable to

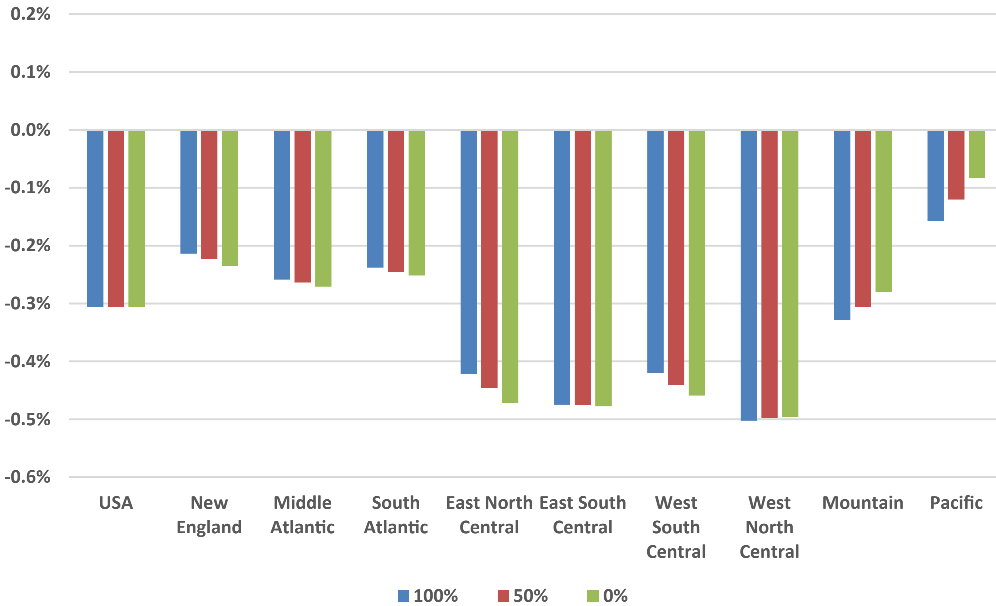

Figure 18. Welfare changes for lump-sum recycling — by share of capital in national capital markets ($25/ton tax, growing at 5%/year)

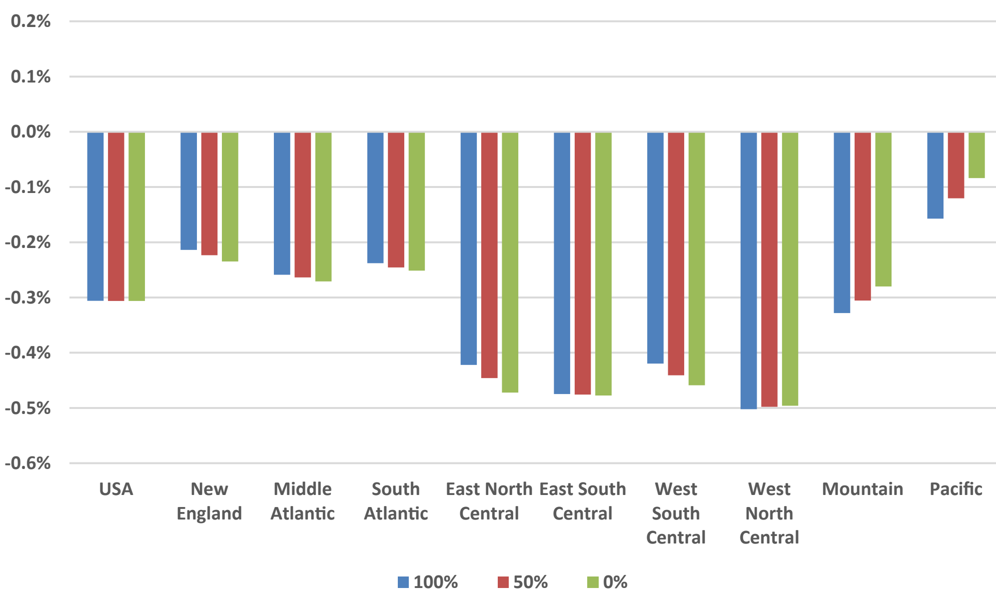

Figure 19. Welfare changes for labor tax recycling — by share of capital in national capital markets ($25/ton tax, growing at 5%/year)

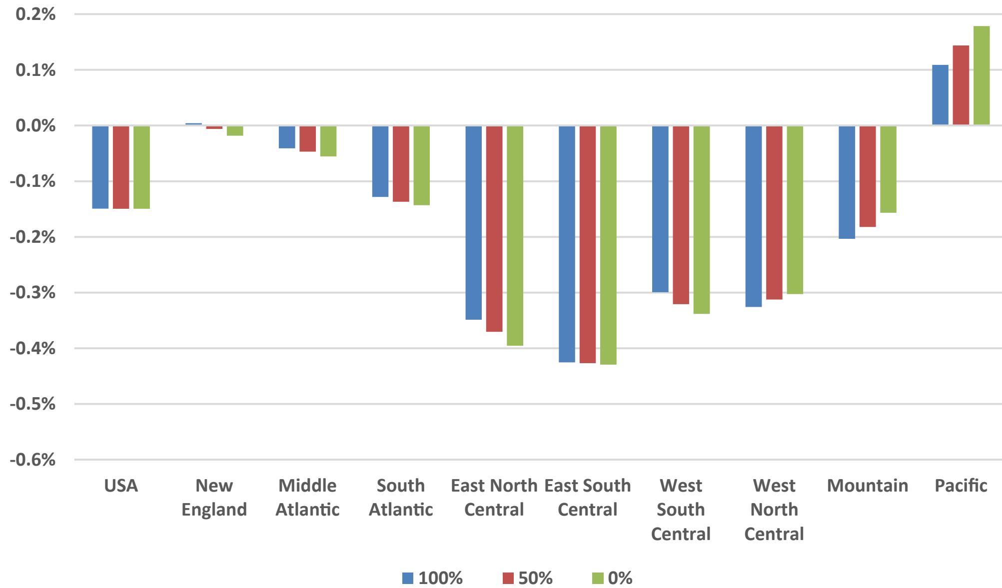

Figure 20. Welfare changes for capital tax recycling — by share of capital in national capital markets ($25/ton tax, growing at 5%/year)

assume these earnings by companies not traded on national markets may be concentrated in local regions. The general implication of adjusting the ownership assumption is to accentuate regional differences in policy impacts. At the national level, how capital earnings are distributed does not affect average household welfare. However, assuming that households in the West own a capital portfolio that is concentrated in the West, which experiences smaller policy impacts, will lead to smaller welfare impacts for those households. Interestingly, this pattern does not hold in New England, apparently because their earnings are more concentrated in labor than other regions. The middle of the country is usually worse off if they own capital assets that are specific to their own regions that are more adversely affected by the carbon policy. Similar patterns hold for both the labor-tax and capital-tax recycling options as well.

6. Conclusions

This analysis has looked at the potential economic implications of carbon tax proposals. Addressing the concerns of businesses and households about energy costs will be an important factor in determining the viability of using these tax instruments to lower emissions in the United States. Such policies have implications for household consumption that can vary across household income classes. Regional differences also play a role in determining the impacts of carbon tax policies. One method for offsetting these impacts is to use the revenues generated to lower costs to households or to lower labor and capital tax rates that affect both household and business decisions.

How successful these options are will tend to vary across regions of the country, depending on the structure of local economies.

Broadly, the analysis finds that taxes are a feasible way to reduce emissions. The size of these reductions can be significant, although it is unclear how successful any given tax rate may be in meeting long-term goals such as an 80% reduction below 2005 emissions levels by 2050. The macroeconomic adjustments associated with carbon taxes starting in the \$25–\$50/ton range are not very large and have little effect on overall economic growth. Using the substantial revenues generated by carbon taxes to supplement household income or lower existing labor and capital taxes can help offset any costs imposed on households by the carbon tax.

It will be important to consider how regional differences in manufacturing and household consumption may interact with carbon taxes. Today, there are important variations across the parts of the country in production technologies, the availability of natural resources availability and energy consumption patterns that will make it easier/harder for regions to reduce cost-effectively emissions. Some parts of the country such as the Northeast and the West Coast have comparatively small responses to a carbon tax because they have manufacturing/service industries and electricity generation that are less carbon-intensive today; other areas in the South and the middle of the country see effects that are above the national averages, given that they are comparatively more carbon intensive and are also more reliant on fossil-fuel production. These regional disparities tend to occur across labor and capital returns, and in overall GDP and consumption impacts.

While revenue recycling options can affect national economic impacts of carbon taxes, unless these revenues are targeted in some fashion to specific regions, they will do little to change disparities in regional policy costs. How capital ownership is distributed across the nation, which remains an open question, can also exaggerate regional differences in these impacts. Model results show that this distribution will influence how regions respond to a carbon tax. Considering all of these factors will be necessary when evaluating how to distribute revenues from any carbon tax in order to alleviate disproportionate burdens on both households and states around the United States.

Acknowledgments

The work reported here has benefitted from input and feedback from participants in the Stanford Energy Modeling Forum and colleagues at the Nicholas Institute, including Brian Murray and Billy Pizer. The analysis conducted herein was partially supported by a grant from The Energy Foundation; model development was partially supported by a gift from Bank of America Merrill Lynch. All errors and omissions are those of the author.

Appendix A. Model Structure

Households have capital-energy structure similar to the logic used for manufacturing industries (see Fig. A.1). Households decide between spending income on housing services (houses plus the energy that makes them comfortable) and all other consumption goods. In addition to specifying the capital-energy tradeoff, DIEM-CGE follows the approach in Bovenberg *et al.* (2005) and distinguishes between capital used in manufacturing and capital used in the housing stock. This allows the model to be explicit about opportunities for improving the energy efficiency of housing through the investment of capital to reduce energy consumption.

A similar capital-energy structure is also applied to the capital stock representing personal vehicles (Fig. A.2). Households can choose to purchase transport such as

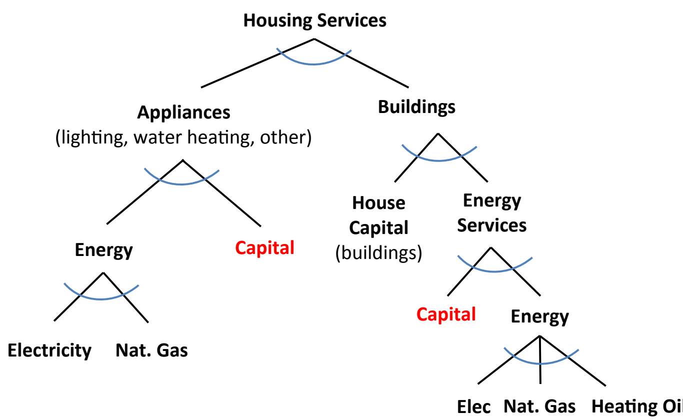

Figure A.1. Housing services.

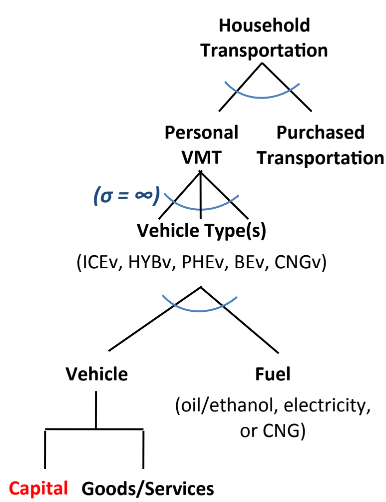

Figure A.2. Transportation services

airline flights and to invest in transport provided by personal light-duty vehicles (LDV) that provide "vehicle miles traveled" (VMT). Several types of LDV are available in the model: conventional internal-combustion engine vehicles (ICEv), hybrid gas-electric vehicles (HYBv), plug-in hybrid electric vehicles (PHEv), battery electric vehicles (BEv), and compressed natural gas vehicles (CNGv). Capital can be invested in new vehicles to improve their miles per gallon (MPG) efficiency — existing vehicles cannot improve MPG and depreciate away.

Electricity has a unique production structure to handle generation of a similar commodity by a variety of different technologies (see Fig. A.3). This production

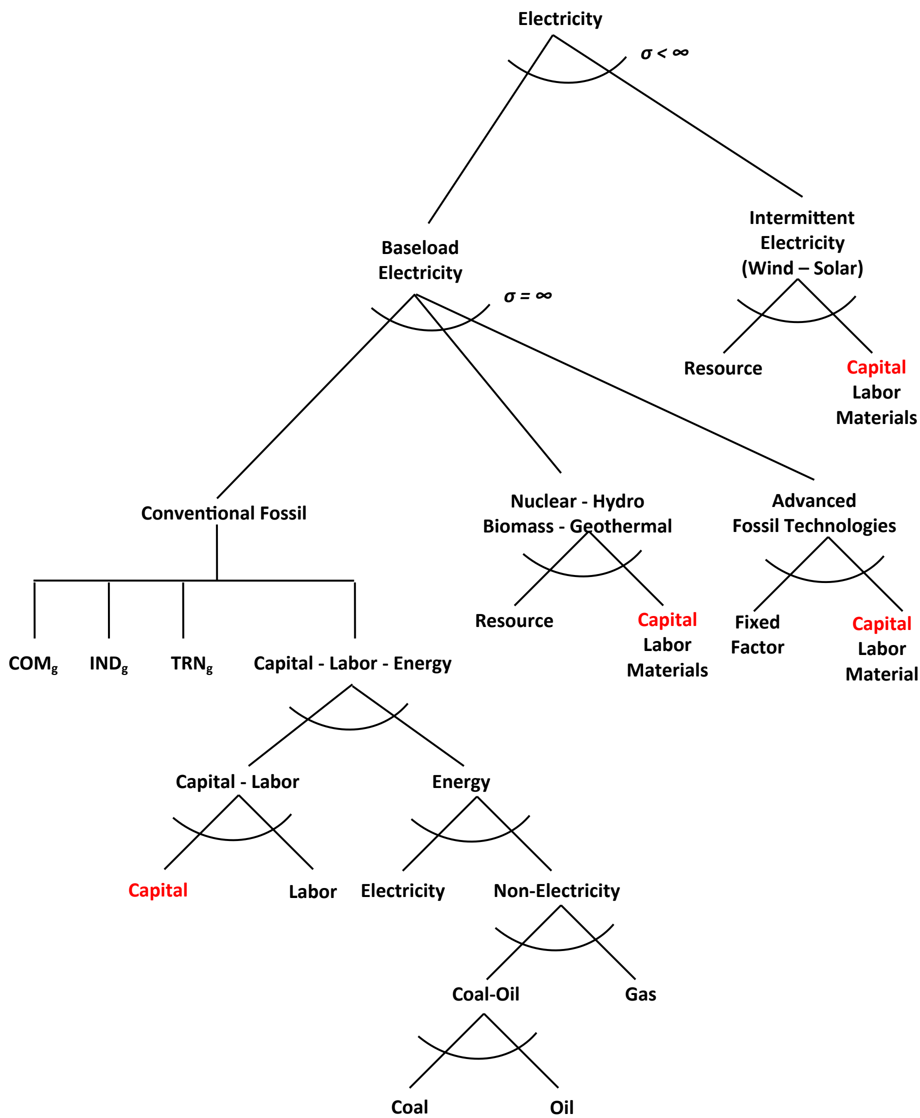

Figure A.3. Electricity generation

provides several options to improve efficiency in the industry: (1) by improving conventional technologies, (2) by investing in new technologies, and (3) by expanding intermittent wind and solar generation — intermittent sources produce a slightly differentiated electricity commodity compared to baseload units. Following Böhringer (1998), McFarland *et al.* (2004), and Böhringer and Rutherford (2008), the second two options allow the model to combine the standard "top-down" nested CES equations with "bottom-up" engineering data on the costs and characteristics of specific technologies.

Information on the types of "Advanced Fossil Technologies" — advanced gas combined cycle (NGCC), NGCC with carbon capture and storage (CCS), and integrated coal gasification combined cycle with CCS — are added to the model based on Paltsev *et al.* (2005). Current cost estimates for these technologies are taken from the AEO 2017 (EIA, 2017a). Wind and solar options are included using costs from both the AEO 2017 and NREL's Annual Technology Baseline (NREL, 2016).

Specific regional costs, along with the expansion paths for each type of technology in the DIEM-CGE model, are calibrated to data and policy simulations from the DIEM-Electricity dispatch model of generation (see the forthcoming Ross (2018) for a discussion of these results in detail). This analysis uses a joint approach to combine DIEM-CGE simulations with more detailed electricity results from the DIEM-Electricity model, rather than a "hard linkage" that attempts to iterate both models to a consistent solution, because of difficulties in achieving a close enough correspondence between the two models' cost structure to enable examination of policy's welfare results.

The different approaches to capital costs in the two types of models, CGE versus electricity dispatch, make it problematic to be consistent enough in "hard, iterated linkage" to be confident in the welfare results. However, by calibrating the electricity generation decisions in DIEM-CGE used in this analysis to choices for the same policies in DIEM-Electricity, it is possible to maintain the logical structure of the CGE model without sacrificing the more detailed findings from the electricity dispatch model. This calibration without direct replacement of results yields better welfare results for this distributional analysis. Essentially, reactions to a carbon tax by specific types of generation (coal retirements, new NGCC or solar construction, etc.) are provided by the dispatch model. Growth rates in these types of generation — and the same cost structure — are used in the CGE model, which is allowed to internally estimate, for example, losses by existing coal-unit capital that are a part of the CGE model, but not considered by the dispatch model.

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ELECTRICITY MARKETS AND THE SOCIAL PROJECT OF DECARBONIZATION

*Shelley Welton**

Decarbonization is the process of converting our economy from one that runs predominantly on energy derived from fossil fuels to one that runs almost exclusively on clean, carbon-free energy. If pursued on the scale that experts believe necessary to prevent dangerous climate change, the infrastructure changes required to decarbonize the United States will have significant social and cultural implications. States aggressively pursuing decarbonization have adopted policies reflecting their understanding that decarbonization is a social project implicating numerous value choices. Various state decarbonization policies combine the aim of decarbonization with job promotion, economic development, income redistribution, urban revitalization, open-space preservation, and the continuation of traditional livelihoods.

These multifaceted state climate policies are multiplying in the Trump era, as federal alternatives recede. But variegated state policies present a challenge to the smooth functioning of U.S. electricity markets, which operate across states to supply least-cost power on a region-wide basis. To address this friction, regulators at the federal and state levels are considering a novel solution: Perhaps these markets should incorporate the aim of decarbonization rather than leaving this job for the states. There is a clear argument in favor of such reforms—they would allow states to accomplish decarbonization at lower cost while protecting electricity markets from distortionary state policies.

Nevertheless, this Article questions the widespread enthusiasm for using regional electricity markets, rather than states, as the primary drivers of decarbonization. Rather than accounting for the social and

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cultural values at stake in decarbonization, the process of integrating decarbonization into electricity markets prioritizes the aim of least-cost decarbonization above all else—thus rejecting states' more capacious understandings of the goals of decarbonization. Moreover, regional electricity markets are quasi-private, complexly structured membership organizations, which operate under federal oversight and provide limited formal channels for state input. Consequently, if regional electricity markets become the primary locus of decarbonization policy, states will have given away a rich set of policy tools for publicly, creatively, and flexibly managing the trajectory of decarbonization. Understanding decarbonization as a social project thus provides new stakes in the otherwise technocratic debate over electricity markets and climate change, highlighting the importance of maintaining the public voice in critical decisions made around how to decarbonize.

INTRODUCTION

One of the Trump Administration's priorities during its first year has been the rollback of federal actions to address climate change. In addition to reconsidering several critical domestic regulations,[1] President Trump announced on June 1, 2017, his intention to withdraw the United States from the Paris Accord[2]—the landmark international agreement on climate change signed by 195 parties.[3] Shortly after this announcement, U.S. states struck back in an aggressive demonstration of their resurgent place in climate policy. In a letter titled "We Are Still In," several states declared that "[i]n the absence of leadership from Washington," they would "work[] together to take forceful action and to ensure that the U.S. remains a global leader in reducing emissions."[4] States are backing up this promise with escalating state laws aimed at "decarbonization"—that is, the process of ending reliance on energy sources that emit carbon pollution.[5]

Leading states have passed legislation to reduce carbon emissions in their jurisdictions 80% by 2050, with a focus on reducing carbon pollution from electricity.[6] These are ambitious goals, likely to require the

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1. Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,093–95 (Mar. 28, 2017) (revoking several of President Obama's climate-related actions and ordering further review of various environmental regulations).

2. Statement by President Trump on the Paris Climate Accord, White House (June 1, 2017), http://www.whitehouse.gov/the-press-office/2017/06/01/statement-president-trump-paris-climate-accord [http://perma.cc/RPC7-ZD8J].

3. Paris Agreement—Status of Ratification, United Nations Climate Change, http://unfccc.int/paris_agreement/items/9444.php [http://perma.cc/49U8-5QUL] (last visited Jan. 18, 2018) (showing signing and ratification status).

4. "We Are Still In" Declaration, We Are Still In, http://www.wearestillin.com/we-are-still-declaration [http://perma.cc/SRL6-QR9U] (last visited Jan. 18, 2018). States are joined in the letter by tribes, cities, colleges, universities, businesses, and investors. Id. Nine states have signed as of January 2018. See id.

5. See infra section I.B.

6. For a catalog of states embracing this goal, see infra note 72 and accompanying text. Decarbonizing electricity is critical because experts predict that global greenhouse gas emissions must approach zero in the coming decades, even though electricity consumption is expected to double as transportation electrifies. See 2 James H. Williams et al., Energy & Envtl. Econ., Inc. & Deep Decarbonization Pathways Project, Policy Implications of Deep Decarbonization in the United States 4 (2015) [hereinafter Williams et al., Deep Decarbonization Policy], http://deepdecarbonization.org/wp-content/uploads/2015/11/

replacement of significant infrastructure at substantial expense.[7] And yet, in setting policies to achieve these goals, no state has adopted a purely market-based system that aims to reduce emissions at the lowest cost above all other goals.[8] Instead, states have crafted schemes that help them manage the contours, aims, and consequences of decarbonization. These state policies include requirements that utilities buy certain amounts and types of renewable energy, incentives for communities to build their own solar farms, payments to aging (and appealingly carbon-free) nuclear power plants to keep them from retiring, and complete redesign of state electricity law.[9] These various policies combine decarbonization with aims ranging from job creation and economic development to income redistribution, urban revitalization, open-space preservation, and the continuation of traditional livelihoods.[10]

There is, however, a potential downside to this rich set of state climate policies. As state ambitions ramp up, complications with this state-by-state approach to decarbonizing electricity become more apparent. States share jurisdiction over electricity with the Federal Energy Regulatory Commission (FERC).[11] In most of the country, states have ceded partial control over electricity supply to regional electricity-market operators, which are "hybrid" quasi-private, quasi-governmental entities, comprised of industry members functioning under FERC oversight.[12] These electricity markets are designed to select least-cost sources of electricity; they do

US_Deep_Decarbonization_Policy_Report.pdf [http://perma.cc/T9FD-TD2C] ("Limiting warming to 2°C or less, an objective agreed upon by the international community, will require that global net [greenhouse gas] emissions approach zero by the second half of the 21st century."); see also William Boyd & Ann E. Carlson, Accidents of Federalism: Ratemaking and Policy Innovation in Public Utility Law, 63 UCLA L. Rev. 810, 812 (2016) ("[D]ecarbonizing the electric power sector is far and away the most important component of any effort to meet ambitious U.S. [greenhouse gas] reduction targets by 2050 and beyond.").

7. See Emily Hammond & Jim Rossi, Stranded Costs and Grid Decarbonization, 82 Brook. L. Rev. 645, 663–64 (2017) (noting that decarbonization "stands to be one of the most significant economic transformations the economy has experienced in the last century"); see also infra note 281.

8. See, e.g., Jim Rossi, Carbon Taxation by Regulation, 102 Minn. L. Rev. 277, 298–99 (2017) [hereinafter Ross, Carbon Taxation] (noting that various approaches to internal subsidies "fall considerably short of the efficiency and social-welfare benefits that a carbon tax could provide").

9. See infra section I.B.

10. See infra sections I.B, II.B.

11. See 16 U.S.C. § 824(b) (2012) (providing federal jurisdiction over "the transmission of electric energy in interstate commerce and to the sale of electric energy at wholesale in interstate commerce," but otherwise reserving authority for states). For more detail, see infra Part I.

12. See Hari M. Osofsky & Hannah J. Wiseman, Hybrid Energy Governance, 2014 U. Ill. L. Rev. 1, 6 (describing how "the tripartite energy system [of physical, regulatory, and market components] involve[s] numerous public and private stakeholders at multiple levels of government"). Electricity-market structures are discussed in sections I.A and III.B.

not "price in" carbon or otherwise favor carbon-free generation sources.[13] Consequently, many allege that state incentives and payment schemes targeted at particular low-carbon technologies interfere with the smooth functioning of these regional markets.[14]

Now, faced with a growing number of divergent state policies, several regional market operators have accepted that electricity markets may need to play a more active role in decarbonization.[15] One key question under discussion is whether it is time to redesign electricity markets to achieve states' decarbonization goals.[16] Such proposals gained momentum in May 2017 when FERC convened a conference to consider their feasibility and desirability.[17] In her opening remarks, then-acting FERC Chair Cheryl LaFleur identified these potential reforms as "the most critical issue [the agency was] confronting."[18] Since that time, debates have intensified regarding how much of a challenge renewable energy presents to electricity markets and how best to manage the shifting composition of electricity-market resources.[19]

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13. See infra note 55 and accompanying text (noting that electricity markets are designed for least-cost electricity and are therefore limited in accommodating other goals); see also infra text accompanying note 237 (describing the aims of a carbon-pricing scheme).

14. See infra section I.C.

15. See infra sections I.C, III.A; see also William Boyd, Public Utility and the Low-Carbon Future, 61 UCLA L. Rev. 1614, 1686–87 (2014) ("From a climate change perspective . . . the looming question is whether electricity markets can deliver significant carbon reductions over the next several decades.").

16. Many people in this conversation distinguish between two ways that markets could be redesigned to support state climate policies. Markets could either be tweaked to *accommodate* state policies without attempting to supplant them, or markets could be used to *achieve* state climate goals. See Cheryl A. LaFleur, Comm'r, FERC, Remarks at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO New England Inc., New York Independent System Operator, Inc., and PJM Interconnection, L.L.C., at 229–30 (May 1, 2017) [hereinafter LaFleur, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170530122035-Transcript,%20May%201,%202017.pdf [http://perma.cc/QNK2-7SZZ] (distinguishing between "achieve"-style solutions, in which markets are redesigned to accomplish state policy goals, and "accommodate"-style solutions, in which markets are adjusted to function around state policy goals); Memorandum from New England States Comm. on Elec. to New England Power Pool 1–2 (Apr. 7, 2017) (on file with the *Columbia Law Review*) (discussing NESCOE's feedback on the "long-term 'achieve'-style proposals," as well as NESCOE's plan to assess a "short-term, 'accommodate'-style proposal"). This Article focuses on the "achieve" category of solutions, although it briefly touches upon the potential to accommodate state policies. See infra Part IV.

17. See FERC Calendar of Events, FERC, http://www.ferc.gov/EventCalendar/EventDetails.aspx?ID=8663&CalType=%20&CalendarID=116&Date=&View=Listview [http://perma.cc/G7B4-JUEN] (last visited Jan. 18, 2018).

18. LaFleur, FERC Technical Conference, supra note 16, at 9.

19. Most notably—and to the consternation of many—the Department of Energy recently requested that FERC consider providing subsidies to "fuel-secure" nuclear and coal plants as a way to respond to changes in market dynamics that have rendered these resources less competitive than natural gas and renewable energy in many parts of the

There is obvious appeal to using electricity markets to achieve state climate change goals. Integrating these goals into markets could lower the cost of decarbonizing energy, while eliminating the risk that accreting state policies might distort the functioning of electricity markets. For this reason, many stakeholders that often find themselves on opposite sides of energy policy debates have expressed support for integrating state climate policies into regional electricity markets.[20] It can thus feel almost reflexively reactionary for anyone who supports rapid decarbonization to resist such efforts.

Nevertheless, this Article argues that states should exercise caution in ceding control over decarbonization too quickly or thoroughly to regional electricity markets. This argument is grounded in comparative institutional competencies[21] and the importance of preserving state centrality in decisionmaking over decarbonization.[22] In short, states do a disservice to current and future residents if they cede the shape of decarbonization policy to market insiders and experts rather than subject these policy decisions to wider democratic inquiry, debate, and decisionmaking.

Although conversations about electricity markets and decarbonization can quickly alienate all but the most technocratic insiders, decarbonization is far more than a technical project. Decarbonization policies will

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country. See Grid Resiliency Pricing Rule, 82 Fed. Reg. 46,940, 46,945 (Oct. 10, 2017) (to be codified at 18 C.F.R. pt. 35). For those expressing consternation, see, e.g., Sonal Patel, What States Told FERC About the DOE's Grid Resiliency Rule, PowerMag (Oct. 25, 2017), http://www.powermag.com/what-states-told-ferc-about-the-does-grid-resiliency-rule-infographic [http://perma.cc/93ZV-2V5F] (mapping state responses to the DOE's proposal and showing many states in key RTO regions to be "strongly opposed"); Jeff St. John, DOE's Coal, Nuclear Cost Recovery Plan Receives Onslaught of Opposition, Greentech Media (Oct. 24, 2017), http://www.greentechmedia.com/articles/read/doe-coal-nuclear-cost-recovery-opposition-perry#gs.6b25rRU [http://perma.cc/MW92-GAHA] ("The proposal has drawn a backlash from major sectors of the energy industry, and the critique of two of three seated FERC commissioners at present, based on the potentially dire impacts it could have on the country's relatively well-run and low-cost electricity markets."). Section IV.C discusses the DOE Notice of Proposed Rulemaking (NOPR) in more detail. For FERC's response, see infra notes 332–334.

20. Of note, several environmental not-for-profits find themselves aligned with fossil fuel generators on this topic. See infra Part III; see also Gavin Bade, The Carbon Consensus: Generators, Analysts Back CO2 Price at FERC Technical Conference, Util. Dive (May 3, 2017), http://www.utilitydive.com/news/the-carbon-consensus-generators-analysts-back-co2-price-at-ferc-technical/441862/ [http://perma.cc/4F9N-UWNS] ("[O]ne noteworthy area of consensus emerged from nearly every corner of the diverse stakeholder group—the need to price carbon in wholesale power markets.").

21. See Neil K. Komesar, Imperfect Alternatives: Choosing Institutions in Law, Economics, and Public Policy 4–6 (1994) (arguing that "deciding who decides" is a critical part of legal analysis and calling for greater attention to comparative institutional analysis).

22. "State" in this context refers to government. This Article does not intend to make a federalism argument, but rather proceeds on the assumption that states will be the level of government that primarily addresses decarbonization for the next several years. See Rossi, Carbon Taxation, supra note 8, at 278 (describing federal carbon tax legislation as "infeasible and . . . stalled, at least for the foreseeable future"); see also infra section IV.D.

determine how our society extracts, owns, sites, manages, moves, consumes, and conserves electricity in the future. Given electricity's centrality to modern life, such policies have the potential to radically alter political and economic power, as well as to shape the future of American landscapes, communities, and daily living arrangements.[23] Decarbonization is thus a profoundly social project.[24]

In crafting multifaceted, nuanced decarbonization policies, states are demonstrating their understanding of this fact. State climate policies reflect state preferences about *how* they decarbonize, instead of just *whether* they decarbonize. These diverse public preferences would be lost in the integration of state policy aims into regional electricity markets. This Article identifies three particular risks electricity markets present in this regard. The first is the loss of transparent, government-driven decisionmaking on the trajectory of decarbonization. Electricity markets are governed through quasi-private, immensely technocratic, and largely opaque processes[25]—hardly the space in which we should center debates over the shape of decarbonization. The second risk is one of homogenization to the lowest common denominator. Electricity-market design limits the tools with which states can respond to decarbonization, requiring states to homogenize their preferences. In practice, such homogenization is likely to water down more ambitious state policies to achieve the near-consensus buy-in of states and stakeholders required in regional electricity-market governance.

The final risk to electricity-market integration of state climate policies stems from the Supreme Court's 2016 decision in *Hughes v. Talen Energy Marketing, LLC.*[26] There, the Supreme Court placed limits on states' abilities to adopt policies that regulate electricity in ways too closely linked to federally overseen markets.[27] Although *Hughes* left open significant questions regarding how much overlap there can be between regional-market functions and state policy aims, it creates legal risk around any state decision to cede decarbonization goals to the markets.[28] Once a state gives control over a particular function—like decarbonization—to its regional market, it may diminish the set of tools that it can use at the state level to accomplish the same policy aim.

23. See infra section II.A.

24. This point is well made outside the legal literature, see infra note 147, but its implications for climate law and policy are surprisingly undertheorized. In a forthcoming article, Professor Alice Kaswan explores how decarbonization's society-wide impacts might inform our understanding of the drawbacks of market-based mechanisms more generally, but she does not address the proposal to use regional electricity markets in particular. See Alice Kaswan, Energy, Governance, and Market Mechanisms, 72 Miami L. Rev. (forthcoming 2018) (manuscript at 1–11) (on file with the *Columbia Law Review*).

25. See infra section III.A.

26. 136 S. Ct. 1288 (2016).

27. Id. at 1299.

28. See infra section III.B.

Articulating these reasons for caution does not mean that states should resist all efforts to integrate decarbonization aims into regional electricity markets. Instead, these risks point to a series of conclusions about when market integration of state climate policies is advisable and how it might best proceed. First, states might prefer using regional electricity markets as a climate tool when their objective is the cheapest decarbonization possible, without regard for what resources the market selects or where these resources are located. In contrast, if a state has resource preferences, distributional goals, or other objectives related to *how* decarbonization proceeds, markets will prove inapt tools. For these states, market integration may prove advisable only if the particular market reform selected allows states leeway to adjust their preferences and factor them into the market design.[29]

Second, the regional politics of decarbonization should inform state decisions. U.S. states diverge considerably in the ambition of their climate policies, from states pledging to go "100% renewable" to states focused on perpetuating U.S. coal consumption.[30] As this Article explains, the structure of U.S. electricity law leaves regional market entities without the authority to mandate that recalcitrant states adopt more aggressive climate policies.[31] Nevertheless, perhaps there is still some bargaining power inherent in the regional market construct, such that states aggressive on climate change might use market solutions to coax along less willing regional neighbors. The greater the likelihood of such persuasion succeeding, the more appealing a market-based solution should be.[32]

Finally, the appeal of integrating state policies into regional markets might shift over time as courts flesh out the boundaries of the *Hughes* decision and related cases.[33] Because of these variables at play, the question of how to manage the intersection of state policies and regional electricity markets is likely to be a dynamic and region-specific one. Nevertheless, there is value in understanding at the outset of these conversations the risks that the marketization of state climate policies presents to the multifaceted project of decarbonization. Only states ready to relinquish control over their decarbonization trajectory in exchange for cost effectiveness should embrace market integration proposals as they stand now.

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29. Part IV explains how certain market reforms might allow for this more easily than others.

30. For a catalog of some of the most ambitious state renewable energy targets, see generally infra notes 87–88. For state support of coal, see generally Kathiann M. Kowalski, As Ohio Legislature Regroups, Power Plant Subsidy Debate to Continue, Midwest Energy News (Aug. 16, 2017), http://midwestenergynews.com/2017/08/16/as-ohio-legislature-regroups-power-plant-subsidy-debate-continues/ [http://perma.cc/88NJ-RATC] (detailing legislative efforts in Ohio to provide subsidies to "1950s-era coal plants" and nuclear generation).

31. See infra section IV.C.

32. See infra section IV.A.

33. See infra section III.C.

Most scholarly analysis of these proposed electricity-market reforms has focused on the jurisdictional questions they present. Regional electricity-market operators are constrained by the Federal Power Act's mandate that federally overseen markets ensure "just and reasonable" rates.[34] Whether integrating decarbonization goals falls within this mandate is a thorny legal question, and many prominent energy law scholars are puzzling through this jurisdictional morass.[35]

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34. See 16 U.S.C. § 824d (2012).

35. See 2 Steven Weissman & Romany Webb, Berkeley Ctr. for Law, Energy & the Env't, Addressing Climate Change Without Legislation: FERC § 3.1 (2014), http://www.law.berkeley.edu/files/CLEE/FERC_Report_FINAL.pdf [http://perma.cc/5XE7-R4Q7] ("In addition to considering . . . supplier and customer interests, FERC's ratemaking must also protect the general public interest."); Christopher J. Bateman & James T. B. Tripp, Toward Greener FERC Regulation of the Power Industry, 38 Harv. Envtl. L. Rev. 275, 278 (2014) (arguing that the Federal Power Act (FPA) authorizes FERC to consider the environmental effects of power generation in setting just and reasonable rates); Joel Eisen, FERC's Expansive Authority to Transform the Electric Grid, 49 U.C. Davis L. Rev. 1783, 1788 (2016) (arguing that "the FPA's terms are not frozen in amber, as the statute has adapted to changing market realities" and that, in FERC v. Electric Power Supply Ass'n (*FERC v. EPSA*), 136 S. Ct. 760 (2016), "the Court has properly confirmed that the FPA has flexibility to address modern developments in the electric grid"); Ari Peskoe, Easing Jurisdictional Tensions by Integrating Public Policy in Wholesale Electricity Markets, 38 Energy L.J. 1, 1 (2017) (exploring "FERC's authority under the [FPA] to approve a wholesale market tariff that facilitates market participants' achievement of their legal obligations under renewable energy and CO_2 policies"); Rossi, Carbon Taxation, supra note 8, at 330 (arguing that "FERC has the authority to adopt grid-system-reliability adders reflecting the carbon attributes of different energy resources"); see also Kate Konschnik & Ari Peskoe, Harvard Envtl. Law Program Policy Initiative, Minimizing Constitutional Risk: Crafting State Energy Policies that Can Withstand Constitutional Scrutiny 11–15 (2014), http://statepowerproject.files.wordpress.com/2014/11/minimizing-constitutional-risk2.pdf [http://perma.cc/JS8G-SPGZ] (noting that "[s]tate regulation of wholesale rates is . . . generally field preempted" and highlighting three policies that may constitute impermissible ratemaking—mandating feed-in tariffs, guaranteeing generator revenue in regions with federally regulated auction markets, and pricing renewable energy credits); Matthew R. Christiansen, *FERC v. EPSA*: Functionalism and the Electricity Industry of the Future, 68 Stan. L. Rev. Online 100, 101–02 (2016), http://www.stanfordlawreview.org/online/ferc-v-epsa/ [http://perma.cc/4LQ8-KSVJ] (describing the Supreme Court's analysis in *FERC v. EPSA* as "eschewing some of the rhetoric regarding 'bright line' [jurisdictional] rules on which the Court had relied in previous FPA cases in favor of a more flexible approach that applied the FPA's basic premise to the changing industry"); Joel B. Eisen, Dual Electricity Federalism Is Dead, but How Dead, and What Replaces It?, 8 Geo. Wash. J. Energy & Envtl. L. 3, 6 (2017) [hereinafter Eisen, Dual Electricity] (arguing that Hughes v. Talen Energy Marketing, LLC, 136 S. Ct. 1288 (2016), "raises more questions than it answers about which state initiatives are permissible"); Emily Hammond, *Hughes v. Talen Energy Marketing, LLC*: Energy Law's Jurisdictional Boundaries—Take Three, Geo. Wash. L. Rev. Docket (2016), http://www.gwlr.org/hughes-v-talen-energy-marketing-llc-energy-laws-jurisdictional-boundaries-take-three [http://perma.cc/4WEF-ABWE] ("*Hughes* doesn't really tell us which state initiatives will survive future Supremacy Clause challenges and which will fail."); Hannah J. Wiseman, Disaggregating Preemption in Energy Law, 40 Harv. Envtl. L. Rev. 293, 294 (2016) (noting that the question of which level of government should regulate an activity is "contentious" and suggesting a preemption framework for energy law).

Less explored, however, is the question of whether states should *want* regional markets to perform this service, legality aside. Often, energy law scholars approach such questions over state versus regional market control through the lens of federalism—asking whether FERC or the states are better positioned to take the lead.[36] This Article frames these debates differently, highlighting the ways in which they implicate long-standing institutional design choices between complex, heavily managed market constructs and more direct regulatory control by states.[37] Framing the issue in this way lends relevance to a separate genre of scholarship, focused on questions of how markets, public policy, and values intersect.[38] Drawing from this literature, the Article illuminates the ways in which decarbonization is a normative societal project—one with contested visions and outcomes. Decarbonization might radically redistribute wealth and power in U.S. society, or it might largely maintain the status quo while shifting only behind-the-scenes fuel choices.[39] State policies reflect and embody this contest while regional markets present a homogenizing and privatizing force that narrows the room in which to debate the many shapes a decarbonized society might take.

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36. See, e.g., Boyd & Carlson, supra note 6, at 812–20; Felix Mormann, Clean Energy Federalism, 67 Fla. L. Rev. 1621, 1625–30 (2015); Jim Rossi, The Brave New Path of Energy Federalism, 95 Tex. L. Rev. 399, 403 (2016) [hereinafter Rossi, Brave New Path].

37. Professor William Boyd began an evocative exploration of these themes in *Public Utility and the Low-Carbon Future*, in which he argues that electricity markets are part of "a broader understanding of public utility" and should be harnessed to normative ends. Boyd, supra note 15, at 1673. Boyd's analysis frames but does not answer the question tackled here—how, within this normative project, states should weigh the relative merits of using markets or regulation to accomplish their decarbonizing aims. Professor Jim Rossi has similarly reframed the conversation by identifying ways in which state decarbonization policies resemble "carbon taxation by regulation." See Rossi, Carbon Taxation, supra note 8, at 279–80. Rossi's focus, however, is on how these regulatory instruments can be made to resemble market mechanisms—a line of inquiry that deviates substantially from my own. See id.; see also infra note 170. Professor David B. Spence also has insightful broader work on these themes. See generally David B. Spence, Naïve Energy Markets, 92 Notre Dame L. Rev. 973 (2017) [hereinafter, Spence, Naïve Energy Markets] (explaining how "energy markets can never resemble the idealized markets of economic theory that have become so popular in conservative policy discourse").

38. See infra Part II. See generally Frank Ackerman & Lisa Heinzerling, Priceless: On Knowing the Price of Everything and the Value of Nothing (2005) (criticizing the assignment of monetary values to public health and environmental resources); Douglas A. Kysar, Regulating from Nowhere: Environmental Law and the Search for Objectivity (2010) (arguing against a utilitarian, welfare-maximization approach to environmental policy in favor of an approach that is more morally accountable); Mark Sagoff, The Economy of the Earth: Philosophy, Law, and the Environment (2d ed. 2008) (describing two conceptions of the environment—as intrinsically sacrosanct and as a source of economic value—and arguing that society must balance the two conceptions); Michael J. Sandel, What Money Can't Buy: The Moral Limits of Markets (2012) (challenging the predominance of markets and market-oriented thinking in the modern era); Boyd, supra note 15 (arguing that a narrow conception of "public utility" has distorted understandings of the role of markets and discussing its relationship to decarbonization).

39. See infra section II.A.

This Article proceeds in four parts. Part I gives an overview of regional electricity markets, state climate change policies, and their intersections. Part II explores the nature of the project of decarbonization, illustrating how state climate policies embody diverse preferences and values that reflect an understanding of the significant choices at hand. Part III shows how electricity-market redesign might eliminate these democratically determined value choices embedded in state climate policies, laying out the challenges that result from using the peculiar governance structures of electricity markets to carry out decarbonization. Part IV presents lessons derived from this analysis for when states might prefer or resist market integration of their decarbonization goals.

I. THE CURRENT MESH AND CLASH OF REGIONAL ELECTRICITY MARKETS AND STATE CLIMATE POLICIES

To understand the debates about decarbonization roiling electricity regulation, one has to begin with a foundation in the structure of electricity policy and electricity markets. This Part provides an overview of regional electricity markets, state climate policies, and their potentially troubling intersections.

A. *Electricity Markets*

Electricity governance in the United States is a patchwork affair, taking on various forms across states and regions that defy quick summation.[40] This patchwork quality stems from the Federal Power Act of 1935, which divides jurisdiction over electricity in the United States. The federal government—acting via FERC—has jurisdiction over "the sale of [electric] energy at wholesale," which comprises sales from electricity generators to the utilities that own the transmission and distribution grid that carries that electricity to end-use consumers.[41] States retain control over "retail sales" of electricity—sales that these utilities make to consumers.[42]

From 1935 until the 1990s, FERC had a fairly straightforward role in electricity regulation. Most utilities owned their own generation resources that they used to supply their retail customers, such that there were relatively few "wholesale transactions" of electricity to regulate.[43] In cases in which one utility sold wholesale power to another, FERC fulfilled its duty

40. Cf. Paul L. Joskow, Markets for Power in the United States: An Interim Assessment, 27 Energy J. 1, 4 (2006) (describing U.S. restructuring as occurring without "a clear coherent blueprint," unlike in other countries).

41. 16 U.S.C. § 824(a), (b)(1) (2012).

42. Id. § 824(b)(1).

43. Paul L. Joskow, Regulatory Failure, Regulatory Reform, and Structural Change in the Electrical Power Industry, 1989 Brookings Papers on Econ. Activity: Microeconomics 125, 134; see also Boyd & Carlson, supra note 6, at 824; David B. Spence, Can Law Manage Competitive Energy Markets?, 93 Cornell L. Rev. 765, 769–70 (2008) [hereinafter Spence, Can Law Manage?].

to ensure "just and reasonable" rates[44] by requiring utilities to prefile the rates they intended to charge for FERC-jurisdictional sales.[45] At the same time, states had their own public utility commissions (PUCs) to regulate the rates that utilities could charge end-use customers.[46] Thus, there was relatively little difference in the *character* of regulation at the state and federal levels—in either case, commissions oversaw regulated monopoly entities.

In the 1990s, Congress and FERC—following on the heels of deregulation in other major sectors, including airlines, trucking, communications, and railroads—took significant steps to promote market constructs within federal electricity regulation.[47] The first move in this direction was a requirement that utilities allow other utilities to utilize their transmission lines at nondiscriminatory rates.[48] Around the same time, many states required their utilities to sell off generation assets so that the same company would no longer comprise both the supply and demand side of electricity transactions.[49] With these two changes in place, the stage was

44. See 16 U.S.C. § 824a-3(b)(1).

45. See id. § 824d(c) (requiring such filings); W. Deptford Energy v. FERC, 766 F.3d 10, 12 (D.C. Cir. 2014) ("The Federal Power Act requires regulated utilities to file with the Federal Energy Regulatory Commission, as a matter of open and accessible public record, any rates and charges they intend to impose for sales of electrical energy that are subject to the Commission's jurisdiction." (citing 16 U.S.C. § 824d(c))).

46. See Boyd & Carlson, supra note 6, at 822–23.

47. See Energy Policy Act of 1992, Pub. L. No. 102-486, §§ 721–722, 106 Stat. 2776 (1992) (codified at 16 U.S.C. § 824j–k); Joskow, supra note 40, at 4–5 (describing FERC's "initiatives to support the creation of competitive wholesale markets"); see also Joseph D. Kearney & Thomas W. Merrill, The Great Transformation of Regulated Industries Law, 98 Colum. L. Rev. 1323, 1323 (1998) (explaining how FERC issued orders "designed to increase the access of local distribution companies to lower-cost gas and to stimulate competition"); Joseph T. Kelliher & Maria Farinella, The Changing Landscape of Federal Energy Law, 61 Admin. L. Rev. 611, 613 (2009) ("[The] Federal Power Act and the Natural Gas Act have changed from a regulatory scheme that controlled market power exercise by utilities, pipelines, and producers through classic rate regulation to a regulatory regime that controls the exercise of market power through reliance on a mixture of competition and regulation."); Spence, Can Law Manage?, supra note 43, at 765 ("Over the last three decades, the world's industrialized democracies have introduced competition into previously noncompetitive, regulated markets.").

48. See Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities, 61 Fed. Reg. 21,540, 21,603 (Apr. 24, 1996) (codified at 18 C.F.R. pt. 35) ("[I]f a transmission provider offers a rate discount to its affiliate, or if the transmission provider attributes a discounted rate to its own transactions, the same discounted rate must also be offered at the same time to non-affiliates on the same transmission path and on all unconstrained transmission paths."); Open Access Same-Time Information System (Formerly Real-Time Information Networks) and Standards of Conduct, 61 Fed. Reg. 21,737, 21,740 (Apr. 24, 1996) (codified at 18 C.F.R. pt. 37) ("This final rule . . . will ensure that transmission customers have access to transmission information enabling them to obtain open access transmission service on a non-discriminatory basis.").

49. See Joskow, supra note 40, at 7 (noting that FERC "could not and did not" order utilities to do this, but state initiatives and market opportunities "led to a considerable

set for the birth of electricity markets—exchanges in which generators could bid in offers to sell electricity and utilities could seek out the lowest-priced sources of electricity to supply their customers.

In 1999, FERC issued Order 2000, which encouraged—but did not require—states and utilities to form regional electricity-management organizations, called either "Regional Transmission Organizations" (RTOs) or "Independent System Operators" (ISOs).[50] These entities would be "independent grid management organizations" in charge of managing the transmission grid and running electricity markets to procure and dispatch least-cost electricity across the region.[51]

Some states and their utilities opted in; others declined—hence the patchwork nature of the present system. Today, seven RTOs serve around two-thirds of the U.S. population.[52] These RTOs range in size from single-state (for example, those that serve New York or California) to fifteen-state (for example, MISO, the RTO serving the upper Midwest).[53] FERC oversees all of these regional entities except for that of Texas, whose RTO has no interstate transmission connections to bring it within federal

amount of restructuring of the ownership of existing generating plants"); see also Robert J. Michaels, The Governance of Transmission Operators, 20 Energy L.J. 233, 236 (1999) (describing the regulatory actions taken by FERC in the late 1990s).

50. There is no functional difference between RTOs and ISOs for the purposes of this Article, and this Article refers to all such entities as RTOs hereinafter. See Regional Transmission Organizations, 65 Fed. Reg. 810, 811 (Dec. 20, 1999) (codified at 18 C.F.R. pt. 35) ("Industry participants . . . retain flexibility in structuring RTOs that satisfy the minimum characteristics and functions. . . . The characteristics and functions could be satisfied by different organizational forms, such as ISOs . . . ."); see also Seth Blumsack, Measuring the Benefits and Costs of Regional Electric Grid Integration, 28 Energy L.J. 147, 147 n.1 (2007) ("There are some differences between ISOs and RTOs in their governance structure and congestion management protocols. Operationally, ISOs and RTOs look very similar.").

51. See Regional Transmission Organizations, 65 Fed. Reg. at 813–15; see also 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, 553 (2007) (listing RTOs' multiple functions).

52. Susan F. Tierney, Senior Advisor, Analysis Grp., Remarks at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England Inc., New York Independent System Operator, Inc., and PJM Interconnection, L.L.C., at n.1 (Apr. 26, 2017) [hereinafter Tierney, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426151811-Tierney,%20Analysis%20Group.pdf [http://perma.cc/32J3-VVS7] ("The current U.S. population is 325 million. According to the ISO/RTO Council, the seven U.S. regional transmission organizations (RTO) and independent system operators (ISOs) provide service in regions where 218 million people live . . . ." (citation omitted)).

53. About MISO, MISO, http://www.misoenergy.org/AboutUs/Pages/AboutUs.aspx [http://perma.cc/FKZ4-SKX8] (last visited Jan. 18, 2018); ISO/RTO Council, NYISO, http://www.nyiso.com/public/markets_operations/services/planning/iso_rto/index.jsp [http://perma.cc/9Q9E-44Y5] (last visited Apr. 14, 2018) (mapping New York and California ISOs).

jurisdiction.[54] As a general matter, states outside of these regions continue to exercise substantially more direct oversight of generation resources.

In RTO regions, FERC has stepped away from direct policy oversight of wholesale electricity prices toward using markets as a tool to ensure just and reasonable prices. In these regions, generators can sell power either through bilateral contracts or through centralized electricity markets administered by RTOs.[55] These are hardly "free" markets, though. FERC and the RTOs oversee these markets through a complex set of rules and agreements that establish what can be bought and sold, by whom, and how.[56]

Some regions—in particular, regions in the East—have chosen to administer separate "capacity markets" to ensure that enough new generation is built to serve future needs.[57] In these markets, generators[58] bid in

54. Electric Reliability Council of Texas (ERCOT), FERC, http://www.ferc.gov/industries/electric/indus-act/rto/ercot.asp [http://perma.cc/PQ4X-DFPW] (last updated Nov. 17, 2015).

55. See Emily Hammond & David B. Spence, The Regulatory Contract in the Marketplace, 69 Vand. L. Rev. 141, 154 (2016). Markets for electricity operate on both a day-ahead and a real-time basis, with the latter market making up for any imbalances in supply and demand that occur close to the time of electricity delivery. Id. Bilateral contracting continues to make up a sizeable portion of electricity sales even in RTO regions. See, e.g., Collin Cain & Jonathan Lesser, Bates White Econ. Consulting, A Common Sense Guide to Wholesale Electric Markets 11 (2007), http://www.bateswhite.com/media/publication/55_media.741.pdf [http://perma.cc/YJ4F-PSZ3] ("Most wholesale power is bought and sold through bilateral contracts, freely negotiated between individual buyers and sellers. In PJM, for example, about 85% of all market sales are bilateral.").

56. See Travis Kavulla, There Is No Free Market for Electricity: Can There Ever Be?, Am. Aff., http://americanaffairsjournal.org/2017/05/no-free-market-electricity-can-ever/ [http://perma.cc/S23A-7VGA] (last visited Apr. 16, 2018) (emphasizing how heavily regulated these markets are).

57. New England, New York, and PJM currently administer forward-looking capacity markets. Am. Pub. Power Ass'n, RTO Capacity Markets and Their Impacts on Consumers and Public Power 1 (2017) [hereinafter APPA, Issue Brief], http://www.publicpower.org/system/files/documents/rto_capacity_markets_and_their_impacts_on_consumers_and_public_power_0.pdf [http://perma.cc/AU5T-3WRV]. MISO administers a shorter-term capacity market for certain generators. See Himanshu Pande & Rachel Green, ICF Int'l, MISO's Capacity Auction: Uncertainty Going Forward 2 (2015), http://www.ourenergypolicy.org/wp-content/uploads/2015/05/MISO_Capacity_Auction.pdf [http://perma.cc/8L7G-EMJ3]. FERC recently rejected a MISO proposal for a three-year forward capacity market. Midcontinent Indep. Sys. Operator, Inc., Order Rejecting Tariff Filing, 158 FERC ¶ 61,128 (Feb. 2, 2017), 2017 WL 465973, at *1.

58. This Article uses "generators" for simplicity, but market participation also extends to producers of resources capable of generating "negawatts"—that is, those producers who can promise reductions in electricity demand can bid into these markets alongside supply-side generation resources. See Demand Response Compensation in Organized Wholesale Energy Markets, 76 Fed. Reg. 16,657, 16,659 (Mar. 15, 2011) (to be codified at 18 C.F.R. pt. 35) (requiring market operators to compensate providers of "negawatts" equally to supply-side resources); see also FERC v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 773 (2016) (upholding this order); Joel B. Eisen, Demand Response's Three Generations:

a promise to have available for the market a certain amount of generating capacity three years in the future, and the region procures enough future capacity to meet future projected demand.[59] In theory at least, these markets ensure long-term reliability by providing generators a second potential stream of revenue—in addition to earnings from the energy market—around which to make investment decisions.[60]

In both energy and capacity markets, RTOs run an auction process to determine which energy resources to purchase. Generators bid in at the price they would accept, and the RTO then "stacks" these bids, "first accepting the lowest bids and then moving up and accepting higher bids until all demand [for electricity] is satisfied."[61] All accepted bids are then paid the highest bid that "cleared" the auction.[62] This "stacking" process creates incentives for generators to bid as low as they can afford to ensure that their generation clears the market and gets paid.[63] In focusing solely on bid prices, the markets remain "agnostic as to resource and fuel types, so they do not favor one technology over another."[64] Because

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Market Pathways and Challenges in the Modern Electric Grid, 18 N.C. J.L. & Tech. 351, 408–09 (2017) (discussing FERC's reasoning behind the order).

59. See N.J. Bd. of Pub. Util. v. FERC, 744 F.3d 74, 82 (3d Cir. 2014) (explaining the process by which RTOs ensure there is enough capacity "to function at peak load"). In this way, "demand" in these markets is determined by regulators' "technocratic guesses." Kavulla, supra note 56.

60. Compare APPA, Issue Brief, supra note 57, at 1 (arguing that capacity markets increase prices without providing attendant benefits), with Peter Maloney, Marginal Success, Insight: U.S. Power Markets 49 (2013), http://www.platts.com/IM.Platts.Content%5Caboutplatts%5Cmediacenter%5Cpdf%5Cinsightdec13_uspower.pdf [http://perma.cc/7QPQ-BPUG] (arguing that capacity markets have "so far achieved their aim").

61. Plaintiffs' Memorandum in Opposition to Motions to Dismiss at 14, Coal. for Competitive Elec., Dynegy Inc. v. Zibelman, 272 F. Supp. 3d 554 (S.D.N.Y. 2017) (No. 16-CV-8164 (VEC)), 2017 WL 4837993, at 6; see also *Elec. Power Supply Ass'n*, 136 S. Ct. at 768 ("Operators accept the generators' bids in order of cost (least expensive first) until they satisfy the [utilities'] total demand.").

62. See Plaintiffs' Memorandum in Opposition to Motions to Dismiss, supra note 61, at 6; see also Brief of PJM Interconnection, LLC as Amicus Curiae in Opposition to Motions to Dismiss at 6, Elec. Power Supply Ass'n v. Star, No. 1:17-CV-01164 (N.D. Ill. Jul. 14, 2017), 2017 WL 5898038 [hereinafter PJM Amicus]. This explanation of market clearing is simplified. In practice, dispatch decisions also take into account where on the grid resources and demand are located, such that pricing is location specific. See Sacramento Mun. Util. Dist. v. FERC, 616 F.3d 520, 524 (D.C. Cir. 2010) (explaining locational marginal pricing); Hammond & Spence, supra note 55, at 155.

63. Plaintiffs' Memorandum in Opposition to Motions to Dismiss, supra note 61; see also Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1293–94 (2016) ("[Utilities] generally bid their capacity into the auction at a price of $0, thus guaranteeing that the capacity will clear at any price. . . . Because the fixed costs of building generating facilities often vastly exceed the variable costs of producing electricity, many generators also function as price takers.").

64. PJM Amicus, supra note 62, at 7. Some suggest that the markets are less neutral in practice, because they impose certain barriers to entry on nontraditional types of resources. See, e.g., Suzanne Herel, Clean Energy Advocates Appeal FERC's Capacity Performance Rulings, RTO Insider (July 12, 2016), http://www.rtoinsider.com/enviros-

of the efficiencies presumed to flow from this market design, FERC has declared prices established by these markets to be presumptively "just and reasonable," such that participation in the market takes the place of the traditional requirement to file rates with FERC.[65]

The fact that FERC's "wholesale" jurisdiction now revolves largely around regionally administered electricity markets[66] means that states deciding whether to join RTOs face a choice between these unusual markets and more traditional regulation.[67] States can either continue to manage their electricity supply through government oversight and planning, or they can place their faith in regionally administered markets to deliver reliable, affordable power. States that have opted to place their faith in markets have done so believing "that it would benefit consumers by leading to lower costs and lower prices in both the short run and the long run."[68]

Now, however, many of the states that chose to participate in regional markets have become increasingly aware of the limits of these markets when it comes to achieving goals beyond least-cost electricity.[69] Particularly with respect to climate change, which the markets do not factor into their dispatch algorithms, states have had to take matters into their own hands.

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ferc-pjm-capacity-performance-28701/ [http://perma.cc/9XVK-5QRU]; see also Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, 81 Fed. Reg. 86,522, 86,522 (Nov. 17, 2016) (to be codified at 18 C.F.R. pt. 35) (proposing regulations to "remove barriers to the participation of electric storage resources and distributed energy resource aggregations in the capacity, energy, and ancillary service markets operated by [RTOs and ISOs]").

65. See Morgan Stanley Capital Grp. Inc. v. Pub. Util. Dist. No. 1, 554 U.S. 527, 535–37 (2008). More specifically, FERC has established that rates determined by the market are presumptively "just and reasonable" for any generator that it determines has "adequately mitigated market power, lacks the capacity to erect other barriers to entry, and has avoided giving preferences to its affiliates." See id. at 537; see also Spence, Can Law Manage?, supra note 43, at 781.

66. To be clear, FERC nominally maintains the same jurisdiction in areas of the country that have not restructured. However, as was the case nationwide prerestructuring, its jurisdiction extends to fewer transactions in these regions.

67. Note that these "markets" themselves require substantial regulatory oversight of more novel varieties. See Lester Lave et al., Deregulation/Restructuring Part I: Reregulation Will Not Fix the Problems 16 (2007), http://www.cmu.edu/gdi/docs/deregulation-restructuring-part-i.pdf [http://perma.cc/6Q6Q-B2JY] ("The wholesale generation market has not actually been deregulated or even seen less regulation. . . . If anything, there are more layers of regulation now.").

68. Joskow, supra note 40, at 2; see also Blumsack, supra note 50, at 148 ("With the introduction of RTO markets, the generation resources over a number of utility control areas are cost-optimized and dispatched jointly.").

69. For a thorough explanation of these limits, see generally Hammond & Spence, supra note 55 (describing the tension between market competitiveness and pursuit of environmental goals in the energy industry).

B. *State Climate Policies*

Leading states have approached the challenge of regulating climate change with a level of commitment far beyond what would be predicted by any sort of rational-choice calculus.[70] Even as the federal government retreats on climate change,[71] certain states are responding bullishly. Most notably, California, New York, Massachusetts, Connecticut, Minnesota, New Jersey, Vermont, and Oregon have passed laws or promulgated executive orders that establish state greenhouse gas reduction targets of between 75% and 80% by 2050.[72] Twenty states in total have greenhouse gas targets,[73] and every state has some policies in place to reduce carbon emissions.[74]

Policy strategies span an enormous gamut. States are using cap-and-trade programs;[75] renewable-energy procurement requirements;[76] rebates and tax incentives for individuals, businesses, and communities;[77] and novel electricity pricing schemes.[78] In some instances, they are also considering

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70. As Professor Kirsten H. Engel has noted:

> [I]t defies economic logic that small subglobal jurisdictions, such as state and local governments in the United States, should be doing much of anything to mitigate their comparatively minor contribution to a global environmental phenomenon. Standard economic theory . . . would argue that small individual exploiters of the commons (here the global atmosphere) have little incentive to reduce the degree of their exploitation for the good of the whole in the absence of an agreement to do so that is binding on all commons users.

Kirsten H. Engel, Mitigating Global Climate Change in the United States: A Regional Approach, 14 N.Y.U. Envtl. L.J. 54, 55 (2005).

71. See Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,093–95 (Mar. 31, 2017) (revoking several of President Obama's climate-related actions and ordering further review of various environmental regulations).

72. Greenhouse Gas Emissions Targets, Ctr. for Climate & Energy Sols., http://www.c2es.org/us-states-regions/policy-maps/emissions-targets [http://perma.cc/2HCQ-T69N] (last updated Sept. 2016).

73. Id.

74. See Database of State Incentives for Renewables & Efficiency, N.C. Clean Energy Tech. Ctr., http://www.dsireusa.org [http://perma.cc/65LA-3W8Q] [hereinafter DSIRE Database] (last visited Jan. 17, 2018). Although, note that in some states, policies assisting in reducing carbon pollution may not be explicitly framed around "climate change" as a goal.

75. See Cap-and-Trade Program, Cal. Air Res. Bd., http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm [http://perma.cc/TKN8-T4P3] (last visited Mar. 2, 2018); Regional Greenhouse Gas Initiative (RGGI), http://www.rggi.org [http://perma.cc/5WNL-GG4A] [hereinafter RGGI] (last visited Jan. 17, 2018) (detailing a cap-and-trade agreement among Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont).

76. See infra notes 81–98 and accompanying text.

77. See DSIRE Database, supra note 74 (collecting and sorting "incentives by type," including numerous tax and other financial incentives).

78. See, e.g., Cal. Pub. Util. Comm'n, Time of Use Rulemaking/R.15-12-012, CA.gov, http://www.cpuc.ca.gov/General.aspx?id=12180 [http://perma.cc/VT9P-YU7Z] (last visited

overhauling the utility business model and the way they regulate utilities.[79] A complete canvass of these state policies would occupy the remaining space of this Article, without contributing anything novel.[80] Instead, this section examines three popular state climate policies that have been the most controversial for the ways in which they intersect with regional electricity markets: renewable portfolio standards, direct procurement orders, and "zero-emissions credits" for nuclear generators.

Renewable Portfolio Standards (RPSs) are one of the most popular state tools for promoting low-carbon energy sources. Twenty-nine states currently have an RPS in place.[81] These laws require[82] utilities in the state to source a certain percentage of the electricity that they sell from renewable sources by a certain date.[83] This approach enables utilities to seek out the cheapest renewable energy available to satisfy the state mandate.[84] Typically, states track compliance with their RPS by issuing "Renewable Energy Credits" (RECs) to renewable energy generators, which utilities then purchase to prove that the requisite share of their energy has come from renewable sources.[85] RECs thus help create a more liquid market

Jan. 17, 2018) ("This effort will include development of the principles, methodologies, and data sources needed to identify [time-of-use] periods that better reflect actual and near-term expected electricity supply and demand.").

79. See Herman K. Trabish, More than 30 States Embrace Grid Modernization, New Policy Tracker Finds, Util. Dive (May 31, 2017), http://www.utilitydive.com/news/more-than-30-states-embrace-grid-modernization-new-policy-tracker-finds/443702 [http://perma.cc/FV8S-Y7NH].

80. See Mormann, supra note 36, at 1625 (describing how "[i]n the absence of comprehensive federal policy action on climate change and clean energy, states are increasingly stepping in to fill the policy void" (footnote omitted)). For examples of state climate policies, see David R. Hodas, State Initiatives, *in* Global Climate Change and U.S. Law 303 (Michael B. Gerrard & Jody Freeman eds., 2d ed. 2014) (providing an overview of state initiatives adopted to address climate change, "explicitly or indirectly through energy regulation, transportation-related initiatives, or energy building codes"); Rossi, Carbon Taxation, supra note 8, at 279–80 (explaining how states use traditional utility regulation, specifically customer rate subsidies in energy law, to advance carbon reduction goals). See generally Lincoln L. Davies, Reconciling Renewable Portfolio Standards and Feed-In Tariffs, 32 Utah Envtl. L. Rev. 311 (2012) [hereinafter Davies, Reconciling] (arguing states should blend both renewable portfolio standards and feed-in tariffs in designing their renewable-energy policies).

81. Renewable Portfolio Standard Policies, Database of State Incentives for Renewables & Efficiency, N.C. Clean Energy Tech. Ctr. (2017) [hereinafter Renewable Portfolio Standard Policies], http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/03/Renewable-Portfolio-Standards.pdf [http://perma.cc/6ZMN-GZEE].

82. Eight additional states have renewable portfolio "goals" but not requirements. Id.

83. Mormann, supra note 36, at 1624. In some cases, state law specifies an absolute quantity. See, e.g., Renewable Portfolio Standard Policies, supra note 81 (showing Texas with an RPS of 5,880 megawatts by 2015).

84. Lincoln L. Davies, Power Forward: The Argument for a National RPS, 42 Conn. L. Rev. 1339, 1357 (2010) [hereinafter Davies, Power Forward].

85. Id. at 1359–60; see also Todd Jones et al., Ctr. for Res. Sols., The Legal Basis for Renewable Energy Certificates 3 (2015) ("Thirty-six (36) U.S. states and territories recognize that RECs can be used to track and transact renewable electricity on the grid."). REC

for renewable energy by allowing the "renewable" attribute to be sold separately from the underlying energy.[86]

In the most ambitious states, RPSs require a substantial percentage of renewables: In New York and California, this percentage is 50% by 2030; in Vermont, 75% by 2032.[87] In 2015, Hawaii adopted a 100% target by 2045.[88] In total, state RPS policies have driven more than half the growth in U.S. renewable energy generation to date and are expected to drive another 50% growth in the sector by 2030—making them an enormously important state climate policy.[89]

Each state RPS defines qualifying renewable resources in its own way, sometimes by enumerating a list,[90] and other times more conceptually. For example, Vermont's definition of renewables includes any "technology that relies on a resource that is being consumed at a harvest rate at or below its natural regeneration rate."[91] Some states use these schemes to express more idiosyncratic preferences tailored to local conditions.[92]

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trading is often limited to either in-state or in-region. Cf. Robin Kundis Craig, Constitutional Contours for the Design and Implementation of Multistate Renewable Energy Programs and Projects, 81 U. Colo. L. Rev. 771, 795 (2010) ("[A]t the state level, RPS requirements that favor instate RECs or forbid out-of-state RECs could run afoul of the dormant Commerce Clause. Similarly, multistate agreements that allow REC trading within the consortium but prohibit RECs from other states could raise constitutional concerns.").

86. Joel H. Mack et al., All RECs Are Local: How In-State Generation Requirements Adversely Affect Development of a Robust REC Market, Elec. J., May 2011, at 8, 10; see also Allco Fin. Ltd. v. Klee, 861 F.3d 82, 92–93 (2d Cir. 2017) (explaining RECs); Kelly Crandall, Comment, Trust and the Green Consumer: The Fight for Accountability in Renewable Energy Credits, 81 U. Colo. L. Rev. 893, 904 (2010) (same). FERC has explicitly endorsed the existence of RECs as creations of state law that can legally exist apart from the underlying electricity bought and sold. See WSPP Inc., 139 FERC ¶ 61,061 (Apr. 20, 2012), 2012 WL 1395532, at *5.

87. Renewable Portfolio Standard Policies, supra note 81. Direct comparison of these standards can be challenging—one must know precisely what resources are included, whether or not renewables that existed before passage of the RPS are included, and what the natural resource endowment of the state is like. See Davies, Power Forward, supra note 84, at 1361.

88. Act of June 8, 2015, 2015 Haw. Sess. Laws 245; see also Renewable Portfolio Standard Policies, supra note 81; About the Hawaii Clean Energy Initiative, http://www.hawaiicleanenergyinitiative.org/about-the-hawaii-clean-energy-initiative [http://perma.cc/QG3D-NVFP] (last visited Jan. 18, 2018).

89. Galen Barbose, Lawrence Berkeley Nat'l Lab., U.S. Renewables Portfolio Standards: 2016 Annual Status Report 2 (2016), http://emp.lbl.gov/sites/all/files/lbnl-1005057.pdf [http://perma.cc/D55H-V9VS].

90. See, e.g., In re Retail Renewable Portfolio Standard, 235 Pub. Util. Rep. 4th (PUR) 414 (N.Y. Pub. Serv. Comm'n 2004) (defining eligible resources as biogas (including anaerobic digestion and landfill gas), biomass, fuel cells, hydro (without new storage impoundment), solar, tidal/ocean, and wind).

91. Vt. Stat. Ann. tit. 30, § 8002(21) (2016).

92. See Davies, Power Forward, supra note 84, at 1360–62 (discussing differences in terms of four core RPS design traits); Steven Ferrey et al., Fire and Ice: World Renewable

Maryland, for instance, includes electricity produced from chicken manure in its RPS, while North Carolina includes electricity from hog waste.[93] Numerous states also establish "tiers" or "carve-outs" within their RPSs, which mandate a certain amount of the overall requirement to come from particular resource types. Twenty-two of the twenty-nine states with RPSs have a carve-out relating either to solar energy or "distributed generation"—a term used to describe small-scale generating resources located at or near the site of consumption.[94]

In some states, legislatures have created additional procurement processes for certain clean-energy resources above and beyond the RPS.[95] For example, in 2016, Massachusetts passed "An Act Relative to Energy Diversity," which requires utilities in the state to enter into long-term contracts for 1,600 megawatts of offshore wind energy.[96] The state has also joined California in mandating that utilities acquire a certain amount of energy-storage resources.[97] Several other northeastern states also have special procurement processes for additional renewable resources.[98]

Finally, there is perhaps the most controversial policy of them all: state support for particular nuclear plants at risk of retiring. New York

Energy and Carbon Control Mechanisms Confront Constitutional Barriers, 20 Duke Envtl. L. & Pol'y F. 125, 144–50 (2010) (cataloguing different state RPSs).

93. See Md. Code Ann., Pub. Util. § 7-701(j), (m) (LexisNexis 2016) (defining poultry litter, which is used in thermal biomass systems); N.C. Gen. Stat. § 62-133.8(e) (2015) (establishing a specific requirement for swine waste).

94. Renewable Portfolio Standards (RPS) with Solar or Distributed Generation Provisions, Database of State Incentives for Renewables & Efficiency, N.C. Clean Energy Tech. Ctr. (2017), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/02/RPS_carveout_4.pdf [http://perma.cc/EYJ9-QEAV] (mapping which states have solar- or distributed-generation provisions).

95. Two recent articles clarify why a state might layer procurement policies on top of an RPS. See Davies, Reconciling, supra note 80, at 313 (discussing how RPSs and other incentives can complement each other); Mormann, supra note 36, at 1658–59 (proposing a model for integrating RPSs and feed-in tariffs). As Davies and Mormann explain, RPS and procurement policies can be blended to create, on the one hand, substantial demand for renewable energy and, on the other hand, assurance to investors of certain returns over a longer period of time. Davies, Reconciling, supra note 80, at 314; Mormann, supra note 36, at 1628.

96. An Act to Promote Energy Diversity, 2016 Mass. Acts, http://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter188 [http://perma.cc/53RC-PJWA] (last visited Apr. 4, 2018). Some states alternatively include a carve-out for offshore wind within their RPS. Benjamin Storrow, Mid-Atlantic Enters "Offshore Game" in a Big Way, ClimateWire (May 12, 2017), http://www.eenews.net/climatewire/2017/05/12/stories/1060054457 (on file with the *Columbia Law Review*).

97. Cal. Pub. Utils. Comm'n, Rulemaking No. 10-12-007, Decision Adopting Energy Storage Procurement Framework and Design Program (2013); Peter Maloney, Massachusetts DOER Will Set Energy Storage Mandate Targets by July, Util. Dive (Jan. 3, 2017), http://www.utilitydive.com/news/massachusetts-doer-will-set-energy-storage-mandate-targets-by-july/433138/ [http://perma.cc/PB9Q-XD32].

98. See infra note 264 (gathering cases explaining and evaluating these policies).

pioneered this strategy with its Public Service Commission's 2016 decision to provide payments, per megawatt hour, to three nuclear units in New York State that it determined were at risk of retiring without state aid.[99] The state awards these units "Zero-Emission Credits" (ZECs) for each megawatt hour of energy they produce through the year 2029.[100] New York utilities are required to purchase these ZECs, with their price determined by the "Social Cost of Carbon"—a figure calculated by the Obama Administration.[101] The ZEC price for the first two years of the program is around $17.50 per megawatt hour; after that time, the ZEC price may decline based on forecasted prices in wholesale markets.[102]

Several states have either followed or are considering following similar courses. Illinois adopted a ZEC program in December 2016, which looks quite similar to New York's.[103] Both states have quickly faced lawsuits challenging the legality of the programs under the Federal Power Act's framework of shared federal–state jurisdiction.[104] The lawsuits have not, however, deterred Connecticut, Ohio, Pennsylvania, and New Jersey from seeking to enact similar programs.[105]

Altogether, the suite of policies that states have amassed to meet their decarbonization goals is both impressive and eclectic—to some delightfully so; to others, frustratingly so.[106] In the next Part, this Article analyzes and defends these diverse climate policies and the preferences they represent. First, though, it is helpful to understand the problems that detractors believe these state policies present to regional electricity markets.

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99. See N.Y. Pub. Serv. Comm'n, Proceeding on Motion of the Comm'n to Implement a Large-Scale Renewable Program & a Clean Energy Standard, 331 Pub. Util. Rep. 4th (PUR) 357 (Aug. 1, 2016) [hereinafter Clean Energy Standard Order] (on file with the *Columbia Law Review*).

100. Id. at 144–45.

101. Id. at 149–50. President Trump has since withdrawn the findings of the Interagency Working Group on Social Cost of Greenhouse Gases, describing them as "no longer representative of governmental policy." Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,093–95 (Mar. 31, 2017).

102. Clean Energy Standard Order, supra note 99, at 51.

103. See 20 Ill. Comp. Stat. Ann. 3855/1–75(d–5) (West Supp. 2017); id. at 3855/1–10; State Defendants' Memorandum in Support of Motion to Dismiss at 6, Elec. Power Supply Ass'n v. Star, No. 1:17-CV-01164 (N.D. Ill. Jul. 14, 2017), 2017 WL 5898040 (describing Illinois's program).

104. See infra notes 251–257 and accompanying text.

105. Ken Dixon, Malloy Signs Millstone Nuclear Bill, Conn. Post (Oct. 31, 2017), http://www.ctpost.com/local/article/Malloy-signs-Millstone-nuclear-bill-12320251.php [http://perma.cc/5UX9-MJLU]; Marie Cusick, Lawmakers Mull Support for Nuclear Industry, NPR: StateImpact Pa. (Apr. 26, 2017), http://stateimpact.npr.org/pennsylvania/2017/04/26/lawmakers-mull-support-for-nuclear-industry [http://perma.cc/7BX2-2JBD]; Peter Maloney, Ohio Lawmakers Introduce Bill To Support FirstEnergy's Nuclear Plants, Util. Dive (Apr. 6, 2017), http://www.utilitydive.com/news/ohio-lawmakers-introduce-bill-to-support-firstenergys-nuclear-plants/439950/ [http://perma.cc/MF5F-EF6D].

106. See infra section I.C (explaining the divergent viewpoints on the advisability of these state policies).

C. *Tensions at the Intersection*

State climate policies and regional electricity markets have coexisted—and indeed, grown together—for around two decades.[107] Why the recent fuss? Regional market operator PJM—an RTO that spans the mid-Atlantic—offers perhaps the most parsimonious explanation for the present spate of concern: "Subsidies are contagious."[108] By "subsidies," PJM is referencing the myriad state policies detailed above that help promote various clean-energy resources. As this quote suggests, regional electricity-market operators are nervous about the proliferation of these state-level, resource-specific policies as a means to achieve ambitious climate-mitigation goals.

The first common complaint about these state policies is that payments to specific zero-carbon resources unfairly suppress market prices. For example, plaintiffs suing to contest the legality of New York's ZEC program explain their concerns as follows: Providing existing nuclear units an out-of-market ZEC payment enables these nuclear plants to lower the price at which they bid into the market.[109] Then, the clearing price of the entire market is lowered such that other plants that do not receive subsidies either fail to clear the auctions or clear at a lower price. Consequently, the argument goes, "the ZEC program . . . distorts the functioning of the FERC-regulated energy and capacity markets."[110] Similar complaints extend to other state support policies, such as RPS and specific procurement policies, which some believe "cause a similar type of harm to . . . markets."[111]

107. See Tierney, FERC Technical Conference, supra note 52, at 2 (observing the prevalence of state policies that can affect wholesale market prices); see also Robert Klee, Comm'r, Conn. Dep't of Energy & Envtl. Prot., Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 1 (May 1–2, 2017), http://www.ferc.gov/CalendarFiles/20170426145943-Klee,%20Connecticut%20DEEP.pdf [http://perma.cc/9CVL-GM3C] (noting that in 1998, Connecticut enacted clean-energy policies contemporaneously with legislation deregulating electricity).

108. Monitoring Analytics, LLC, State of the Market Report for PJM, Volume 2: Detailed Analysis 2 (2017) [hereinafter Monitoring Analytics, State of the Market Report], http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2016/2016-som-pjm-volume2.pdf [http://perma.cc/UAJ9-YY3A].

109. See Complaint at 19–23, Coal. for Competitive Elec. v. Zibelman, 272 F. Supp. 3d 554 (S.D.N.Y. 2017) (No. 16-CV-8164 (VEC)) (describing New York's subsidy scheme); see also Robert C. Flexon, President & CEO, Dynegy Inc., Pre-Conference Remarks at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 2 (May 1–2, 2017) [hereinafter Dynegy, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426151233-Flexon,%20Dynegy.pdf [http://perma.cc/CV5N-L53M] ("In RTO/ISO markets, a generator relies on the combination of energy and capacity revenues to recover its costs. A generator's offer to supply energy and/or capacity is typically tied to its cost[s] . . . the ZECs will enable the nuclear generators to make offers well below their production costs.").

110. Plaintiffs' Memorandum in Opposition to Motions to Dismiss, supra note 61, at 7.

111. PJM Amicus, supra note 62, at 9.

Perhaps the most contested element of this narrative is the normative claim that the market is "distorted" and "harmed," rather than merely altered, by these kinds of state policies. An alternative view is that it is perfectly legitimate for states to support certain resources and that such support does not render these resources' market bids "uneconomic."[112] To the contrary, this view holds, state support policies are permissible judgment calls by states that exist at "the heart of their historic jurisdiction over generation resources."[113] If they affect market prices, so be it—there's nothing necessarily wrong with that. Indeed, subsidies to fossil fuels have long affected their relative competitiveness in ways that the market has not accounted for.[114]

Moving beyond these semantics—and the substantially different views they represent of the relative hierarchy of market functioning and state policy goals—can be challenging. Complaints about state clean-energy policies lowering market prices often feel like their own protectionist effort to insulate carbon-heavy resources from necessary change. But the most compelling version of this argument looks further down the road than mere market "distortion." That longer-term argument proceeds like this: States decided to join regional electricity markets to have these markets competitively select least-cost electricity and generating capacity. Going forward, states plan to continue to rely on these markets to send signals about whether and when to invest in new generating capacity in any particular region. But if state policies in support of certain resources lower the prices those markets are sending to everyone else, then it may well be the case that non-policy-supported generators—

112. Jennifer Chen, Sustainable FERC Project, Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 2 (May 1–2, 2017) [hereinafter Chen, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426151027-Chen,%20Natural%20Resources%20Defense%20Council.pdf [http://perma.cc/9T47-PNA5]; see also Lisa G. McAlister, Am. Mun. Power, Pre-Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 3 (May 1–2, 2017) [hereinafter American Municipal Power, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426151448-McAlister,%20American%20Municipal%20Power.pdf [http://perma.cc/NAU5-EHMY] ("An effort to distinguish between state actions that are 'inside' versus 'outside' the market would be misplaced.").

113. Robert Erwin, Gen. Counsel, Md. Pub. Serv. Comm'n, Comments at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 4 (May 1–2, 2017) [hereinafter Erwin, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426150720-Erwin,%20Maryland%20PSC.pdf [http://perma.cc/PQR3-KQJD].

114. See Rossi, Carbon Taxation, note 8, at 287 n.49 ("Studies that incorporate environmental and energy security costs associated with fossil fuels in the United States estimate that annual direct and indirect subsidies exceed $121 billion (in 1999 dollars).").

in particular, natural gas generators[115]—no longer see value in building new plants.[116]

This result, in and of itself, might be exactly what states desire: Their policies push out existing, carbon-emitting resources by supporting certain zero-carbon resources. But here's where PJM's worry about subsidies' contagiousness comes into play: Renewable energy, nuclear energy, and natural gas have different attributes that lead them not to be perfectly interchangeable electricity sources. Solar and wind energy are available only when the sun is shining or the wind is blowing, respectively. Nuclear power cannot be turned on and off quickly—meaning that it is not very useful in balancing out the variability in solar and wind.[117] Natural gas and hydropower, by contrast, are capable of quickly "ramping" up and down, such that they act as flexible complements to these variable resources.[118] Electricity storage can play a similar role in "smoothing" out electricity supply.[119]

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115. See Paul Hibbard et al., Analysis Grp., Electricity Markets, Reliability and the Evolving U.S. Power System 15 (2017) (noting combined-cycle, natural gas combustion turbines are "the technology of choice for new fossil-fueled generation investment in most regions"); see also Raymond L. Gifford et al., The Breakdown of the Merchant Generation Business Model: A Clear-Eyed View of Risks and Realities Facing Merchants 7 exh.6 (2017) [hereinafter Gifford et al., Merchant Report].

116. See, e.g., ISO New England Inc. Pre-Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 1 (May 1–2, 2017) [hereinafter ISO-NE, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426150054-White,%20ISO-NE.pdf [http://perma.cc/U6S8-GRVL] (suggesting that subsidized "out-of-market procurements could undermine cost-effective price formation, in turn impacting both [the ISO-NE capacity market's] ability to attract unsubsidized new investment cost effectively and investors' willingness to maintain existing supply resources"); see also NRG Power Mktg., LLC v. FERC, 862 F.3d 108, 111 (D.C. Cir. 2017) (observing that these challenges could ultimately lead to "brownouts or blackouts"); Gifford et al., Merchant Report, supra note 115, at 1; ISO New England, 2016 Economic Study: NEPOOL Scenario Analysis (First Draft) 5 (2017) (on file with the *Columbia Law Review*) ("New resources will require sources of revenue in addition to the wholesale energy market to remain economically viable. Natural gas units show the greatest revenue shortfall [because] of their production costs being higher than the $0/MWh fuel costs of renewables, but renewable resources also show significant revenue shortfalls.").

117. See MIT, The Future of the Electric Grid: An Interdisciplinary MIT Study 53–76 (2011) (discussing the challenges of depending upon variable energy sources).

118. Id. at 64; see also Hammond & Spence, supra note 55, at 164.

119. See Judy W. Chang et al., Brattle Grp., Advancing Past "Baseload" to a Flexible Grid: How Grid Planners and Power Markets Are Better Defining System Needs to Achieve a Cost-Effective and Reliable Supply Mix 17 (2017), http://files.brattle.com/files/7352_advancing_past_baseload_to_a_flexible_grid.pdf [http://perma.cc/FS9T-RZV6] (explaining the role that "flexible resources" can play in "help[ing] to integrate variable renewable resources"); Amy L. Stein, Reconsidering Regulatory Uncertainty: Making a Case for Energy Storage, 41 Fla. St. U. L. Rev. 697, 710–12 (2014) ("[R]eliability benefits can come in the form of backup electricity in times of power outages, enhanced power quality to prevent outage, and frequency regulation that adjusts for differences between grid operators' predictions and actual demand.").

These divergent characteristics underpin the "contagion" worry. As renewable energy comes to play a larger role in the grid, states may realize that they need a certain amount of natural gas, electricity storage, or some other new resource to keep their decarbonizing grid running smoothly and efficiently.[120] In this case, if the market is incapable of supporting such resources, states may end up having to *also* design subsidy programs for these resources.[121] Eventually, the market might be so poor at sending competitive price signals that the only way for any resource to remain viable[122] would be to obtain state subsidies.[123] Such a result would ultimately amount to creeping, accidental re-regulation of the electricity sector and abandonment of the gains states intended to obtain from regional electricity markets.[124]

120. Cf. Abraham Silverman, Deputy Gen. Counsel & Vice President, Regulatory, at NRG Energy, Inc., Pre-Technical Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 2 (May 1–2, 2017) [hereinafter NRG Energy, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426151513-Silverman,%20NRG.pdf [http://perma.cc/6M75-V8AE] (explaining that to succeed in decarbonizing the grid, "the power sector must be ruthlessly efficient in attracting and deploying capital").

121. See Michael Hogan, Regulatory Assistance Project (RAP), Hitting the Mark on Missing Money: How to Ensure Reliability at Least Cost to Consumers 7 (2016), http://www.raponline.org/wp-content/uploads/2016/09/rap-hogan-hitting-mark-missing-money-2016-september.pdf [http://perma.cc/QGG6-9YWU] (explaining that markets increasingly will need flexible resources as renewables' penetration increases and that these flexible resources are missing the necessary "remuneration of investment"); Monitoring Analytics, State of the Market Report, supra note 108, at 2 (providing detailed analytics assessing proposed subsidy solutions); David B. Spence, Paradoxes of "Decarbonization," 82 Brook. L. Rev. 447, 470 (2017) [hereinafter Spence, Paradoxes] (observing that a recognition that natural gas will be a necessary backup fuel on an all-renewables grid "begs the question[] [of] who will own and build natural gas-fired power plants that will almost never be used").

122. Emily Hammond and David Spence do an excellent job explaining why market prices may fail to provide adequate returns on investment to plant owners. See Spence & Hammond, supra note 55, at 163.

123. See PJM Amicus, supra note 62, at 8 ("Lower clearing prices . . . starve otherwise economic existing generation, beginning a vicious cycle that requires these plants also to look for out-of-market subsidies, further depressing clearing prices and undermining the market price.").

124. See Dynegy, FERC Technical Conference, supra note 109, at 5 (explaining that "[r]ecent state-level interventions have had a devastating effect on the ability of unsubsidized market participants to attract and retain private capital"); Tierney, FERC Technical Conference, supra note 52, at 6 (suggesting this result would "affect the continuing viability of the current designs of these three RTOs' forward capacity markets"); Gavin Bade, Re-Regulation on the Horizon? State Plant Subsidies Point to Looming 'Crisis' in Organized Power Markets, Util. Dive (Oct. 20, 2016), http://www.utilitydive.com/news/re-regulation-vertically-integrated-utility/428639/ [http://perma.cc/YG54-HDR8] (arguing that "[w]ithout concerted action to alter market constructs . . . states will turn back to a vertically-integrated utility model"). Indeed, one might interpret DOE's NOPR proposing cost-of-service ratemaking for fuel-secure resources as a glaring example of precisely this

Whether this potentiality presents an imminent threat remains a matter of debate. For the moment, the worry is particularly acute in the eastern RTOs that rely on regional forward capacity markets as the primary way to ensure resource adequacy (that is, enough electricity going forward to keep the lights on). In these regions, states have largely required utilities to sell off their generation assets, such that corporations building generators do not have the benefit of a captive monopoly rate base[125] to help pay for new plants.[126] Instead, these generators rely exclusively on payments from electricity markets as the way to recoup their investments, such that a depression in market prices threatens their survival to a greater extent than in other markets.

Although state reregulation of the electricity sector is sometimes held out as a plausible solution to these challenges, no state pursuing aggressive decarbonization expresses reregulation as its aim.[127] Instead, states wish to remain a part of regional electricity markets while also accomplishing their decarbonization goals.[128] Accordingly, the key question becomes how to balance the aims of these policies with the risks they

type of "creeping subsidy." See Grid Resiliency Pricing Rule, 82 Fed. Reg. 46,940 (proposed Oct. 10, 2017) (to be codified at 18 C.F.R. pt. 35).

125. In regulated regions, approved capital expenditures make up a utility's "rate base." The utility is entitled to recover the costs reflected in the rate base as well as a reasonable rate of return, typically around ten percent per year. See Fed. Power Comm'n v. Hope Nat. Gas Co., 320 U.S. 591, 602–03 (1944) (establishing the governing standard for whether rates are "just and reasonable"); see also Edison Elec. Inst., Q4 2015 Rate Case Summary 1 (2016), http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/QtrlyFinancialUpdates/Documents/QFU_Rate_Case/2015_Q4_Rate_Case.pdf [http://perma.cc/QK53-SV8K] (finding that the average return on equity in the fourth quarter of 2015 was 9.62%, "a near-record low in . . . over-three-decades of data").

126. In other RTOs, states maintain a more direct role in ensuring resource adequacy by approving certain generation resources for construction and assuring utilities a fair rate of return on these assets. See PJM Amicus, supra note 62, at 3 (explaining these regional differences); Spence, Paradoxes, supra note 121, at 464–65 (arguing the "problem of attracting private capital lies at the heart of public utility regulation, and hangs like a shadow over hybrid and competitive markets"); Tierney, FERC Technical Conference, supra note 52, at 2–3 (explaining why regions where states maintain a traditionally regulated utility industry are less impacted by these concerns).

127. LaFleur, FERC Technical Conference, supra note 16, at 54–55 (summarizing the view of state representatives, who "in general still want the centralized market to play some role in resources for liability and sustaining existing resources for reliability" and who were not "going to take over buying all the resources at the state level").

128. See ISO-NE, FERC Technical Conference, supra note 116, at 1 (explaining that "New England states have not expressed interest" in returning to a situation in which they fully control resource adequacy); see also Susanne Desroches, Deputy Dir., Infrastructure Policy, N.Y.C. Mayor's Office of Recovery and Resiliency, Pre-Conference Comments at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 5 (Apr. 25, 2017), http://www.ferc.gov/CalendarFiles/20170426150357-DesRoches,%20New%20York%20City.pdf [http://perma.cc/68CN-FEX4] ("To be clear, the City continues to see value in the wholesale markets, and it is not suggesting that we go back to vertically integrated utilities.").

present to electricity-market functionality. Before taking up this question in Parts III and IV, the next Part argues that the answer to this question requires a deeper understanding of the nature of the project of decarbonization—an understanding that has largely been lacking in conversations to date.[129]

II. WHAT SHOULD WE ASK OF DECARBONIZATION? PREFERENCES BEYOND LEAST COST

At one level, decarbonization is a technical challenge. To combat climate change, the amount of carbon released in the production of electricity must be dramatically reduced. Leading studies suggest that adequately mitigating climate change—that is, minimizing the possibility of planetary catastrophe—will require "deep decarbonization" of developed country economies.[130] "Deep decarbonization" in this context describes decarbonization efforts of around 80% by 2050—precisely the aim embraced by leading U.S. states.[131]

Several recent projects have fleshed out the technological changes necessary to accomplish this transformation. These projects yield answers along the following lines: "The carbon intensity of electricity will need to be reduced by a startling 97%."[132] To do so, "[p]etroleum, coal, and natural gas [must] play a much smaller role in the primary energy supply," and "wind, solar, biomass, and nuclear [must] become the dominant share of primary energy supply."[133] These changes will, of course, "profoundly transform the U.S. energy economy."[134] A more interesting and open question, though, is how—and how much—these major infrastructure changes will reverberate throughout the American economy and American society.

A. *Two Visions of the Decarbonized Future*

It can be difficult to trace the ways in which discrete energy-infrastructure decisions affect larger social and political structures. It is often only in hindsight, after the gradual accretion of decades of such decisions,

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129. See Roopali Phadke, Public Deliberation and the Geographies of Wind Justice, 22 Sci. as Culture 247, 248 (2013) ("To date, new energy policy has focused on innovation and investment pipelines. Remarkably, little attention has been paid to understanding the social dimensions of these major infrastructure shifts.").

130. The White House, United States Mid-Century Strategy for Deep Decarbonization 6–7 (2016), http://unfccc.int/files/focus/long-term_strategies/application/pdf/mid_century_strategy_report-final_red.pdf [http://perma.cc/DH3A-7YTM]; Williams et al., Deep Decarbonization Policy, supra note 6, at 11; see also John C. Dernbach, Pathways to a Zero-Carbon Future, Envtl. F., July–Aug. 2017, at 30, 35.

131. Williams et al., Deep Decarbonization Policy, supra note 6, at 35.

132. Id. at 49.

133. Id. at 19–20.

134. Id. at 9.

that we can understand how energy policies interrelate to larger questions of social structure and economic and political power.[135] But part of this Article's argument is that it is important to appreciate up front—as best we can—the expansive effects that our choices around *how* to decarbonize the energy system are likely to have.

In an attempt to develop an appreciation of decarbonization's potentially widespread ramifications, this section asks the reader to consider two divergent pathways to deep decarbonization. The first emerges from a recent, personal conversation with an acquaintance who works for a major environmental not-for-profit that will remain undisclosed.[136] He explained that, frustrated with recent backsliding on climate change in the United States, his organization was quietly assembling a group of the major fossil fuel companies in an attempt to devise a response to climate change that would ensure that the companies maintained their dominant role in the economy. That is to say, this group hoped to draft legislation related to decarbonization that would do as little as possible to shake up market shares, or political power, within the energy industry or beyond. In this group's view, accepting a policy actively designed to forestall any significant distributional shifts is the surest way to achieve rapid deep decarbonization.

If this pathway were taken, the major political and economic players in the decarbonized future might not look so different from those of today—many of the changes would play out behind the scenes of the electricity grid. All of us would get used to landscapes dotted by major utility-scale wind farms, nuclear power plants, solar arrays, and transmission lines, owned by companies like Exxon and BP.[137] Companies would

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135. For a powerful demonstration of these interlinkages, see generally Timothy Mitchell, Carbon Democracy: Political Power in the Age of Oil (2011), which traces the ways in which the switch from coal to oil as a dominant fuel impacted political economy and political institutions in the Western world.

136. That makes this anecdote hard to cite. But it is not particularly important that it can be externally validated—it is offered in the spirit of exploring "sociotechnical imaginaries," as described by the scholar of science, technology, and society, Professor Sheila Jasanoff. Sheila Jasanoff & Sang-Hyun Kim, Sociotechnical Imaginaries and National Energy Policies, 22 Sci. as Culture 189, 190 (2013). These imaginaries, for Jasanoff, are "'collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects,'" as well as "powerful cultural resources that help shape social responses to innovation." Id. (quoting Sheila Jasanoff and Sang-Hyun Kim, Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea, 47 Minerva 119, 120 (2009)); see also Charles Taylor, Modern Social Imaginaries 23 (2004) (defining "social imaginaries" as "the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations").

137. Several of the big oil companies are already moving in this direction. See, e.g., Anna Hirtenstein, Big Oil Follows Silicon Valley into Backing Green Energy Firms, Bloomberg Tech. (Aug. 15, 2017), http://www.bloomberg.com/news/articles/2017-08-

build whichever combination of these resources proved most profitable to them. The price of electricity would likely rise, but companies such as General Electric would provide new technologies to help control electricity demand—technologies that would be available to those who could afford them.[138]

Now, consider a second, quite different pathway that a country or state could take toward decarbonization. This pathway emerges from the thesis of journalist Naomi Klein's 2014 book *This Changes Everything*.[139] In her view, the reason that the world has made so little progress on climate change is that "the Right is Right": Addressing climate change requires actions that "directly challenge our reigning economic paradigm" and "spell extinction for the richest and most powerful industry the world has ever known—the oil and gas industry."[140] She doubts that any significant solution can be forged through cooperation with major corporations, citing the poor record of this strategy to date.[141] Instead, she sees the challenge of climate change as an opportunity to forge new grassroots alliances that link climate change to community health and that demand more democratic decisionmaking and local economic power.[142] Climate change, in this view, "could be the catalyst to attack inequality at its core."[143]

If this pathway toward decarbonization were pursued, there might be an efflorescence of city movements to reclaim their electricity grids from private ownership.[144] Communities would collectively invest in locally sited solar and wind farms, deciding to pay more to support local clean energy and local jobs. Consumption of energy and other goods might fall as the country pursued low-growth economic policies that focused on delivering free time instead of material accumulation, in an effort to spread fewer resources more broadly.[145] Significant lifestyle changes might be required, including reduced consumption of meat and dairy, less car ownership, and fewer airplane trips.[146]

15/big-oil-follows-silicon-valley-into-backing-green-energy-firms/ [http://perma.cc/XKT9-3FFV].

138. See Shelley Welton, Clean Electrification, 88 U. Colo. L. Rev. 571, 591–609 (2017) (exploring the trend toward creating a "participatory grid" and the equity challenges it presents).

139. Naomi Klein, This Changes Everything: Capitalism vs. The Climate (2014).

140. Id. at 31, 63.

141. Id. at 207–49.

142. See id. at 96–97, 360–61.

143. Id. at 409.

144. See Shelley Welton, Public Energy, 92 N.Y.U. L. Rev. 267, 304–07 (2017) [hereinafter Welton, Public Energy] (documenting efforts in this vein).

145. See, e.g., Tim Jackson, Prosperity Without Growth: Economics for a Finite Planet 3, 151, 180 (2011) (asking "[w]hat can prosperity possibly look like in a finite world" and concluding that it might include consuming less, improving social equality, and working fewer hours).

146. See Mike Childs, Friends of the Earth, Just Transition: Is a Just Transition to a Low-Carbon Economy Possible Within Safe Global Carbon Limits? 4 (2011), http://

It is hard to get much further apart than these two visions of the decarbonized future—one based entirely on political expediency and maintenance of the economic order; the other based on a vision of using the project of decarbonization to radically restructure political and social relations. Their coexistence hints at the range of possibilities that decarbonization holds for power structures, community character, and daily life. No matter how we approach it, decarbonization will shape more than just physical infrastructure, making it a *social* project as much as a technical one.

There is considerably more to be said about the many contours of the "social project" of decarbonization, but much of it will have to wait for future work. This Article does not attempt to explore the range of potential considerations or solutions in their entirety, nor does it make any judgment about the most viable or desirable version of this social project. For the present argument, it is enough to understand that decarbonization is, inexorably, more than just a technical challenge. Discussions around its trajectory implicate choices and values that extend far beyond what technologies are available at what costs.[147] The question then becomes: Who determines what additional values are relevant? The

friendsoftheearth.uk/sites/default/files/downloads/just_transition.pdf [http://perma.cc/H77H-FXET] (finding these sacrifices necessary if the United Kingdom were to meet decarbonization goals while ensuring that "essential needs for housing, transport and energy use are met").

147. Many scholars outside the legal field have forcefully made similar points. See, e.g., Govert Valkenburg & Giancarlo Cotella, Governance of Energy Transitions: About Inclusion and Closure in Complex Sociotechnical Problems, 6 Energy Sustainability & Soc'y (2016), http://link.springer.com/content/pdf/10.1186%2Fs13705-016-0086-8.pdf [http://perma.cc/R7LH-KET4] (describing the energy transition as "at once a technological, regulation and political problem" that implicates a "heterogeneity of relevant values"); Catherine Butler et al., Public Values for Energy Futures: Framing, Indeterminacy and Policy Making, 87 Energy Pol'y 665, 669 (2015) [hereinafter Butler et al., Public Values] (finding that the public "situate[s] climate change as just one element within a much wider set of concerns about environment and human/nature relations"); Christina Demski et al., Public Values for Energy System Change, 34 Global Envtl. Change 59, 59 (2015) ("Publics are deeply implicated in energy transitions, for example as consumers and producers of energy, as citizens with voting powers, or as active protesters and proponents of energy infrastructures."); Jasanoff & Kim, supra note 136, at 189 ("[R]adical changes in the fuel supply are likely to transform social infrastructures, changing established patterns of life and work and allocating benefits and burdens differently from before."); Clark A. Miller & Jennifer Richter, Social Planning for Energy Transitions, 1 Current Sustainable Renewable Energy Rep. 77, 78 (2014) ("[T]he rise of new energy resources (or the end of old ones) can give rise to massive reconfiguration of social, environmental, and technological landscapes . . . ."); Andre Silveira & Paul Pritchard, Univ. of Cambridge Inst. for Sustainability Leadership, Justice in the Transition to a Low Carbon Economy (2016) (unpublished working paper), http://www.cisl.cam.ac.uk/publications/publication-pdfs/justice-in-the-transition-to-a-low-carbon-economy.pdf [http://perma.cc/CPY8-VNQT] ("A more explicit consideration of justice issues in the transition to a low carbon economy is increasingly called for by both governmental and civil society actors in national and international fora.").

sections that follow contend that state politics present a better avenue for this determination than quasi-private, regional electricity markets.

B. *State Policies as Reflections of the Social Project of Decarbonization*

Although no state has embraced a vision of decarbonization near either extreme described above, state responses to climate change similarly evince an understanding of the significant political and value choices bound up in decarbonization policy.

Take, for example, state variations in RPSs, which demonstrate preferences for certain resources that are either locally abundant (for example, Maryland's chicken manure) or particularly desirable, but less economically competitive (for example, rooftop solar carve-outs).[148] In both of these instances, states have chosen to promote certain aims beyond "mere decarbonization"—that is, the lowest-cost decarbonization achievable.[149] By including chicken manure in its RPS, Maryland provided a potential additional stream of revenue to the state's many poultry farmers, while diverting nitrogen-rich poultry manure from running off into the Chesapeake Bay—a body of water that has faced significant problems of nitrogen overloading.[150]

By including solar and distributed generation carve-outs, states have prioritized controlling both the type and scale of their clean-energy build-out. A policy preference for distributed generation ensures that renewable energy built in a state will not all occur in large-scale, utility- or developer-led projects that consume open space. Instead, some of it will be located on the roofs and in the yards of state residents, providing them additional income streams and creating opportunities for new businesses to emerge in the electricity sphere.[151] A built-in preference for solar serves a different end: It ensures that all of a state's renewable energy will not come from the cheapest source—frequently wind—but instead that state policy will work to promote multiple renewable energy technologies.[152]

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148. See supra section I.B.

149. Indeed, even the choice of a renewables requirement—as opposed to a broader "clean energy" standard—illustrates a preference in this regard. Lincoln Davies catalogues the many "ancillary benefits" an RPS can bring. Davies, Power Forward, supra note 84, at 1357–59.

150. See Dep't of Legislative Servs. of Md. Gen. Assembly, Fiscal and Policy Note: S.B. 348, Renewable Energy Portfolio Standard—Tier 1 Renewable Source—Poultry Litter 4–5 (2008), http://mlis.state.md.us/2008rs/fnotes/bil_0008/sb0348.pdf [http://perma.cc/VRQ8-L9GB].

151. See, e.g., Community Energy Solar, http://communityenergysolar.com/about [http://perma.cc/73SW-BEUM] (last visited Feb. 15, 2018) (noting that the company focuses on community solar development).

152. See, e.g., About the Solar Carve-Out Program, Mass. Exec. Office of Energy & Envtl. Affairs, http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/rps-solar-carve-out/about-the-rps-solar-carve-out-program.html [http://perma.cc/

Direct procurement policies for particular resources serve a similar purpose: They signal a commitment to developing a certain local clean-energy industry. Massachusetts politicians celebrated the state's 2016 legislation mandating offshore wind on this ground, proclaiming, for example: "What we have here, as opposed to an amorphous bill of clean energy generally or greenhouse gases generally, is a specific technology—an offshore wind economy—that we're hoping to jump start and we have real incentives in place to make that happen."[153]

New York tells a similar story about its ZEC program for nuclear energy. The New York Public Service Commission asserts that without support for nuclear, it would be exceedingly difficult for the state to accomplish its RPS goal of 50% renewables by 2030.[154] Although nuclear power does not count towards this 50% goal, "[i]f the nuclear plants were to retire before the renewable build-out occurs, the resulting gap in the state's power supply would lead to a surge in [greenhouse gas] emissions as fossil-fuel-fired generators fill that gap."[155] Accordingly, the Commission has designed the ZEC as a time-limited measure to assist the state in meeting its long-term decarbonization targets.[156] It also decided to provide nuclear energy a fixed level of support, pegged to predicted wholesale market prices, rather than allow it to receive the fluctuating, often more generous prices awarded to renewables.[157] Illinois is even

SQ6J-56ZD] (last visited Jan. 18, 2018) (articulating multiple goals for Massachusetts's solar carve-out program, including cultivating a long-term solar market in the state and encouraging build-out of systems of various sizes, including residential, commercial, and utility-scale).

153. Elise Harmon, In 2016, Massachusetts Passed a Landmark Renewable Energy Bill—Here's What You Need to Know, New Eng. Climate Change Rev. Blog (Dec. 19, 2016) (quoting Robert Fitzpatrick, director of government affairs for the Massachusetts Clean Energy Center), http://www.northeastern.edu/climatereview/?p=294 [http://perma.cc/C4E3-4VKK]; see also Press Release, Governor Charlie Baker, Governor Baker Signs Comprehensive Energy Diversity Legislation (Aug. 8, 2016), http://www.mass.gov/governor/press-office/press-releases/fy2017/governor-baker-signs-comprehensive-energy-diversity-law.html [http://perma.cc/5D3C-H2P3] (discussing a commitment to "providing residents and businesses with a . . . reliable clean energy future").

154. Memorandum of Law in Support of Defendants' Motion to Dismiss Complaint Pursuant to Fed. R. Civ. Pro. 12(b)(6) at 3–5, Coal. for Competitive Elec. v. Zibelman, 272 F. Supp. 3d 554 (S.D.N.Y. 2017) (No. 16-CV-8164 (VEC)), 2016 WL 10076867.

155. Id.

156. The ZEC expires, at least under current plans, in 2029. Clean Energy Standard Order, supra note 99, at 156.

157. Whereas nuclear energy receives $17.50 per megawatt hour under the ZEC plan, renewables in 2017 were compensated at the rate of around $21 per megawatt hour. Compare id. at 20, with 2018 Compliance Year, N.Y. State Energy Res. & Dev. Auth. (NYSERDA), http://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/REC-and-ZEC-Purchasers/2018-Compliance-Year [http://perma.cc/4C2G-NQPN] (last visited Mar. 21, 2018). The price awarded to renewables has fallen to $17 per megawatt hour for 2018, supra 2018 Compliance Year, but is likely to rebound in the coming years, as New York rapidly increases the stringency of its utilities' renewable purchasing obligations. See REC and ZEC Purchasers, N.Y. State Energy Res. & Dev. Auth., http://www.nyserda.ny.gov/All-

more explicitly far-reaching in the aims of its ZEC program: The title of its governing legislation is the "Future Energy Jobs Bill," and leaders in the state have touted the ZEC program for its job-preserving potential.[158]

Each of these policies reflects decisions by state actors—either the legislature or the commission in charge of electricity—to pursue courses of decarbonization that focus on goals beyond the most efficient removal of carbon.[159] They want their decarbonization policies to also create new local industries and jobs, provide new ways for consumers to produce energy close to home, solve contemporaneous environmental challenges, preserve open space and utilize abandoned lots or existing structures, and stabilize energy prices and air emissions during a period of dramatic transition.

C. *Is It All Just Rent Seeking?*

It is not difficult to conjure up a public-choice-minded skeptic's swift reaction to my argument: social project? These state policies are all just examples of successful rent seeking, in which certain powerful industries are benefitting to the detriment of the people of the state![160] A proponent

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Programs/Programs/Clean-Energy-Standard/REC-and-ZEC-Purchasers [http://perma.cc/DXT9-2QYJ] (last visited Mar. 21, 2018) (detailing New York's increasing "Tier 1 REC" purchase requirements from 2018 through 2021).

158. See Governor Bruce Rauner Signed the Future Energy Jobs Bill, Bruce Rauner, http://www.brucerauner.com/news/governor-bruce-rauner-signed-the-future-energy-jobs-bill/ [http://perma.cc/MZH4-4FYR] (last visited Feb. 15, 2018) (observing that the bill saves "thousands of good-paying jobs").

159. New York made this point most poignantly in its filings for the FERC conference on integrating markets and public policy: "Incorporating a single policy goal into the federal wholesale markets may seemingly help reach that one goal, but may frustrate the multilayered approach carefully designed by the State and reflects a misunderstanding and oversimplification of a State's multi-faceted policy framework." Scott A. Weiner, N.Y. State Pub. Serv. Comm'n, Pre-Technical Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 4 (2017) [hereinafter Weiner, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426150501-Weiner,%20NY%20State%20DPS.pdf [http://perma.cc/2TC2-2F6U].

160. "Public choice models . . . treat the legislative process as a microeconomic system in which 'actual political choices are determined by the efforts of individuals and groups to further their own interests; these efforts have been labeled 'rent-seeking.'" Daniel A. Farber & Philip P. Frickey, The Jurisprudence of Public Choice, 65 Tex. L. Rev. 873, 878 (1987) (quoting Gary S. Becker, A Theory of Competition Among Pressure Groups for Political Influence, 98 Q.J. Econ. 371, 371 (1983)) (describing but not endorsing these models). For more on public choice theories of legislation and regulation, see Mancur Olson, The Logic of Collective Action: Public Goods and the Theory of Groups 141–48 (1965) (discussing "special interest" theory and business lobbies); Martin Gilens & Benjamin I. Page, Testing Theories of American Politics: Elites, Interest Groups, and Average Citizens, 12 Persp. Pol. 564, 566 (2014) ("A quite different theoretical tradition argues that U.S. policy making is dominated by individuals who have substantial economic resources, i.e., high levels of income or wealth—including, but not limited to, ownership of business firms."); Mathew D. McCubbins et al., Administrative Procedures as Instruments of Political Control, 3 J.L. Econ. & Org. 243, 243 (1987) ("A central problem

of the rent-seeking hypothesis might suggest that most of the state policies detailed in this Article are deviations from the most efficient way to decarbonize, which would be to simply put a price on carbon.[161] These deviations might be the result of successful lobbying on the part of particular clean-energy industries—including nuclear, wind, and solar—which have secured for themselves premium prices for their particular type of clean energy at the expense of ratepayers, who are largely unorganized, politically powerless players in these debates.

It is certainly important not to be naïve about the motivations behind state climate policies. To respond to these concerns, this section makes two brief points. First, this Article's argument does not turn on a rejection of public choice theory or on proof that harmful rent seeking is absent from state climate policy. Public debate and public churn about the aims and methods of decarbonization are valuable *even if* they sometimes result in certain industries getting a boost. Unjustified rent seeking can be (and is being[162]) contested through the courts and in the theater of public debate. In contrast, utilizing RTO governance structures and energy markets as the locus for debating, hashing out, and implementing decarbonization policy shunts these debates to much more private, inaccessible quarters—*without* eliminating the distinct possibility of rent seeking also occurring in those forums.[163]

Second, it is not clear that state decarbonization policy preferences can easily be shrugged aside as examples of problematic rent seeking. To be sure, some of these state policies appear to favor certain industries. But in the case of the most dominant state policy, RPS, it is more fledgling solar and wind developers who stand to benefit most—at the expense of established fossil fuel companies. That's hardly a predictable outcome under a public choice explanation of the companies most likely to hold sway with government. The same holds true for numerous other state policies that work against incumbent utility interests.[164] The case of

of representative democracy is how to ensure that policy decisions are responsive to the interests or preferences of citizens."); Richard A. Posner, Theories of Economic Regulation, 5 Bell J. Econ. & Mgmt. Sci. 335, 341–42 (1974) (discussing some versions of the "capture theory"); George J. Stigler, The Theory of Economic Regulation, 2 Bell J. Econ. & Mgmt. Sci. 3, 3 (1971) (discussing the power of industries to influence and shape regulation for their own benefit).

161. See infra note 183 and accompanying text.

162. See infra section III.C (discussing lawsuits against state policies).

163. On RTO governance processes, see infra section III.B.

164. See Elias L. Quinn & Adam L. Reed, Envisioning the Smart Grid: Network Architecture, Information Control, and the Public Policy Balancing Act, 81 U. Colo. L. Rev. 833, 869–79 (2010) (explaining utilities' mixed motivations when it comes to introducing smart grid technologies); Michael P. Vandenbergh & Jim Rossi, Good for You, Bad for Us: The Financial Disincentive for Net Demand Reduction, 65 Vand. L. Rev. 1527, 1531–34 (2012) (explaining why utilities are so opposed to reducing demand); see also Peter Kind, Energy Infrastructure Advocates, Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business 17 (2013), http://www.ourenergypolicy.org/wp-content/uploads/2013/09/disruptivechallenges-1.pdf [http://

ZEC programs for nuclear may seem to better conform to a classic public choice account of a large corporation persuading lawmakers to give it special treatment. Even there, though, the supporters of the policy defy simplistic explanation—the ZEC program divided the environmental community, with many groups coming out in support of it.[165] This division suggests that many saw ZECs as productively serving decarbonization goals.

Moreover, even accepting that some rent seeking may be at work in these policies, it might not be *bad* rent seeking.[166] Scholars have posited several ways in which policy mechanisms that favor certain groups may produce more efficacious or efficient outcomes than neutral policies. Professor Eric Biber has made the case that when it comes to climate change, state policies that build interest-group support may create "political momentum" that prevents backsliding and allows for a gradual ratcheting up of the ambition of climate policies.[167] Similarly, Professor Zach Liscow and Quentin Karpilow argue that when government's goal is to encourage innovation—as it is in the realm of decarbonization—state policies that "specifically encourage cleantech" may be *more efficient* than technology-neutral policies like a carbon tax.[168] As a separate justification,

perma.cc/6ADJ-TKZJ] (setting forth utility concerns with the popular policy of "net metering" to promote rooftop solar).

165. Clean Energy Standard Order, supra note 99, at 53 (noting "comments among environmental groups are divided").

166. Many scholars have remarked on the indeterminacy of the concept of "rent seeking"—one person's "rent" is another person's social-welfare gain. Mark Kelman, On Democracy-Bashing: A Skeptical Look at the Theoretical and "Empirical" Practice of the Public Choice Movement, 74 Va. L. Rev. 199, 227 (1988) ("When public choice theorists observe that the political process is an arena of 'rent-seeking,' they are being so conceptually ambiguous in their condemnation that they have simply muddied our discourse."); Daryl J. Levinson, Foreword: Looking for Power in Public Law, 130 Harv. L. Rev. 31, 119 (2016) (describing the difficulty of constructing a persuasive "normative account of how much political power various groups should rightly possess [and] setting a baseline from which to measure disproportionate influence"); see also Farber & Frickey, supra note 160, at 896 ("[A] finding of differential impact often can be effectively challenged. Researchers disagree, for example, over whether trucking regulation benefited owners, drivers, or both.").

167. Eric Biber, Cultivating a Green Political Landscape: Lessons for Climate Change Policy from the Defeat of California's Proposition 23, 66 Vand. L. Rev. 399, 402 (2013); see also Jonas Meckling et al., Winning Coalitions for Climate Policy, 349 Science 1170, 1170 (2015) ("Green industrial policy creates and enhances low-carbon industries, which brings economic constituencies into coalitions for decarbonization, as well as giving feedback that drives progress toward more comprehensive climate policy."); Matthew Wansley, Virtuous Capture, 67 Admin. L. Rev. 419, 422–23 (2015) (arguing that "rent-seeking is not socially wasteful" when it allows "political actors . . . [to] use interest groups—by altering their power and incentives—to pursue public-interested regulatory goals").

168. Zachary Liscow & Quentin Karpilow, Innovation Snowballing and Climate Law, 95 Wash. U. L. Rev. 387, 403, 444 (2017) (asserting that "innovation spillovers," in which cleantech innovation builds on itself, "alone might justify government use of deployment subsidies" which "can help direct innovation flows . . . away from dirtytech and towards cleantech").

Professors William Boyd and Ann Carlson have made a federalism-based, "laboratories of democracy"–type argument for why we should want states to experiment with different ways to decarbonize.[169]

These scholars advance pragmatic arguments as to why state policies that favor certain pathways to decarbonization might make political or economic sense.[170] This Article's argument is broader: Any apparent rent seeking in these policies may be justified as a way to fulfill values related to decarbonization that go beyond efficiency.[171] When states establish climate change policies, they are—at least in part—channeling value judgments about how decarbonization should proceed.[172]

Emerging research suggests that the public has distinct preferences and value judgments related to decarbonization. In response to surveys and deliberative polls, individuals have expressed several values beyond pure economic efficiency they consider important in energy systems change, including "not wasting;" environmental protection; stability, reliability, and affordability; autonomy and freedom; and social justice and fairness.[173] These diverse values lead people to have strong preferences for certain technologies over others;[174] a concern for low-income protections

169. See Boyd & Carlson, supra note 6, at 817; see also N.Y. State Pub. Serv. Comm'n v. N.Y. Indep. Sys. Operator, Inc., 158 FERC ¶ 61,137 (Feb. 3, 2017), 2017 WL 496267, at *12 (Bay, Comm'r, concurring) (celebrating state laboratories for their ability to "incentivize the development of needed energy infrastructure, the deployment of innovative technologies, or the establishment of Renewable Portfolio Standards").

170. Professor Rossi has recently advanced the argument that state decarbonization policies "can better promote efficiency and social welfare by aligning the features of internal customer subsidies with the same principles that would inform design of a carbon tax." Rossi, Carbon Taxation, supra note 8, at 279. This suggestion works if indeed the state views efficiency as a good measure of social welfare. But if a state determines that other aims trump efficiency, then it might be perfectly justified in choosing policies that deviate substantially from a carbon tax.

171. Cf. Mark Sagoff, Economic Theory and Environmental Law, 79 Mich. L. Rev. 1393, 1396–97 (1981) (explaining how many of our laws appropriately reflect preferences for ends other than efficiency); Spence, Naïve Energy Markets, supra note 37, at 1024 (suggesting that Americans are interested in fairness and protection from market failure in addition to efficiency maximization).

172. The democratic link might appear weaker when agencies—rather than legislatures—make decisions about the shape of decarbonization policy. There is, however, a literature suggesting that agencies might be better positioned in some ways to adopt democratically determined preferences. See Jerry L. Mashaw, Greed, Chaos, and Governance: Using Public Choice to Improve Public Law 37 (1999); Mark Seidenfeld, A Civic Republican Justification for the Administrative State, 105 Harv. L. Rev. 1512, 1515 (1992); David B. Spence & Frank Cross, A Public Choice Case for the Administrative State, 89 Geo. L.J. 97, 101–02 (2000).

173. Butler et al., Public Values, supra note 147, at 667.

174. Professor Dirk Scheer and his coauthors find a strong preference for renewable energy over fossil fuel generation combined with "carbon capture and storage." Dirk Scheer et al., Public Evaluation of Electricity Technologies and Future Low-Carbon Portfolios in Germany and the USA, 3 Energy, Sustainability & Soc'y, no. 8, 2013, at 1; see also Butler et al., Public Values, supra note 147, at 670 (describing "public visions" as "converg[ing] with policy on some of the key areas, specifically reductions in fossil fuels,

and bill stability over "affordability" as a general metric;[175] skepticism about market mechanisms over regulatory approaches;[176] and a desire to "be heard" on energy system preferences.[177]

Many of these same preferences emerge in state decarbonization policies—for example, in concerns over who is benefited and who is burdened by particular policies, in the widespread tendency to favor the promotion of renewable energy above nuclear energy, and in many states' particular emphasis on individuals' ability to choose their own energy supply. State policies on decarbonization, then, can be seen as attempts to capture the "messy, pluralistic, and pragmatic" goals associated with the social project of decarbonization and to give voice to community judgments regarding the desired shape of our future decarbonized society.[178] Responding to and incorporating these preferences helps a state maintain broad citizen support for its decarbonization initiatives. Without this support, passing the laws necessary to reach "deep decarbonization" levels of carbon mitigation will be all the more difficult.

Of course, there is no guarantee that state policies are accurately channeling residents' preferences in these regards.[179] Indeed, I have argued elsewhere that energy law should pay more attention to how citizen preferences are generated, understood, and incorporated into decisionmaking around decarbonization.[180] Nevertheless, one need not

increases in RETS . . . , and the need for reductions in demand"); Demski et al., supra note 147, at 59–60, 66 (finding a strong public preference, through deliberative workshops, among U.K. residents for "micro-generation technologies"); Nick Pidgeon & Christina C. Demski, From Nuclear to Renewable: Energy System Transformation and Public Attitudes, 68 Bull. Atomic Sci. 41, 42 (2012) (describing preference for nuclear over wind in one Welsh county).

175. See Butler et al., Public Values, supra note 147, at 669 (finding that the group studied was more concerned with "subsidies for low income households and developments to ensure cost stability over and above lowest cost possible").

176. Id. at 670.

177. Shelley Welton, Grasping for Energy Democracy, 116 Mich. L. Rev. 581, 585–87 (2018) [hereinafter Welton, Grasping for Energy Democracy] (documenting the growing demands of citizen groups focused on "energy democracy" to be included in the creation of energy regulation); see also Leslie Mabon et al., Deliberative Decarbonisation? Assessing the Potential of an Ethical Governance Framework for Low-Carbon Energy Through the Case of Carbon Dioxide Capture and Storage, 33 Envt. & Plan. C: Gov't & Pol'y 256, 258–59 (2015) (suggesting that current governance processes for decarbonization suffer from "epistemic injustice" in the ways that "particular technologies come to be conceived as solutions to the problems of climate change").

178. See Kysar, supra note 38, at 3, 15–16 (making the argument that these characteristics have always described the diverse goals of environmental policymaking).

179. Cf. Gilens & Page, supra note 160, at 565 (finding that "mass-based interest groups and average citizens have little or no independent influence" on U.S. government policy, but also observing that these policies track their preferences "roughly two-thirds of the time").

180. See Welton, Grasping for Energy Democracy, supra note 177, at 586 (identifying three emerging conceptions of what "energy democracy" might entail, including consumer choice, local control, and access to process).

have perfect faith in state democracies[181] in order to accept the central argument of this Article, which is one of *comparative* institutional competence.[182] The choices currently on the table for states pursuing decarbonization are either (1) maintain robust state public policies as a way to establish the contours of decarbonizing electricity or (2) transfer central responsibility for ensuring decarbonization to regional electricity markets. The next Part describes why regional electricity markets are a troublesome mechanism for accomplishing the social project of decarbonization.

III. ELECTRICITY-MARKET REDESIGN TO ACCOMPLISH THE PROJECT OF DECARBONIZATION

Almost every academic (myself included) prefers that policies to address climate change include some sort of national carbon tax or cap-and-trade scheme.[183] Putting a price on carbon is theoretically appealing because of its potential breadth, simplicity, and efficiency.[184] Most states

181. Nor should one: Several recent articles do excellent work in reminding us why we should not "put state democracy on a pedestal." See David Schleicher, Federalism and State Democracy, 95 Tex. L. Rev. 763, 767–68 (2017) (arguing state and local elections often "have little to do with anything that *ought to* matter—like the past performance of state government, or candidates' positions on issues in front of the state or local governments"); Miriam Seifter, Further from the People? The Puzzle of State Administration, 93 N.Y.U. L. Rev. (forthcoming 2018) (manuscript at 3) (on file with the *Columbia Law Review*) (discussing the role of civil society oversight at the state level and finding that "state agencies are, on the whole, less transparent than their federal counterparts, less closely followed by watchdog groups, and less tracked by the shrinking state-level media"); see also Jim Rossi, The Electric Deregulation Fiasco: Looking to Regulatory Federalism to Promote a Balance Between Markets and the Provision of Public Goods, 100 Mich. L. Rev. 1768, 1782 (2002) (book review) (arguing that state regulatory processes are more amenable to capture than federal regulatory processes).

182. Cf. Komesar, supra note 21, at 3–4 (arguing that "institutional choice is an essential part of law and public policy choice" and advocating for a "participation-centered" framework for "*doing* comparative institutional analysis").

183. There is, however, debate regarding whether carbon pricing should be supplemented with additional policies. See Ann E. Carlson, Designing Effective Climate Policy: Cap-and-Trade and Complementary Policies, 49 Harv. J. on Legis. 207, 207 (2012) (exploring issues of complementarity and competition between economy-wide carbon policies and more targeted strategies). My argument here regarding the "social nature" of the project of decarbonization leads me to conclude that supplementary policies are desirable to the extent that a polity wants to control the shape of decarbonization.

184. See Liscow & Karpilow, supra note 168, at 457–63 (collecting sources in favor of carbon pricing); see also Peter Howard & Derek Sylvan, Inst. for Policy Integrity, Expert Consensus on the Economics of Climate Change 2 (2015), http://policyintegrity.org/files/publications/ExpertConsensusReport.pdf [http://perma.cc/DE98-N2RW] (reporting survey results showing that 75% of expert economists favor a market-based mechanism for carbon); Jerry Taylor, Niskanen Ctr., The Conservative Case for a Carbon Tax 3–10 (2015), http://niskanencenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf [http://perma.cc/K8LE-Z9Q8] (arguing that the alternative to a carbon tax "is a plethora of command-and-control regulatory interventions," which already "impose a sort of carbon tax").

with robust decarbonization policies also support some sort of national carbon-pricing scheme, particularly one that would allow them to pursue additional side policies to address their citizens' decarbonization preferences.[185] Despite its theoretical appeal, however, such a scheme is a political pipe dream in the near term.[186]

In its place, proponents have advanced the idea of addressing decarbonization within regional electricity markets as a compromise measure. Although covering less of the country and less of the economy than a federal carbon price, including decarbonization aims in electricity markets still holds some advantages over state-by-state efforts. The many parties in favor of using markets to achieve decarbonization goals argue that market incorporation represents the most feasible way, in the current political climate, to efficiently decarbonize.[187] At the same time, they suggest, incorporating state climate goals into markets would help control the purported damage that variegated state climate policies do to regional electricity markets.[188]

This Part first describes leading proposals for how to achieve state climate goals through RTO markets and the governance processes these proposals would have to go through. It then advances three reasons why the compromise measure of achieving decarbonization through electricity markets is a risky substitute for robust, democratically determined action on climate change. In brief, these reasons are that (1) procedurally, given RTO governance structures, using these market constructs to achieve climate goals would remove decisions over decarbonization further from the public view and democratic oversight; (2) substantively, incorporating climate goals into regional electricity markets would homogenize and water down state preferences; and (3) recent Supreme Court precedent creates a risk that once states cede control over decarbonization to an RTO, they may give away some ability to adopt supplementary policies to strengthen or shape the trajectory of their decarbonization efforts.

185. Most states do not, however, favor allowing federal policy to preempt supplementary state policies. See Memorandum from Mary D. Nichols, Cal. Air Res. Bd. et al., to Senators Kerry, Graham, & Lieberman (Mar. 30, 2010) (on file with the *Columbia Law Review*) (arguing that federal climate legislation should "establish a national carbon market and include national programs, while preserving states' rights to implement their own climate policies").

186. See, e.g., Timothy Cama, Trump Brings Big Changes to Climate Policies, The Hill (Feb. 10, 2017), http://thehill.com/policy/energy-environment/318824-trump-brings-big-change-to-climate-policies [http://perma.cc/SV8N-JM7F] (discussing the Trump Administration and Republican Congress's climate policies, which largely favor limiting regulations and enacting measures to "unwind Obama-era rules on energy").

187. See infra notes 197–199.

188. See supra section I.C.

A. *Proposed Market Reforms to Achieve State Policies*

Stakeholders have proposed two predominant reforms to incorporate state climate aims into regional electricity markets. The first is for electricity markets to create their own carbon-pricing systems, analogous to a carbon tax. Thus, for example, certain stakeholders in New England's RTO have proposed the following scheme:

> Under a carbon pricing system, each electricity producer would pay an emissions fee in direct proportion to the amount of carbon (in tons) its generation facilities emit. The carbon emissions price (that is, the fee per ton emitted) could be fixed, be a set price schedule that increases over time, or be dynamically adjusted based on aggregate performance over time to satisfy specific carbon reduction objectives.[189]

PJM—the mid-Atlantic RTO—has proposed a similar scheme, suggesting a carbon-pricing system might also be pursued by a subset of the region interested in a carbon price, should the entire region prove unable to reach agreement.[190] And New York's RTO has also come out in favor of a carbon-pricing scheme in that single-state market.[191] New York's proposal focuses on using the (now-defunct, federal[192]) "social cost of carbon" to create a "carbon adder" for each generator based on its carbon emissions.[193] "This fee would be added to the prices generators bid into the wholesale electricity market and those adjusted prices used by NYISO to determine the dispatch order."[194]

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189. ISO New England, NEPOOL 2016 IMAPP Proposals: Observations, Issues, and Next Steps 2 (2017) [hereinafter ISO-NE Proposal], http://www.iso-ne.com/static-assets/documents/2017/03/iso-ne_jan_2017_imapp_memo_vtransmit2.pdf [http://perma.cc/2354-QND3]. The ways in which this scheme would interact with the current carbon-pricing regime in the New England region are discussed in section IV.B.

190. PJM, Advancing Zero Emissions Objectives Through PJM's Energy Markets: A Review of Carbon-Pricing Frameworks 1 (2017) [hereinafter PJM, Advancing Zero Emissions Objectives], http://pjm.com/~/media/library/reports-notices/special-reports/20170502-advancing-zero-emission-objectives-through-pjms-energy-markets.ashx [http://perma.cc/J9B9-4N5X].

191. See Bradley C. Jones, President & CEO, N.Y. Indep. Sys. Operator, Inc. (NYISO), Pre-Technical Conference Comments at the FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 4 (2017), http://www.ferc.gov/CalendarFiles/20170426150524-Jones,%20NYISO.pdf [http://perma.cc/C3W3-BV88].

192. See supra note 101.

193. Justin Gundlach & Romany Webb, Sabin Ctr. for Climate Change Law, Columbia Law Sch., Carbon Pricing in New York ISO Markets: Federal and State Issues 31 (2017), http://columbiaclimatelaw.com/files/2017/02/Gundlach-Webb-2017-02-Carbon-Pricing-in-NYISO-Markets.pdf [http://perma.cc/P79H-2NQB].

194. Id. at iii–iv; see also Samuel A. Newell et al., The Brattle Grp., Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals, at v–vii (2017), http://www.nyiso.com/public/webdocs/markets_operations/documents/Studies_and_Reports/Studies/Market_Studies/Pricing_Carbon_into_NYISOs_Wholesale_Energy_Market.pdf [http://perma.cc/8WRM-EJPU].

A separate set of proposals focuses on using RTOs to run centralized, market-based procurement processes specifically for clean energy. Thus, for example, an RTO might create a "Forward Clean Energy Market," in which the market operator would solicit contracts for future commitments of low- or no-carbon resources in an annual auction.[195] This model would, in essence, amalgamate the various state RPSs in a region and attempt to satisfy them all at the same time and at the lowest cost. Such a scheme would also guarantee renewables a certain amount of revenue into the future, helping to create the certainty necessary to obtain project financing.[196]

Proponents of these reforms include many clean-energy as well as fossil-fuel generators,[197] well-regarded market analysts,[198] and several states and environmental groups.[199] There is an obvious reason for this

195. See ISO-NE Proposal, supra note 189, at 4–5.

196. Id.

197. See, e.g., Aleksandar Mitreski, Senior Dir., Regulatory Affairs, Brookfield Renewable, Panel 2: Stakeholder's Perspective in ISO-NE (Apr. 26, 2017), http://www.ferc.gov/CalendarFiles/20170426150309-Mitreski,%20Brookfield%20Renewable.pdf [http://perma.cc/TS2G-98KR]; John E. Shelk, President & CEO, Elec. Power Supply Ass'n, Opening Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 2 (May 1, 2017) [hereinafter EPSA, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426150649-Shelk,%20EPSA.pdf [http://perma.cc/8C3L-BFTK] ("States have an important role to play given that the FPA reserves retail jurisdiction to States . . . . However, it is *critical* that federal and state authorities be exercised within the law and in concert to achieve federal and state policy objectives consistent with well-functioning wholesale power markets."); NRG Energy, FERC Technical Conference, supra note 120, at 1–2 ("The uniform American experience is that competition drives down prices, increases quality of service, and encourages technical innovation.").

198. See, e.g., Samuel A. Newell, Principal, Brattle Grp., Comments at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 2 (Apr. 25, 2017) [hereinafter Brattle Group, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426151703-Newell,%20The%20Brattle%20Group.pdf [http://perma.cc/X6VM-3XCT] ("Harnessing competition will be critical for spurring innovation and guiding technology choices to help meet environmental and reliability objectives cost effectively. The centralized wholesale markets can best orchestrate this kind of competition if they are enhanced to incorporate the states' decarbonization objectives.").

199. See Erwin, FERC Technical Conference, supra note 113, at 5 ("FERC should investigate placing value on the avoided externalized costs of non-emitting generation resources."); Andrew G. Place, Vice Chairman, Penn. Pub. Util. Comm'n, Pre-Technical Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 3–4 (Apr. 25, 2017), http://www.ferc.gov/CalendarFiles/20170426150811-Place,%20Pennsylvania%20PUC.pdf [http://perma.cc/B6LM-WC45] (lauding the potential efficiencies of these solutions); Angela M. O'Connor, Chairman, Mass. Dep't of Pub. Util., Pre-Technical Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 4 (Apr. 2017), http://www.ferc.gov/CalendarFiles/20170426150007-O'Connor,%20Massachuetts%20DPU.pdf

broad-based support: Pricing carbon into electricity markets should help to achieve electricity-sector carbon-emissions reductions more efficiently, since a market price drives innovation and doesn't predetermine winners.[200] Similarly, having a market scheme procure all of a region's renewable-energy demand would be a more efficient way to meet state RPSs than having each state's utilities go it alone.[201] As a substantive matter, then, the argument for subsuming state climate policies into markets is relatively straightforward: It offers a more efficient way to accomplish state public policy aims while keeping electricity prices as "just and reasonable" as possible. Relatedly, it avoids the need to constantly guard

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[http://perma.cc/JR4B-4FTR] ("Massachusetts . . . remains firmly committed to finding market-based solutions that can not only accommodate our currently effective statutory requirements in the short-term, but that can also provide market-based frameworks for accomplishing the Commonwealth's goals through the competitive markets on a long-term basis."). But not all states and environmental groups are on board—many have come out at least against certain types of market integration. See, e.g., Memorandum from New England States Comm. on Elec. to New England Power Pool, supra note 16, at 1 ("NESCOE confirms that it does not support an additional carbon pricing-style mechanism in furtherance of state laws . . . ." (footnote omitted)); Brien J. Sheahan, Chairman, Ill. Commerce Comm'n, Pre-Technical Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 3 (2017), http://www.ferc.gov/CalendarFiles/20170426150841-Sheahan,%20Illinois%20Commerce%20Commission.pdf [http://perma.cc/XFV8-BAUF] ("Illinois supports regional market design modifications that either complement or enhance state policy initiatives."); Robert B. Stoddard, Conservation Law Found., Prefiled Comments at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 3 (Apr. 2017), http://www.ferc.gov/CalendarFiles/20170426151751-Stoddard,%20Conservation%20Law%20Foundation.pdf [http://perma.cc/HJ8Z-2T4H] [hereinafter Conservation Law Found., FERC Technical Conference] (supporting a "carbon adder" but explaining that its "practical drawbacks" led the organization to "develop a supplementary financial instrument to address these deficiencies"). Note that NESCOE does support further exploration of a Forward Clean Energy Market. Memorandum from New England States Comm. on Elec. To New England Power Pool, supra, at 4.

200. See Liscow & Karpilow, supra note 168, at 389–97 (collecting sources making this argument); Jonas J. Monast et al., On Morals, Markets, and Climate Change: Exploring Pope Francis' Challenge, 80 Law & Contemp. Probs., no. 1, 2017, at 139 ("Incorporating externalities into the cost of production has the virtue of 'getting the price right' and moves the market toward the economically efficient outcome from a utilitarian social welfare maximization perspective, in which the price paid for a good reflects the full marginal cost of its production."); Brattle Group, FERC Technical Conference, supra note 198, at 3 ("The most market-oriented approach to implementing a decarbonization policy is to price carbon emissions.").

201. See Brattle Group, FERC Technical Conference, supra note 198, at 4 ("[C]lean energy markets would maximize competition and innovation by admitting new and existing resources of all clean technologies (although they still would not provide as broad a price signal as carbon prices)."); see also ISO-NE Proposal, supra note 189, at 4.

against potential market distortions caused by state public policies, thus maintaining predictable, well-functioning competitive markets.[202]

Despite widespread support, these proposals are not without challenges. One of these is legal—it is not clear that federally overseen electricity markets have the mandate to include environmental considerations within their dispatch models. As noted in the introduction, many excellent legal minds are engaged in this analysis.[203] A second challenge is less strictly legal in nature, although it implicates jurisdictional frictions. It is relatively clear what states might gain from integrating climate policies into regional electricity markets. But no action is without tradeoffs. What, then, do they stand to lose? The remainder of this Part tackles this question.

B. *How a Stakeholder Proposal Becomes a Tariff Provision: The Intricacies of RTO Governance*

To enact a regional decarbonization mechanism, a proposal would first have to clear complex RTO and FERC governance processes. RTOs are "Frankenstein like"[204] hybridized creatures, singular in their structure.[205] These organizations operate as not-for-profit corporations, governed by a board of directors and overseen by FERC.[206] Functionally, RTOs manage the day-to-day transfer of electricity across utility transmission lines, as

202. See, e.g., EPSA, FERC Technical Conference, supra note 197, at 2 (arguing that FERC should incorporate decarbonization policies into markets as the strategy most "consistent with investing private at-risk capital based on market price signals").

203. See supra note 35.

204. John P. Hughes, President & CEO, Elec. Consumers Res. Council (ELCON), Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 325 (May 2, 2017), http://www.ferc.gov/CalendarFiles/20170530122053-Transcript,%20May%202,%202017.pdf [http://perma.cc/R7MN-B7EZ].

205. Christina Simeone, Kleinman Ctr. for Energy Pol'y, PJM Governance: Can Reforms Improve Outcomes? 22 (2017) ("As organizations, RTO's are unique in structure, authority, and function."). To be sure, one might include RTOs in the larger category of "quasi-governmental institutions," but to group them there does little to illuminate their particular pathologies, which are of interest here. Cf. Osofsky & Wiseman, supra note 12, at 7 (describing the "inadequate jurisdictional authority, related concerns of overlapping or fragmented authority, and heavy involvement of private actors in energy governance" of RTOs).

206. See, e.g., PJM Interconnection, L.L.C., By-Laws § 2.1 (effective Dec. 1, 2009), http://www.pjm.com/~/media/documents/corp-docs/by-laws.ashx [http://perma.cc/R8LZ-DQZC] (establishing a PJM Board elected by PJM members to "manage the business and affairs of the Company"); see also California ISO (CAISO), Docket No. 16-RGO-01, Principles for Governance of a Regional ISO 9 (Oct. 7, 2016) ("PJM, MISO, and ISO-NE all have boards with nine voting members, while SPP has seven voting members."). Selection processes for the membership of RTO boards have been a matter of some controversy, but such controversy exceeds the scope of this Article. See Dworkin & Goldwasser, supra note 51, at 563–67 (reviewing issues that arise in selecting and terminating RTO boards).

well as coordinate electricity markets.[207] They exist only in those areas in which utilities have voluntarily ceded operational control of their transmission assets after obtaining the approval of their home states to do so.[208] Tariffs, by-laws, and operating agreements dictate the terms of RTO operations and governance, and the RTO board must file proposed changes in these documents with FERC for its approval.[209] In determining whether to approve an RTO's proposed changes, FERC evaluates whether they will further "just and reasonable" rates and avoid "unduly discriminatory or preferential" practices, after hearing from interested parties through a notice-and-comment procedure.[210]

Before a board can make such a request to FERC, any proposal must go through internal RTO-governance processes.[211] RTO boards solicit the opinions and expertise of stakeholders principally through topic-specific committees.[212] These committees ostensibly allow all stakeholders—persons with an interest in the market rules—to have their views considered.[213] But only "members" receive voting privileges.[214] Members are

207. See Regional Transmission Organizations, 65 Fed. Reg. 810, 813–15 (Dec. 20, 1999) (codified at 18 C.F.R. pt. 35).

208. See id. at 831 (describing the voluntary approach to RTO formation); see also Dworkin & Goldwasser, supra note 51, at 548 (explaining that RTOs are "between government and business"); Daniel Greenfield & John Kwoka, The Cost Structure of Regional Transmission Organizations, 32 Energy J. 159, 163 (2011) ("RTOs are unusual economic institutions. They are not-for-profit corporations that assume control and management of the bulk power transport systems of their member utilities, while the latter continue to own all of those assets.").

209. See 16 U.S.C. § 824d(c)–(d) (2012); see also N.J. Bd. of Pub. Utils. v. FERC, 744 F.3d 74, 83 (3d Cir. 2014) (explaining that "tariff" is "the term of art used to refer to the 'classifications, practices, and regulations' a public utility uses to establish electricity rates"); Simeone, supra note 205, at 9 (detailing PJM's governing documents).

210. 16 U.S.C. § 824e; see also Peskoe, supra note 35, at 10 (describing how FERC evaluates regional proposals).

211. Note that the description that follows of RTO governance is necessarily a broad sketch, since each region "has its own power and governance structure and each relies on its own particular language and terminology." Dworkin & Goldwasser, supra note 51, at 561. This Article attempts to capture their substantial similarities. See E4The Future, Inc., Regional Energy Markets: Do Inconsistent Governance Structures Impede U.S. Market Success? 3 (2016) (surveying RTO governance and finding "nearly all" of them follow a process like the one detailed here).

212. See Benjamin A. Stafford & Elizabeth J. Wilson, Winds of Change in Energy Systems: Policy Implementation, Technology Deployment, and Regional Transmission Organizations, 21 Energy Res. & Soc. Sci. 222, 230 (2016) (describing MISO's engagement with stakeholders).

213. Id. at 224 ("RTO stakeholders represent different interests, including owners of transmission assets, generation assets, power marketers, and environmental advocates as well as industrial energy load, energy market traders, state policy makers, and others.").

214. See E4The Future, Inc., supra note 211, at 3 (surveying RTO operating procedures and finding that "[w]hile many allow the public to participate in RTO/ISO business activities, most restrict who can fully participate in the stakeholder process by establishing paid membership requirements and allowing voting by members only").

predominantly transmission-owning utilities, generators, and other energy-market participants with financial stakes in market outcomes.[215]

Membership rules vary by RTO, but generally becoming a member requires establishing an interest in the operations of the market and paying annual membership dues.[216] Members are grouped by their interest in the markets, with weighted votes established by group.[217] Typically, a proposal for reform must obtain a super-majority vote by the members of a committee before it is recommended for the RTO board's consideration.[218]

RTOs also have structures in place for states to provide input into regional electricity-market governance. Most notably, this influence occurs via "regional state committees" comprised of state representatives (typically utility commissioners) from the states within the RTO's territory.[219] These committees supply feedback to RTO boards of directors on proposed tariff changes, which the boards take into account in deciding whether to recommend any changes to FERC. Such committees do not, however, have any formalized role in the RTO process—a source of consternation for some, given how important RTO governance is for state policy outcomes.[220]

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215. See Seth Blumsack et al., Can Capacity Markets Be Designed by Democracy?, Proc. of the 50th Haw. Int'l Conf. on Sys. Sci. 3075, 3076 (2017) (breaking down PJM's voting members into categories); About 60% of the U.S. Electric Power Supply Is Managed by RTOs, U.S. Energy Info. Admin.: Today in Energy (Apr. 4, 2011), http://www.eia.gov/todayinenergy/detail.php?id=790 [http://perma.cc/3WEG-MNS4] (explaining the types of members that RTOs have).

216. See, e.g., 4 Southwest Power Pool, Inc., Bylaws § 2.1 (effective Nov. 10, 2014), http://www.spp.org/documents/13272/current%20bylaws%20and%20membership%20agreement%20tariff.pdf [http://perma.cc/J9U5-XP4C] ("Qualifications: Membership in SPP is voluntary and is open to any . . . entity willing to meet the membership requirements, including execution of the Membership Agreement."). Some regions will waive dues for good cause. See, e.g., id. § 8.2 (effective Aug. 5, 2018).

217. See Dylan Reed & Arvin Ganesan, How Grid Governance Stands in the Way of Advanced Energy Progress, Advanced Energy Econ.: Advanced Energy Perspectives (Sept. 8, 2016), http://blog.aee.net/how-grid-governance-stands-in-the-way-of-advanced-energy-progress [http://perma.cc/RN5F-NGUG].

218. E4The Future, Inc., supra note 211, at 11 ("The voting thresholds in each stakeholder process require super-majorities in almost every situation."). PJM, for example, requires that pending motions be approved "by a 75 percent sector-weighted vote of the members present at the committee meeting, where each sector gets a 20 percent share of the vote." Id. at 6.

219. See Dworkin & Goldwasser, supra note 51, at 588–91 (describing these entities). For examples of regional state committees, see, e.g., Southwest Power Pool, Inc., supra note 216, § 7.2; Independent State Agencies Committee, PJM, http://www.pjm.com/committees-and-groups/isac.aspx [http://perma.cc/3J9K-S2PT] (last visited Jan. 19, 2018); New England States Committee on Electricity, http://nescoe.com [http://perma.cc/NSU6-B9N9] (last visited Jan. 19, 2018).

220. See Simeone, supra note 205, at 41 (recommending a more formal role for states in RTO governance); Dworkin & Goldwasser, supra note 51, at 588–91 (describing states' lack of formal influence at RTOs).

Despite these channels of input and influence, RTO boards remain "independent."[221] Thus, a board need not *formally* follow either members' majority preferences or state wishes. When it submits its final decisions to FERC, however, an RTO board frequently explains major deviations from members' recommendations.[222] In practice, then, it is substantially easier for a board to establish that a proposed change is "just and reasonable" if a substantial proportion of its members—and its members' states—so agree.[223] Members, states, or other stakeholders that continue to disagree with an RTO proposal can protest the changes during FERC's vetting process or ultimately through a lawsuit.[224] These protests can also be backed up by the more drastic measure of deciding to leave the RTO (in the case of member utilities)[225] or requiring their utilities to leave the RTO (in the case of states).

Any decision by an RTO to incorporate decarbonization objectives into market operations would occur through the process outlined above: An RTO board would determine—by a requisite margin of votes—that such changes would help to ensure "just and reasonable rates" and would file a petition with FERC to have such changes approved. FERC would then have the ultimate decision on whether including decarbonization in RTO market rules would in fact be "just and reasonable."[226] The remainder of this Part discusses the pathologies that might emerge from using this decisionmaking structure to achieve decarbonization aims.

C. *Resulting Challenges for RTO Control of Decarbonization*

Several characteristics of RTOs make them imperfect sites for decisions on the shape of decarbonization policies. This section details three particular flaws that should give states pause in ceding control over decarbonization policy to their RTOs: (1) RTO governance presents a diminished space for deliberative, democratic decisionmaking, as compared to state politics; (2) RTO-governance structures create a tendency

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221. See Wholesale Competition in Regions with Organized Electric Markets, 73 Fed. Reg. 64,099, 64,157 (Oct. 17, 2008) (codified at 18 C.F.R. pt. 35) (discussing the challenge of "balanc[ing] customers' and other stakeholders' need for effective access to the boards of RTOs and ISOs, with the need for the independent management of each RTO and ISO"); Stafford & Wilson, supra note 212, at 231 ("All stakeholder voting in MISO is considered 'advisory' in nature and MISO is not required [sic] follow stakeholder votes.").

222. See, e.g., E4The Future, Inc., supra note 211, at 4 (noting that when the New England RTO provides a proposal to FERC without unanimous stakeholder support, it must "explain in its filing why its proposal is superior").

223. See supra note 210 and accompanying text (discussing the standard by which FERC evaluates an RTO's proposed changes).

224. See 16 U.S.C. § 825l(b) (2012).

225. See Dworkin & Goldwasser, supra note 51, at 570 (arguing that members' ability to "vote with [their] feet" threatens RTO independence, as RTOs "desire to retain participants and geographic spread").

226. See 16 U.S.C. § 824d.

for policies to become homogenized and watered down when adopted at the regional level; and (3) the jurisdictional frictions created by *Hughes* pose a risk that states may diminish their own tools for controlling decarbonization if they cede the same functions to their RTOs.

1. *A Loss of Public Procedure.* — The first challenge of RTO control over decarbonization policies has to do with RTOs' governance structure, and in particular, the relative sway of various stakeholders and members within RTO governance. Many suspect that stakeholders with assets managed by the RTO—that is, transmission owners—have outsized influence, given that they can wield the threat of leaving the RTO should they be dissatisfied with a change in the governing rules.[227] Similarly, although "membership" is not limited to these asset holders, weighted voting by membership sector can stack the deck against public interest organizations or those without a strong foothold in the industry.[228]

Moreover, even if the stakeholder-committee processes were viewed as fair, participation in them would still be challenging. In a recent study that interviewed numerous participants in RTO governance, the tenor of many responses was along the following lines: To participate successfully, "you have to be a combination of an economist and a math wizard."[229] Others observed that the sheer quantity of stakeholder meetings at RTOs makes it impossible for smaller, less resourced organizations to participate.[230]

These challenges point to the first key risk of shunting decarbonization policy into RTOs: They offer considerably less transparent, only quasi-public frameworks in which to make these critically important decisions. Although RTO-governance processes *nominally* give boards independent decisionmaking power (a structure that itself already lessens public accountability), their membership rules and the weight that FERC gives to stakeholder opinions—both as a matter of law and practice—dampen this independence.[231] Thus, if RTOs take over decarbonization

227. See, e.g., American Municipal Power, FERC Technical Conference, supra note 112, at 2 (suggesting the "rules churn" at PJM provides "a cloak for 'gaming' behavior"); see also, e.g., Dworkin & Goldwasser, supra note 51, at 561–62 (noting stakeholder worries that RTOs are not as independent as they should be); Kavulla, supra note 56 (suggesting that "usually . . . moneyed 'stakeholders' get their way"); Kenneth Rose, Trouble in Market Paradise: Development of the Regional Transmission Operator, 50 J. Econ. Issues 535, 536 (2016) (noting RTOs' stakeholders include "market participants" with "strong economic interest[s] in RTO rules and procedures").

228. See Blumsack et al., supra note 215, at 3083 ("[T]here may be limits to the degree to which organizations like RTOs can create mechanisms for heterogeneous stakeholders with opposing interests to develop passable market rules and protocols.").

229. Stafford & Wilson, supra note 212, at 230; see also id. (quoting a respondent describing these processes as "a world of acronyms" in which it is easy to get lost).

230. Id. at 231 (quoting a respondent to highlight the multitude of RTO stakeholder meetings which often occur at overlapping times).

231. See Dworkin & Goldwasser, supra note 51, at 562, 570–71 (noting RTOs' need to "maintain relationships with . . . stakeholders").

policymaking, it will not be elected public officials or their appointed bureaucrats, but private companies, who will hold much of the power to determine the shape of these efforts.

Having expressed these concerns about stakeholder governance, it is important to acknowledge some limits on the extent to which private companies would shape RTO-led decarbonization efforts, particularly on the front end. No RTO is likely to proceed with decarbonization efforts without support from participating states, at least in the current legal and political climate.[232] States hold this sway because of another feature of RTOs: their explicit disengagement from creating new "policy."[233] RTO representatives maintain: "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."[234] Because RTOs eschew any role in determining what the "public interest" is, states retain what Professor Christina Simeone has described as "an incredible amount of power and influence" in shaping the interaction of public policies and markets.[235]

RTOs disclaim this policymaking function for both political and legal reasons. Politically, it would be substantially harder to convince states to let their utilities join or remain in RTOs if membership meant ceding state policymaking authority to this quasi-private entity. As a legal matter, imagine if an RTO were to include any sort of decarbonization requirement—such as a carbon price—that caused a state's utilities to pay extra for electricity. For states in which state decarbonization policy supported this change, a "just and reasonable" finding would be understandable—as noted above, pricing carbon in the market would likely help the state accomplish its aims at the lowest price possible. In contrast, for any state that did not have a policy in place that supported this extra payment, a carbon price might well be "unjust and unreasonable" because it would force the residents of the state to pay more for reasons unsupported by any state or federal policy.[236] Accordingly, any state that

232. In contrast, if significant national climate change policy reemerged, one could imagine an RTO basing its authority to integrate decarbonization goals on this legal requirement, rather than on state legal requirements.

233. Stafford & Wilson, supra note 212, at 229 (suggesting state-level policy dictates RTO policy).

234. Id.

235. Simeone, supra note 205, at 27.

236. See Robert R. Scott, Comm'r, N.H. Pub. Util. Comm'n, Pre-Technical Conference Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 2 (Apr. 25, 2017), http://www.ferc.gov/CalendarFiles/20170426150034-Scott,%20%20NHPUC.pdf [http://perma.cc/T5KY-CHX5] ("[S]tates like New Hampshire that have no legal mandate to reduce carbon emissions beyond RGGI are insistent that they pay none of the costs of implementing other states' policies."); see also Peskoe, supra note 35, at 34 & n.217 (explaining that to avoid this legal risk, "an RTO carbon adder should be designed to achieve compliance with public policies and not to mitigate environmental harms").

did not believe its underlying decarbonization policies justified its utilities' increased costs for wholesale power would have a strong legal claim to advance in front of FERC and the federal judiciary.

There is, in sum, a byzantine set of dynamics facing RTO efforts to integrate state decarbonization aims. RTOs would be unlikely to request such changes in their tariffs unless both stakeholder committees—via super-majority vote—and all states in a region endorsed the request. FERC, similarly, would be unlikely to approve the request if any state felt it unfairly required its customers to pay for more decarbonization than state law mandated. Not only would all of these negotiations occur deeper in the shadows than does state climate change policymaking, but this de facto near-consensus procedural requirement would also likely have troubling substantive impacts, discussed in the following section.

2. *Homogenization and the Watering Down of Preferences.* — The second challenge with using RTOs to achieve state decarbonization aims is that their structure and legal mandate leaves them with a diminished set of policy tools as compared to states. Accordingly, the use of these markets to achieve state goals would likely entail both homogenization and watering down of state preferences.

The more drastic homogenizing force would come from imposition of a carbon price, which would require substantial regional agreement across a range of topics. The entire theory behind a carbon-pricing scheme is that it eliminates aims beyond the cheapest decarbonization achievable.[237] Away would go state preferences for particular types of clean energy, particular locations or scales, or broad-based inclusion or redistribution as a part of decarbonization policy (except to the extent that states continued to pursue these goals through separate, state-specific side policies).[238]

Moreover, states would also have to homogenize their timing and targets for decarbonization. In order for a carbon price to work, there would likely have to be a single price throughout a region.[239] Setting this price would be challenging, given the divergent state decarbonization targets that exist in multistate regions.[240] To reach region-wide agreement

237. Peskoe, supra note 35, at 34 (suggesting the "social cost of carbon" is not currently reflected in FERC rates).

238. See Spence, Naïve Energy Markets, supra note 37, at 988–92, 1001 (describing how energy markets reduce all decisionmaking to economic optimality, ignoring questions of redistribution or values other than efficiency). Whether states could pursue their desired suite of side policies would depend on how circuit courts interpret and apply *Hughes*—a topic taken up infra section IV.B.

239. See PJM, Advancing Zero Emissions Objectives, supra note 190, at 1 ("To avoid significant complexity . . . a single carbon price is required across the carbon price subregion."). Brattle Group suggests a multistate region could possibly administer multiple carbon prices, although it admits that such an idea is "complicated" and "needs to be developed further." See Brattle Group, FERC Technical Conference, supra note 198, at 4.

240. See Conservation Law Found., FERC Technical Conference, supra note 199, at 1–2 (discussing the complexity of "integrating state policy preferences into RTO Markets");

on a price, states with higher targets would either have to accept a price that would not fully satisfy their decarbonization goals, or find a way to refund revenues from the regional carbon-pricing scheme to those neighbor-states that otherwise feel that they would be "overpaying" (a politically contentious work-around, to be sure).[241] This dynamic would create a pull toward a "lowest-common-denominator" level of carbon pricing—which would be bad both for states keen on rapid decarbonization and for free-riding states that want to see their neighbors carry more of the burden of achieving decarbonization.[242]

A less drastic homogenization of state climate policies might occur in the case of a Forward Clean Energy Market. In this model, states could control their overall level of desired renewable procurement and pass this information on to the market operator.[243] But such a scheme would still require, at a minimum, agreement on qualifying resources. To be sure, the scheme could be designed to allow states to make requests for certain types, as well as amounts, of renewable power.[244] The more the market was segmented by resource type, however, the less benefit it would provide in the form of an interstate, least-cost auction.[245] Accordingly, a Forward Clean Energy Market would also create pressure to homogenize resource preferences in order to reap the benefits of creating a regional auction.[246]

The homogenizing forces described here present two distinct lines of concern. The first springs from theories of democratic experimentalism.[247]

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see also Brian Forshaw, Conn. Mun. Elec. Energy Coop., Written Comments for FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 4 (May 1, 2017) [hereinafter CMEEC, FERC Technical Conference], http://www.ferc.gov/CalendarFiles/20170426150137-Forshaw,%20Energy%20Market%20Advisors.pdf [http://perma.cc/RP35-N3Y9].

241. See PJM, Advancing Zero Emissions Objectives, supra note 190, at 1–2 (explaining the need for states to agree on participation and on a price).

242. Dworkin & Goldwasser, supra note 51, at 564 (explaining that the structure of RTO governance means that "[t]he need for consensus may result in the least common denominator option winning out").

243. In this way, the Clean Energy Market is not intended "to eliminate or replace state renewable portfolio standards, but . . . is a complimentary system for market procurement of the RECs needed to meet the RPS." Renew Northeast & Nextera Energy, Presentation at NEPOOL IMAPP Meeting: A New IMAPP Proposal 13 (Jan. 25, 2017) (on file with the *Columbia Law Review*).

244. See id. at 6.

245. See id.

246. Professor Felix Mormann confirms this argument by making a similar point with respect to the idea of pursuing a federal RPS, arguing that "[g]eographic gains from a federal policy approach would likely come at the expense of a federal RPS's aspirational aggressiveness," because a "federally palatable RPS regime . . . would likely aim lower aspirationally and, ultimately, have a shallower impact." Mormann, supra note 36, at 1643.

247. See Michael C. Dorf & Charles F. Sabel, A Constitution of Democratic Experimentalism, 98 Colum. L. Rev. 267, 288 (1998) (arguing for greater use of "demo-

Because decarbonization is in the early stages of what looks to be a long, expensive, transformative slog, perhaps it is best at this stage to allow multiple models to flourish, instead of subsuming state policies into regional markets. Former FERC Chair Norman Bay adopted this position in a concurrence authored right before his resignation, in which he celebrated state decarbonization policies for their experimental character.[248] And Professors Ann Carlson and William Boyd have made a thoughtful case regarding the national decarbonization benefits that such state experiments can produce.[249]

This classic "laboratories of democracy" line of argument is compelling, but it captures only part of the challenge that states face as they consider regionalizing their decarbonization efforts through RTOs. In this context, the choice is not simply between the state, regional, or federal *scale* as the locus of policymaking. Instead, choosing between the state and regional scale also implicates a fundamental choice between electricity *markets* or *regulation* as the fundamental driver of decarbonization. States that turn RPSs or carbon pricing over to RTOs must be willing to allow RTO governance to dictate the terms of these policies going forward. To relinquish control to a regional electricity market is thus to authorize a diminishment in the suite of tools and scope of control available to publicly manage decarbonization.

3. *The Risk of Aggrandizing Market Control.* — There is an obvious objection to the argument made in the previous subsection: Why assume that if states were to give regional markets some control over achieving climate change goals, they could not continue to shape decarbonization's trajectory through complementary side policies if necessary? This argument relates to an argument economists often make about the risks of mixing policy aims: Why not let markets take care of decarbonization as cheaply as possible and then let states craft *separate* policies to accomplish their additional aims? Wouldn't this be better than letting states design these inefficient, multifaceted policies that attempt to mash together the goals of decarbonization with social justice and economic growth?[250]

cratic experimentalism," in which localities experiment in government service provision and central regulators facilitate learning from one another's experimentation).

248. See N.Y. State Pub. Serv. Comm'n v. N.Y. Indep. Sys. Operator, Inc., 158 FERC ¶ 61,137 (Feb. 3, 2017), 2017 WL 496267, at *12 (Bay, Comm'r, concurring) ("In our constitutional order, states are rightly celebrated for being laboratories for experimentation. Among other things, those laboratories may incentivize the development of needed energy infrastructure, the deployment of innovative technologies, or the establishment of Renewable Portfolio Standards." (footnote omitted)).

249. See Boyd & Carlson, supra note 6, at 815 (explaining how state diversity in electricity governance has led to "interesting examples of policy innovation").

250. See Eric A. Posner & David Weisbach, Climate Change Justice 169–88 (2010) (discussing the "ethical obligations of wealthy nations" in climate change policies); cf. Louis Kaplow & Steven Shavell, Should Legal Rules Favor the Poor? Clarifying the Role of Legal Rules and the Income Tax in Redistributing Income, 29 J. Legal Stud. 821, 822–26

The response to this argument again revolves around the pathologies of electricity markets, and in particular, the way these markets operate under shared state and federal jurisdiction.[251] In brief, the challenge is this: Once a state cedes policy objectives to its regional electricity market, the state may suffer limits on its ability to craft supplementary policies or to reclaim the objectives if it does not like the results the market produces.

This argument no doubt appears strange at first blush. Why should a state lose its ability to reclaim control over public-policy objectives, if it only voluntarily gives the market control over these objectives in the first place? The complicating factor is a recent line of Supreme Court jurisprudence interpreting the state–federal boundary in electricity law, which updates the longstanding principle that "[s]tates may not regulate in areas where FERC has properly exercised its jurisdiction to determine just and reasonable wholesale rates."[252]

Of particular relevance is the Supreme Court's 2016 decision in *Hughes v. Talen Energy Marketing, LLC*, which considered a subsidy scheme devised by Maryland to incentivize power plants to build in the state.[253] Although Maryland's RTO, PJM, ran a capacity market to ensure future resource adequacy throughout the region,[254] Maryland was frustrated that the market was not incentivizing any generation to locate in congested areas of the state, where electricity prices were higher than average.[255] To attract new investment, Maryland "solicited proposals from various companies for construction of a new gas-fired power plant at a particular location."[256] It then entered into a "contract for differences" with the winning bidder, in which it guaranteed the winner a certain

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(2000) (advocating for an income-tax system, rather than legal rules, as a means of helping the poor).

251. I do not mean to argue that jurisdictional friction presents the only reason that states might prefer to create policies jointly aimed at decarbonization and other social goals. Others have written general rebuttals to the argument that redistributional aims should be separated from other policy goals. See, e.g., Daniel A. Farber, Climate Justice, 110 Mich. L. Rev. 985, 989 (2012) (reviewing Posner & Weisbach, supra note 250) ("To say that we should not engage in redistribution unless we can implement the ideal form of redistribution is really to say that we should not engage in redistribution at all."); Lee Anne Fennell & Richard H. McAdams, Fairness in Law and Economics: Introduction 5 (Univ. of Chi. Pub. Law & Legal Theory, Working Paper No. 489, 2014) (on file with the *Columbia Law Review*) (arguing the high political costs of tax redistribution may make it cheaper to redistribute outside the tax scheme). The jurisdictional churn in electricity law presents particular reason to eschew using these markets to decarbonize.

252. Miss. Power & Light Co. v. Mississippi ex rel. Moore, 487 U.S. 354, 374 (1988).

253. 136 S. Ct. 1288, 1294–95 (2016).

254. See Conn. Dep't of Pub. Util. Control v. FERC, 569 F.3d 477, 480 (D.C. Cir. 2009) (describing PJM's capacity market).

255. See *Hughes*, 136 S. Ct. at 1294.

256. Id.

price for any capacity it supplied that also cleared the PJM capacity market auction.[257]

The Supreme Court had no trouble finding that this scheme violated the Supremacy Clause of the Constitution, as Maryland's program "set[] an interstate wholesale rate" and thus "invade[d] FERC's regulatory turf" under the Federal Power Act.[258] In so holding, the Court was careful to point out that states "of course" maintain authority to "encourage construction of new in-state generation."[259] The particular problem with Maryland's scheme, though, was that the payments to the generator were "conditioned on [its] capacity clearing the auction," such that they were too closely linked to interstate wholesale prices.[260] In contrast, the Court passed no judgment on "the permissibility of various other measures States might employ to encourage development of new or clean generation, including tax incentives, land grants, direct subsidies, construction of state-owned generation facilities, or reregulation of the energy sector."[261]

Particularly given this explicit disclaimer, it is hard to know exactly what *Hughes* portends for the host of policies that states have designed to decarbonize electricity.[262] There is now a profusion of litigation challenging state clean-energy policies under *Hughes'* logic. Both Illinois and New York are in the middle of litigation over the legality of their ZEC programs.[263] Connecticut, Massachusetts, and Rhode Island have all faced similar attacks against their procurement policies for specific clean-energy resources.[264]

Whether these policies will ultimately prove acceptable will come down to how circuit and district courts interpret and apply the standards

257. Id.

258. Id. at 1297. The decision was 8-0, with two concurrences only "to emphasize the narrowness of the holding." Hammond, supra note 35.

259. *Hughes*, 136 S. Ct. at 1298.

260. Id. at 1297 n.9.

261. Id. at 1299.

262. See Hammond, supra note 35 (arguing that *Hughes* "combines an easily predictable result on the merits with significant uncertainty for states going forward").

263. See Coal. for Competitive Elec. v. Zibelman, 272 F. Supp. 3d 554 (S.D.N.Y. 2017), appeal docketed, No. 17-2654 (2d Cir. Aug. 25, 2017); Vill. of Old Mill Creek v. Star, Nos. 17-cv-01163 & 17-cv-01164, 2017 WL 3008289 (N.D. Ill. July 14, 2017), appeal docketed sub nom. Elec. Power Supply Ass'n v. Star, No. 17-2445 (7th Cir. July 17, 2017).

264. See Riggs v. Curran, 863 F.3d 6, 7–8 (1st Cir. 2017) (dismissing on procedural grounds a challenge to Rhode Island's statute seeking to develop offshore wind); Allco Fin. Ltd. v. Klee, 861 F.3d 82, 86–87 (2d Cir. 2017); Town of Barnstable v. Berwick, 17 F. Supp. 3d 113, 120–22 (D. Mass. 2014), vacated as moot or unripe, 786 F.3d 130 (1st Cir. 2015) (dismissing a challenge to Massachusetts's offshore wind-procurement scheme on the grounds that the relief sought was retroactive and therefore barred by the Eleventh Amendment).

articulated in *Hughes*.[265] And courts will have to integrate the *Hughes* precedent with two other recent Supreme Court cases dealing with similar topics: *OneOK v. Learjet, Inc.*[266] and *FERC v. Electric Power Supply Ass'n*.[267] The Court's 2016 decision in *Electric Power Supply Ass'n* affirmed FERC's jurisdiction over any practice "directly affecting" wholesale rates, striking down states' arguments that FERC had overreached its jurisdiction.[268] The year before, in *OneOK*, the Court clarified that field preemption of state energy law should turn on an analysis of the *purpose* of the state regulation, such that courts should examine "the target at which the state law aims in determining whether that law is pre-empted."[269]

For present purposes, the fallout of *Hughes* and related precedents is that there might be substantial consequences to ceding new powers to regional electricity markets. *Hughes* made clear that because Maryland had granted PJM the right to control resource adequacy in the region by running a capacity market, the state lost some of its ability to concurrently strive to achieve the same goals. In contrast, right now RTOs claim no control over decarbonization. Quite the contrary: They specifically decry any obligation in this regard. But what if states were to grant their electricity-market operator control over decarbonization? Then, under the logic of *Hughes* and *OneOK*, states might be preempted from tying any state policies too closely to whatever market construct for decarbonization the RTO devised. In particular, states would have to be careful not to impermissibly "tether" their policies or prices for clean energy to the results of regional clean-energy or carbon markets.[270]

To be sure, even if a state decided to allow decarbonization to proceed through its RTO, many traditional state methods of encouraging decarbonization would likely not be threatened—including tax breaks, financial incentives, and straightforward subsidies. Although part of the picture, these methods have not emerged as the predominant tools that states use to regulate climate. Instead, the most important state policies are those that proceed through rate regulation, including RPSs, ZECs, regional carbon prices, procurement mandates, and ratepayer support of certain technologies.[271] There is a reason that these policies predominate:

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265. Hammond, supra note 35 ("*Hughes* doesn't really tell us which state initiatives will survive future Supremacy Clause challenges and which will fail.").

266. 135 S. Ct. 1591 (2015).

267. 136 S. Ct. 760 (2016).

268. Id. at 760.

269. *OneOK*, 135 S. Ct. at 1599 (emphasis omitted). Interestingly, though, the Court did not rely on *OneOK*'s test in deciding *Hughes* the following year.

270. See Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1299 (2016) ("Nothing in this opinion should be read to foreclose Maryland and other States from encouraging production of new or clean generation through measures 'untethered to a generator's wholesale market participation.'" (quoting Brief for Respondents at 40, *Hughes*, 136 S. Ct. 1288 (Nos. 14-614, 14-623), 2016 WL 183803)).

271. See Rossi, Carbon Taxation, supra note 8, at 298–306.

They are funded not through general taxation but through the rate base. They are, in other words, a form of covert "taxation by regulation,"[272] which serves as a more politically feasible way to meet decarbonization aims than direct taxation.[273]

Under the *Hughes* framework, these popular forms of "carbon taxation by regulation" would be particularly threatened by RTO jurisdiction over decarbonization. Regional carbon-pricing and state procurement schemes would be at risk if they were designed in ways that pegged their pricing to market outcomes.[274] Even Renewable Portfolio Standards—the central mechanism of state clean-energy policy to date—might prove vulnerable under an expansive interpretation of *Hughes*, should a state wish to pursue an RPS design that differs from a regional clean-energy procurement market.[275]

A hypothetical example helps illustrate these concerns. Consider the case in which a state wishes to promote a particular type of renewable resource in the state that its RPS is inadequately incentivizing—say, offshore wind. Right now, in order to promote more offshore wind, a state would be free to offer that generator a long-term premium *on top of* REC prices that fluctuates based on how much the generator is able to earn from the REC market.[276] The state might find this particular method for

272. Richard A. Posner, Taxation by Regulation, 2 Bell J. Econ. & Mgmt. Sci. 22, 23 (1971) (describing the phenomenon of "internal subsidies," where policy aims are accomplished through the use of rate regulation); see also Rossi, Carbon Taxation, supra note 8, at 278–80 (explaining how these climate change-related tools are a new version of Posner's classic internal subsidization).

273. Whether rate regulation presents a *superior* mechanism for accomplishing decarbonization as compared to more general taxation is a question beyond the scope of this Article. Rossi provides a partial defense of such policies in *Carbon Taxation by Regulation*, supra note 8. Rossi argues that carbon taxation by regulation can and does function as an effective—albeit fragmented—substitute for carbon regulation but suggests that several reforms would help it do so more effectively. See id. at 323–41.

274. See *Hughes*, 136 S. Ct. at 1299.

275. Part IV describes why an expansive reading of *Hughes*, of the sort that would invalidate RPSs, is unlikely. Nevertheless, the concern is a live one, even absent RTO subsummation of decarbonization goals. Several parties in the ZEC litigation have worried that if ZECs are illegal, so too are RPSs. See Joel Eisen, The New (Clear?) Electricity Federalism: Federal Preemption of States' "Zero Emissions Credit" Programs, 45 Ecology L.Q. (forthcoming 2018) (manuscript at 18) [hereinafter Eisen, Electricity Federalism] (on file with the *Columbia Law Review*) (collecting commentators raising this concern). Many participants in the ZEC litigation, however, assert that ZECs are different in kind from RPSs and other state policies. See Proposed Brief of Amicus Curiae American Wind Energy Ass'n in Support of Neither Party at 2, Elec. Power Supply Ass'n v. Star, No. 1:17-cv-01163 (N.D. Ill. Apr. 13, 2017). In his forthcoming article, Professor Joel Eisen argues for a reading of *Hughes* and related cases that would invalidate ZECs but allow state RPS policies to stand. See Eisen, Electricity Federalism, supra (manuscript at 19) ("ZECs aim directly at remedying the revenue shortfall on the wholesale markets. RECs do not, because they are designed with reference to environmental attributes, not wholesale market prices.").

276. See WSPP Inc., 139 FERC ¶ 61,061 (Apr. 20, 2012), 2012 WL 1395532, at *4 (finding that the separate sale of RECs does not fall within the Commission's jurisdiction).

promoting certain renewables quite attractive, as it would create long-term investor certainty without complicating the state's RPS or causing residents to overpay.[277] But if renewables procurement were to become RTO administered and FERC jurisdictional (through proposals such as a regional clean-energy market), it is unclear whether such a scheme would survive. It might, under the logic of *Hughes* and *OneOK*, be too closely tethered in purpose or effect to the newly FERC-jurisdictional clean-energy market.

Less hypothetically, consider New York's current study of adopting a single-state RTO carbon adder. There, regulators have proposed that a market carbon price and the state REC program can and should operate simultaneously.[278] To facilitate this dual scheme, an August 2017 study by the Brattle Group proposed that "[f]uture REC contracts could be structured so that the price adjusts automatically with changes in carbon prices, mitigating regulatory uncertainty associated with a carbon charge."[279] Again, under the logic of *Hughes*, it is not clear that such tethering would be permissible.[280]

Of course, the risks that *Hughes* and related decisions pose remain largely inchoate. As such, it is hard to know how to factor them into pressing decisions on decarbonization policy and markets. This Article's final section clarifies how states might integrate these developing risks into decisionmaking about the future of their climate change policies.

IV. IMPLICATIONS FOR CURRENT ELECTRICITY-LAW DEBATES

So far, this Article has explored some dangers in using regional electricity markets as a tool to accomplish the "social project" of decarbonization. At the same time, the Article does not intend to give short shrift to these markets' potency as a potential least-cost solution or as a bargaining tool in interstate climate negotiations. To evaluate these tradeoffs, section IV.A first lays out some variables to help states assess whether regional electricity-market integration of decarbonization objectives is in their best interest. Sections IV.B and IV.C then briefly explore options for regionalizing climate policy outside RTOs and how markets might adapt to accommodate such schemes. Finally, section IV.D examines what this Article's argument portends for laggard states, as opposed to states taking the lead on climate change.

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277. See supra note 95.

278. Newell et al., supra note 194, at iv ("We assume the carbon charge is designed to complement (rather than replace) . . . existing policies that contribute to decarbonization.").

279. Id. at 46.

280. The legality of this proposal might turn on structural details, including the extent to which the state required such automatic price-adjustment mechanisms in REC contracting.

A. *Deciding Whether to Regionalize Through Electricity Markets*

The limitations and pathologies of regional electricity markets identified in this Article suggest that states should assess three variables in deciding whether to aggressively pursue the integration of climate goals into these markets: (1) the relative priority of advancing least-cost solutions; (2) the evolution of legal doctrine surrounding federal–state jurisdiction over electricity policy; and (3) regional politics.

1. *Relative Priority of Least-Cost Solutions.* — Much of this Article's analysis has centered on the ways in which state climate policies evince an understanding of decarbonization as a social project with multifaceted goals. State climate policies illustrate attention to distributional consequences, the risks and externalities associated with various low-carbon technologies, and the ways in which transforming energy can also transform state economies. But leading states are also pursuing ambitious targets, which are likely to cost substantial sums to achieve.[281] It could be that as implementation progresses, affordability will become the dominant priority for states pursuing decarbonization.

Accordingly, the first question state policymakers considering regional integration might ask is: How important is *least-cost* decarbonization to state residents, as compared to a more managed decarbonization trajectory that incorporates other goals? The more the scale tilts in favor of affordability as a central criterion, the greater the benefits of regionalization through electricity markets.

Understanding decarbonization as a social project also points to some useful conclusions about what kind of regional market design for decarbonization states might prefer. In particular, a Forward Clean Energy Market in which states can funnel their decarbonization preferences into the market design presents less of a relinquishment of state control than does a region-wide climate price.[282] Of course, a clean-energy market also presents a less thoroughly efficient solution—again highlighting the importance of prioritizing state aims relating to decarbonization.

One final word regarding temporality is in order. Even if a state finds that a particular market construct for achieving decarbonization might perfectly achieve its aims at time zero, there is a long-term risk to ceding such control to the market. Given the scale of the enterprise of deep

281. See Ron Binz et al., Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know 5–6 (2012), http://www.raponline.org/wp-content/uploads/2016/05/ceres-binzsedano-riskawareregulation-2012-apr-19.pdf [http://perma.cc/5RJQ-DQF5] (predicting that retail electricity prices will "rise sharply" in the next twenty years due to the level of investment needed in the U.S. electricity sector); James H. Williams et al., Pathways to Deep Decarbonization in the United States 1, 24 (2014), http://unsdsn.org/wp-content/uploads/2014/09/US-Deep-Decarbonization-Report.pdf [http://perma.cc/W45R-MF7Z] (estimating the median price of cutting carbon dioxide emissions 80% from 1990 levels by 2050 to be between $160 billion and $650 billion).

282. See supra section III.A for a detailed description of these two policy options.

decarbonization, a state's goals and preferences regarding the shape of decarbonization may well evolve over time.[283] If state aims change such that affordability ceases to be the priority criterion, a state may have limited recourse once it has ceded decarbonization imperatives to the market, other than full-scale market exit.

This temporal constraint appears particularly acute with respect to carbon-pricing schemes, which may "lock in" investments that states do not want their ratepayers to support.[284] A regional carbon price would likely incentivize near-term investments in new combined-cycle natural gas facilities, which could displace higher-emitting fossil fuel facilities.[285] But states may not want a carbon-price scheme to help finance construction of these types of facilities, given their inability to contribute to long-term "deep decarbonization" targets.[286] States weighing market integration should thus carefully evaluate not only short-term goals but also the compatibility of a market scheme with their long-term aims.

2. *Evolving Legal Risk.* — The second variable that can help shape state decisions regarding decarbonization and electricity markets is that of evolving legal risk. As traced in section III.E, the *Hughes* decision has opened up a new line of attack on state climate policies. How these cases play out in the coming years should influence decisions about whether to decarbonize through regional markets.

Consider first the outcome in which courts give *Hughes* its narrowest possible reading. Courts in this instance would hold that *Hughes* preempts only those state policies that *explicitly* condition receipt of some benefit on clearing wholesale electricity markets.[287] In that case, states might feel more confident in ceding some authority over decarbonization to regional electricity markets, because they could assume such shared authority would place limited constraints upon state power. A state in this

283. See, e.g., Weiner, FERC Technical Conference, supra note 159, at 5 (expressing concern that wholesale market integration of climate policy "would likely hinder States in adapting to changing times"); cf. Mhairi Aitken, Why We Still Don't Understand the Social Aspects of Wind Power: A Critique of Key Assumptions Within the Literature, 38 Energy Pol'y 1834, 1835 (2010) (noting research that regarding nuclear power plants, "public attitudes are not stable but rather adapt and change in relation to events or changing situations").

284. See generally Karen C. Seto et al., Carbon Lock-in: Types, Causes, and Policy Implications, 41 Ann. Rev. Env't. & Resources 425 (2016) (describing the path-dependent processes that prevent the emergence of low-carbon alternatives).

285. See Newell et al., supra note 194, at 33.

286. Cf. Liscow & Karpilow, supra note 168, at 421–22 (suggesting reasons for states to target a few promising cleantech options in their climate investment).

287. Cf. Vill. of Old Mill Creek v. Star, Nos. 17-cv-01163 & 17-cv-01164, 2017 WL 3008289, at *13 (N.D. Ill. July 14, 2017), appeal docketed sub nom. Elec. Power Supply Ass'n v. Star, No. 17-2445 (7th Cir. July 17, 2017) ("*Hughes* should not be extended to invalidate state laws that do not include an express condition, but that in practice (and when combined with other market forces), have the effect of conditioning payment on clearing the wholesale auction.").

scenario would likely maintain considerable ability to shape its decarbonization trajectory, so long as complementary state policies were not explicitly conditioned on certain regional decarbonization market outcomes.

Now consider the (in my opinion, less likely[288]) outcome in which courts use the logic of *Hughes* to strike down RPSs, nuclear subsidies, and special procurement orders as intruding on federal jurisdiction over regional electricity markets. In that case, states would be faced with a conundrum. On the one hand, states would be left with considerably fewer climate policy options *other* than using regional electricity markets, since their primary policy levers to date would be impermissible. On the other hand, a decision to cede decarbonization objectives to the market would likely take even more policy options off the table, given that *Hughes* and its progeny in this scenario would stand for the proposition that states are prohibited from enacting a broad range of policies that too thoroughly impact regional markets. In this case, states would be faced with difficult choices between returning to the drawing board in terms of how to craft state climate policies, or giving in to the pressure to let the markets do their decarbonization work for them.

Finally, consider the emerging middle-ground scenario, in which courts develop a sliding scale for determining which state policies are too closely "tethered" to wholesale markets.[289] Early indications are that courts are likely to head in this direction. In June 2017, the Second Circuit became the first circuit court to interpret *Hughes*, ruling on a challenge to Connecticut's use of its procurement laws to encourage more solar energy.[290] The plaintiff in that case argued that Connecticut's procurement scheme should be preempted under the logic of *Hughes*, since the state was directing its utilities to enter into a specific wholesale contract and therefore interfering with federal jurisdiction over wholesale electricity pricing.[291] The Second Circuit dodged the direct preemption argument, instead finding that Connecticut's law did not *compel* utilities to enter into contracts with the winning bidders of the procurement process.[292] The court thus left open the question of whether a state scheme that more clearly required utilities to enter into contracts with certain renewable resources would be preempted. Nevertheless, the court took a moment to opine on *Hughes*, observing that Connecticut's scheme appears quite different from Maryland's failed program, given that Connecticut's program involves traditional bilateral contracts that are in no way conditioned on certain resources clearing

288. See Peskoe, supra note 35, at 41 ("Renewable portfolio standards . . . have co-existed with FERC-regulated markets for nearly two decades with little significant legal controversy."); supra note 276.

289. Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1299 (2016).

290. See Allco Fin. Ltd. v. Klee, 861 F.3d 82, 86 (2d Cir. 2017).

291. See id. at 86, 92.

292. See id. at 97–98.

the regional capacity auction.[293] As such, Connecticut's contracts resemble "precisely what the *Hughes* court placed outside its limited holding."[294]

In July 2017, U.S. District Courts for the Northern District of Illinois and the Southern District of New York reached similarly limited conclusions in dismissing lawsuits against Illinois's and New York's ZEC programs.[295] The first opinion to be issued concerned Illinois. Plaintiffs in that case argued, inter alia, that the ZEC program violated the *Hughes* standard for preemption because it was too closely tied to wholesale prices, since Illinois's program allowed for the price of ZECs to be adjusted based on predictions of wholesale prices.[296] The court rejected this argument, reasoning that basing ZEC prices on future projected wholesale prices is not an interference with the wholesale market that rises to the level of *Hughes*.[297]

The Southern District of New York reached the same conclusion regarding that state's program. Its opinion emphasized that *Hughes* was focused on the "impermissible tether" of required participation in the wholesale market and that New York's ZEC program required nothing of the sort.[298] Moreover, the court observed, the ZEC program "does not guarantee a certain wholesale price that displaces the market-determined price" but rather simply places a separate value on the environmental attributes of nuclear.[299]

The Illinois and New York decisions have been appealed to the Seventh and Second Circuits, respectively.[300] These courts are now tasked with drawing a delicate line between schemes that come too close to electricity markets in design or in purpose[301] and those that stay further away from pegging their schemes to market prices and functions. The fact that this jurisprudence appears to be shaping itself around this inquiry should

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293. Id. at 99, 102.

294. Id. at 99.

295. Coal. for Competitive Elec. v. Zibelman, 272 F. Supp. 3d 554, 571 (S.D.N.Y. 2017), appeal docketed, No. 17-2654 (2d Cir. Aug. 25, 2017); Vill. of Old Mill Creek v. Star, Nos. 17-cv-1163 & 17-cv-1164, 2017 WL 3008289, at *1 (N.D. Ill. July 14, 2017), appeal docketed sub nom. Elec. Power Supply Ass'n v. Star, No. 17-2445 (7th Cir. July 17, 2017).

296. *Star*, 2017 WL 3008289, at *4, *10.

297. Id. at *11. The court also rejected an argument that receipt of ZECs was implicitly tied to participation in wholesale markets. Id. at *12–13.

298. *Zibelman*, 272 F. Supp. 3d at 569.

299. Id. at *17. For this reason, the court found the scheme indistinguishable from RPS and RECs, which it noted FERC has long determined fall outside its jurisdiction. Id. at *13.

300. *Zibelman*, 272 F. Supp. 3d 554, appeal docketed, No. 17-2654 (2d Cir. Aug. 25, 2017); *Star*, 2017 WL 3008289, appeal docketed, No. 17-2445 (7th Cir. July 18, 2017).

301. On the "purpose" point, it is interesting to note that both courts highlighted this line of inquiry from *OneOK* and emphasized the extent to which the state ZEC programs had environmental goals that were quite distinct from wholesale-market aims. See *Zibelman*, 272 F. Supp. 3d at 571; *Star*, 2017 WL 3008289, at *10–11.

at least give states pause about ceding control over decarbonization to the markets. In doing so, states risk carving out more room for their policies to become constrained by regional markets' integration of the project of decarbonization.

3. *Regional Politics.* — One final variable relevant to state decisionmaking on integrating climate change aims into regional electricity markets is that of regional politics. This Article painted regional electricity-market governance as suffering from pathologies that are likely to yield least-common-denominator solutions.[302] This potentiality is least problematic in one-state RTOs like New York. That state is more likely to be able to translate its climate goals into a market-based scheme that fully reflects its decarbonization aims—leaving one fewer variable for state regulators there to contend with.[303] In multistate regions, though, the challenge of watering down is quite real. But even there, perhaps aggressive states might use market integration as a bargaining chip in negotiations with other states that are worried about state climate policies' destabilizing effects on the regional market. In particular, they might suggest to a recalcitrant state: "Up the ambition of your RPS five percent, or allow the market to use a higher price on carbon, and we will commit to pursuing regional decarbonization through the market." It is not clear whether laggard states see enough appeal to using electricity markets that such a promise could motivate them to greater action on climate change. But the more states find this outcome plausible, the more appealing using regional electricity markets to decarbonize might be.

B. *Thinking Outside the Market: State-Led Climate Policy Regionalization*

Much of the appeal of using regional electricity markets to accomplish climate change aims comes from the opportunity they present for capitalizing on the efficiencies of a larger, regional market construct. But if that's the draw for states, then electricity markets are far from the only method available. Many states have already devised regional solutions through cooperative arrangements that avoid the pathologies of electricity markets.[304]

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302. See supra sections III.B–.C.

303. Such is particularly the case if state regulators retain control over establishing the level of carbon pricing. Cf. Newell et al., supra note 194, at 22 (dodging the political question of how New York's price might be set in noting that "[p]olicymakers should define a process for determining the price and modifying it over time" and that "[t]his process could be led or informed by the NYPSC and other state agencies").

304. See Sarah Hofmann, Comm'r, Vt. Pub. Serv. Bd., Exec. Comm. Nat'l Council on Elec. Policy (NCEP), Statement at FERC Technical Conference: State Policies and Wholesale Markets Operated by ISO-New England, Inc., New York Independent System Operator, Inc. and PJM Interconnection, L.L.C., at 3 (May 1, 2017), http://electricitypolicy.org/wp-content/uploads/sites/6/2017/05/Statement-of-Commissioner-Hofmann-for-FERC-tech-conference-on-Ma-1.pdf [http://perma.cc/89QD-L2HX] (arguing to FERC that states "are well suited to collaboratively working out answers to the policy questions").

Two successful examples predominate.[305] The first is a regional cap-and-trade program, the Regional Greenhouse Gas Initiative (RGGI), which nine northeastern states have been running since 2009.[306] In this scheme, participating states devised a "memorandum of understanding" that set forth negotiated carbon-reduction targets for each state, along with a plan for each state to adopt legislation approving of the regional scheme.[307] All states were able to pass such legislation, bringing the scheme into force. Under the program as it is currently run, each generator that emits carbon pollution must purchase enough credits to cover its emissions from a region-wide auction.[308]

RGGI has coexisted for almost ten years alongside the PJM, NYISO, and ISO-New England regional electricity markets with scant complaints regarding market interference. Generators simply factor the cost of RGGI allowances into their expenses, on which they base their bids into regional electricity markets.[309] Clearly this requirement to at least partially internalize the costs of carbon emissions has an impact on the prices at which these generators offer electricity to the regional markets, but no one argues that it creates a distortionary effect.[310] RGGI thus stands as proof that it is possible to concoct a regional pricing scheme *outside* the regional electricity market without causing undue interference.

RGGI is not an unmitigated success—otherwise, many of its participants would hardly now be considering building carbon pricing into their regional electricity markets. RGGI's main problem, quite simply, is that the caps that states were able to agree upon for RGGI—and the resultant allowance prices—have been too low to accomplish the most ambitious states' decarbonization goals.[311] Nevertheless, RGGI has functioned as a

305. States were also actively pursuing regional solutions to Clean Power Plan compliance until the Trump Administration announced plans to dismantle these regulations. See Susan F. Tierney & Paul J. Hibbard, Analysis Grp., Carbon Control and Competitive Wholesale Electricity Markets: Compliance Paths for Efficient Market Outcomes 22–26 (2015), http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/clean_power_plan_markets_may_2015_final.pdf [http://perma.cc/DEY4-WC2B] (encouraging states to adopt regional Clean Power Plan compliance plans that track market borders); see also Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,095 (Mar. 31, 2017) (instructing the EPA Administrator to review the Clean Power Plan with an eye toward withdrawal).

306. See RGGI, supra note 75.

307. RGGI, Regional Greenhouse Gas Initiative: Memorandum of Understanding 1–11 (2005), http://www.rggi.org/docs/mou_12_20_05.pdf [http://perma.cc/PVB6-BL3Y]; see also Craig, supra note 85, at 821 (explaining RGGI's structure).

308. Fact Sheet: RGGI CO_2 Allowance Auctions, RGGI, http://www.rggi.org/docs/RGGI_Auctions_in_Brief.pdf [http://perma.cc/6YQB-MD23] (last visited Jan. 20, 2018).

309. See Peskoe, supra note 35, at 44. Peskoe notes, however, that RGGI, too, might face increased risk of preemption if participating states pursue a FERC-jurisdictional carbon price. See id.

310. See Tierney & Hibbard, supra note 305, at 25 (asserting that RGGI "allows for seamless implementation in centralized wholesale power markets").

311. See Memorandum of Law, supra note 154, at 6 n.12 ("[T]he RGGI program is not sufficient to meet New York's 50 percent renewables and 40 percent [greenhouse gas]

base policy upon which states can build the myriad other decarbonization policies discussed in this Article. And RGGI can function in this manner because a regional "memorandum of understanding" creates no risk of wresting away state power to address decarbonization simultaneously at the state level. At the same time, building upon years of trust among states, RGGI has twice succeeded in lowering its program carbon cap, thus raising the cost of allowance prices and strengthening the program's effects.[312] RGGI's structure thus presents an appealing alternative to electricity-market integration for states intent on regionalization.

A second example of regional cooperation on decarbonization outside of electricity markets comes from regional trading of RECs—the renewable energy credits that utilities use to demonstrate compliance with state RPS.[313] To date, most REC markets are single state—thus creating what many critics have bemoaned as unnecessarily constricted trading pools.[314] But the New England states have created a regional market for RECs that enlarges the pool of RECs available to create a more stable, fluid market.[315] They have done so through state laws that allow for generators to satisfy state RPS obligations with RECs purchased from any generator in the region that meets the state-specific definition of "renewable," or similarly, from a renewable generator *outside* the New England region that can demonstrate that its renewable energy was imported into the region.[316] In this way, New England already orchestrates regional cooperation on renewable energy.

reduction goals, and changing RGGI to achieve more ambitious goals 'is not within the State's unilateral control.'" (citation omitted) (quoting Clean Energy Standard Order, supra note 99, at 133)).

312. See RGGI, Summary of RGGI Model Rule Changes: February 2013, at 3 (2013), http://www.rggi.org/sites/default/files/Uploads/Design-Archive/Model-Rule/2012-Program-Review-Update/Summary_of_Model_Rule_Changes_02_07_13.pdf [http://perma.cc/BDS4-P46G]; Dale Bryk, East Coast States Strengthen Power Plant Pollution-Cutting Program, Set Model for Nation, NRDC Expert Blog (Feb. 7, 2013), http://www.nrdc.org/experts/dale-bryk/east-coast-states-strengthen-power-plant-pollution-cutting-program-set-model [http://perma.cc/56SH-4SJH]; Bruce Ho & Jackson Morris, RGGI Agrees to Cut Power Plant Pollution by Another 30%, NRDC Expert Blog (Aug. 23, 2017), http://www.nrdc.org/experts/bruce-ho/rggi-agrees-cut-power-plant-pollution-another-30 [http://perma.cc/V5BH-WW39].

313. See supra notes 85–86 and accompanying text.

314. See Crandall, supra note 86, at 896; Davies, Power Forward, supra note 84, at 1343–44; Mack et al., supra note 86, at 18; Mormann, supra note 36, at 1644–45.

315. See, e.g., Conn. Gen. Stat. § 16-245a(b) (2017); see also Allco Fin. Ltd. v. Klee, 861 F.3d 82, 89–90 (2d Cir. 2017) (describing the program); Mack et al., supra note 86, at 20 (same).

316. See, e.g., Vt. Pub. Serv. Dep't, Types of Renewable Energy Credits in New England: A Summary 1 (2015) (on file with the *Columbia Law Review*). A renewable energy generator outside the region can satisfy this requirement with help from a regional tracking system that monitors the renewable energy imported from surrounding ISOs and other entities. See id.; see also *Klee*, 861 F.3d at 92.

These programs suggest that regional cooperation can flourish without having to relinquish control to quasi-private governance organizations that are not under state oversight. To be sure, both RGGI and New England's REC-sharing arrangement carry their own legal risk. Commentators frequently point to the dangers of both the Compact Clause[317] and the Dormant Commerce Clause[318] when it comes to programs like these.[319]

These risks are not theoretical—both RGGI and the New England REC program have faced lawsuits on these grounds.[320] But for now, courts have sided with the states. One New York case brought against RGGI on Compact Clause grounds settled;[321] another was thrown out on procedural grounds.[322] New England's regional REC scheme recently received substantial validation on Dormant Commerce Clause grounds, in the same Second Circuit opinion that upheld the state's renewables procurement regime.[323] With these holdings in place, both a regional

317. The Compact Clause prohibits states from entering "into any Agreement or Compact with another State" without the consent of Congress. U.S. Const. art. I, § 10. But not all compacts are prohibited—the critical question, as formulated by the Supreme Court in U.S. Steel Corp. v. Multistate Tax Comm'n, 434 U.S. 452, 493 (1978), is whether the agreement increases the "political power" of participating states.

318. The Dormant Commerce Clause prohibits states from enacting measures grounded in economic protectionism, which "benefit in-state economic interests by burdening out-of-state competitors." Dep't of Revenue v. Davis, 553 U.S. 328, 338 (2008) (internal quotation marks omitted) (quoting New Energy Co. of Ind. v. Limbach, 486 U.S. 269, 273–74 (1988)).

319. See, e.g., Craig, supra note 85, at 771, 786, 820 (highlighting potential constitutional infirmities with RGGI and regional RECs); Note, The Compact Clause and the Regional Greenhouse Gas Initiative, 120 Harv. L. Rev. 1958, 1965 (2007). See generally Ferrey et al., supra note 92 (examining constitutional challenges to a feed-in tariff for renewable power).

320. See North Dakota v. Heydinger, 825 F.3d 912, 920–21 (8th Cir. 2016) (striking down Minnesota's law providing that "'no person' shall 'import or commit to import' power from a large new energy facility located 'outside the state'" on Dormant Commerce Clause grounds).

321. See Consent Decree, Indeck Corinth, L.P. v. Paterson, No. 5280-09 (N.Y. Sup. Ct. Dec. 23, 2009) (on file with the *Columbia Law Review*); Christopher Rizzo, Cap-and-Trade Under Attack Around the Nation, GreenLaw Blog (June 29, 2011), http://greenlaw.blogs.pace.edu/2011/06/29/cap-and-trade-under-attack-around-the-nation [http://perma.cc/TS9E-AA6N] (providing a report of the settlement).

322. Thrun v. Cuomo, 976 N.Y.S.2d 320, 322 (Sup. Ct. 2013) (dismissing the case because "certain claims are time-barred and the remaining claims have been rendered moot").

323. Allco Fin. Ltd. v. Klee, 861 F.3d 82, 86–87 (2d Cir. 2017). Plaintiffs alleged that the New England regional REC-sharing program harmed their interests in a Georgia solar facility, which was not allowed to sell RECs to Connecticut utilities for purposes of RPS compliance. The Second Circuit found no merit in this contention, determining that a Georgia REC and a New England REC are in fact "different products" that can legally be treated differently. Id. at 103. Underlying this finding was the recognition that "Connecticut consumers' need for a more diversified and renewable energy supply, acces-

cap-and-trade program and a regional market for RECs appear to stand on relatively firm legal ground. Of course, it could still come to pass that RPS programs themselves get struck down or that another circuit analyzes regional RECs' constitutionality differently. But the legal risk inherent in pursuing these types of regional solutions comes for states with an attendant gain—not having to relinquish public control over the course and content of these important decarbonization programs.

C. *Designing Markets to Accommodate, Rather than Achieve, State Policies*

The problem, of course, with pursuing regional solutions outside markets is that it returns the states to the problem animating current disputes: the fact that extra-market solutions, whether pursued at the regional or state level, may distort and ultimately dismantle electricity markets.[324] Here, then, a separate set of proposals for how to manage these concerns is salient. While many are deep in exploration of how to use electricity markets to *achieve* decarbonization, there is a second strand of proposed reforms that would focus on redesigning electricity markets not to subsume state climate policies but merely to *accommodate* them. Such accommodation would require regional markets to embrace the coexistence of manifold state policies in a way that has not always been the case to date and to intentionally mold their rules to support the continued viability of markets in the face of these state policies.[325]

There are many ideas about how markets might be refined to better accommodate state climate policies, and most proposals tend to be quite technical. The basic idea behind them, though, is this: Regions should identify what current market signals are failing to achieve, and rework the market construct to achieve these aims. That might be through pricing some "attribute" of electricity that markets do not currently value—for example, markets might pay generators for their ability to "ramp" up and down quickly to balance out renewables.[326] Or, it might be through

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sible to them directly through their regional grid or indirectly through adjacent control areas, would not be served by RECs produced . . . in Georgia." Id. at 105.

324. See supra section I.C.

325. To be fair, regions have already been doing some accommodation for years, through policies such as exemptions from the "minimum offer price rule," Kavulla, supra note 56, which requires that "new generators bid . . . at or above a specified price in certain circumstances," Rossi, Brave New Path, supra note 36, at 424. See also N.J. Bd. of Pub. Utils. v. FERC, 744 F.3d 74, 85–86, 93–94 (3d Cir. 2014) (describing the minimum offer price rule and upholding PJM's determination not to exempt state-supported resources from it any longer). But the current suite of accommodations is clearly inadequate, given the worries documented about wholesale market interference in this Article.

326. MISO and CAISO have introduced "ramping products," which compensate resources for their ability to ramp up and down quickly. Chang et al., supra note 119, at 25. To read more about how other markets might pursue similar programs, see PJM, Proposed Enhancements to Energy Price Formation 2, 5 (2017), http://www.pjm.com/-/media/library/reports-notices/special-reports/20171115-proposed-enhancements-to-energy-price-

redesigning capacity markets to pay different prices to state-supported resources—like renewables and nuclear energy—and resources that are unsupported by these policies.[327]

The Department of Energy's October 2017 proposed "Grid Resiliency Pricing Rule" can be understood as one such attempt to refine market structures[328]—albeit, in the view of many experts, a poorly designed one. In that notice of proposed rulemaking, the Department asked FERC to consider providing out-of-market payments to "fuel-secure" resources that it believes are undervalued by current regional market-pricing structures.[329] In particular, this proposed rule would have provided additional compensation to coal and nuclear plants in recognition of the "resiliency" benefits[330] that substantial on-site storage of fuel can provide.[331]

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formation.ashx [http://perma.cc/7UGN-BVE7]. Cf. Hogan, supra note 121, at 8 (pointing out some of the challenges with this strategy).

327. See PJM, Capacity Market Repricing Proposal 1 (2017) [hereinafter PJM, Repricing Proposal], http://pjm.com/~/media/library/reports-notices/special-reports/20170502-capacity-market-repricing-proposal.ashx/ [http://perma.cc/K2UQ-CB3P] (proposing a "two-stage capacity auction" in which state-supported resources are allowed to clear the market but do not set the price to be paid to other resources); Peskoe, supra note 35, at 16 (detailing these proposals); see also NEPOOL, Framework Document Two-Tier FCM Pricing 1–2 (2016), http://nepool.com/uploads/IMAPP_20160914_Framework_NRG_rev.pdf [http://perma.cc/GND8-FM36] (describing a two-stage forward capacity auction); CMEEC, FERC Technical Conference, supra note 240, at 4 (proposing alternatively a "bilateral-residual capacity market structure"); American Municipal Power, FERC Technical Conference, supra note 112, at 4 (same). Identifying what counts as "state support" and what doesn't is likely to be a contentious area for negotiation under this proposal. See PJM, Repricing Proposal, supra, at 4 (describing how PJM will distinguish "actionable from non-actionable subsidies"); Chen, FERC Technical Conference, supra note 112, at 1 (worrying these proposals will unfairly focus on the "more visible" state policies for renewables).

328. See Grid Resiliency Pricing Rule, 82 Fed. Reg. 46,940, 46,941–45 (proposed Oct. 10, 2017) (to be codified at 18 C.F.R. pt. 35).

329. Id. at 46,945.

330. The concept of "grid resiliency" lacks a clear definition. The National Academy of Sciences has explained it in this way: "Resilience is not just about lessening the likelihood that [grid] outages will occur. It is also about limiting the scope and impact of outages when they do occur, restoring power rapidly afterwards, and learning from these experiences to better deal with events in the future." Comm. on Enhancing the Resilience of the Nation's Elec. Power Transmission and Distribution Sys., Nat'l Acad. Sci., Enhancing the Resilience of the Nation's Electricity System 1 (2017), http://www.naesb.org/misc/nas_report.pdf [http://perma.cc/JH9W-DPEU]. In DOE's proposed rule, the agency "does not define 'resiliency,' nor has the Commission ever used that word in connection with wholesale rates." Harvard Environmental Policy Initiative, Comments on Proposed Grid Resiliency Pricing Rule, FERC Docket No. RM18-1-000, at 1 (Oct. 18, 2017), http://environment.law.harvard.edu/wp-content/uploads/2017/10/Harvard-EPI-DOE-NOPR-Comment.pdf [http://perma.cc/YA3N-PVXD].

331. See Grid Resiliency Pricing Rule, 82 Fed. Reg. at 46,942–43. Note, however, that the DOE NOPR differs from state nuclear support schemes in one critical way: It does not recognize the climate change benefits of nuclear power in the least.

In January 2018, FERC terminated this proposed rulemaking, explaining that the proposal was legally insufficient because it failed to demonstrate that regions were experiencing any resiliency challenges that resulted in "unjust and unreasonable" RTO tariffs.[332] In FERC's termination order, several commissioners sharply critiqued the Department of Energy's plan for its potential to unravel energy markets. In particular, they suggested that the Department had used the amorphous goal of "resiliency" to justify payments to two favored resources that do not clearly provide grid resiliency benefits, while ignoring other resources that might better provide grid resiliency.[333] In place of this misguided attempt, the Commission initiated a new rulemaking "to specifically evaluate the resilience of the bulk power system in the regions operated by [RTOs]," as a first step in determining whether there is a real need to redesign markets to respond to resiliency challenges.[334]

Through these new twists, the Department of Energy's controversial proposal could ultimately prompt regional solutions that strengthen markets while responding to concerns over ever-expanding state resource subsidization. A frank reckoning with exactly what "resilience" services are lacking from the grid and what resources and investments might provide them should help regions determine if there is some "resiliency attribute" that markets currently undervalue and whether there is a market-grounded methodology for rewarding any resources that provide that value.[335] If pursued in this manner, an RTO's creation of an additional

332. See Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012 (Jan. 8, 2018), 2018 WL 345249, at *5.

333. See id. at *12 (LaFleur, Comm'r, concurring); id. at *16 (Glick, Comm'r, concurring); Comments of the PUC of the State of California, Grid Reliability and Resilience Pricing, FERC Docket No. RM18-1-000, at 1, 4–6 (Oct. 23, 2017) ("Evidence regarding reliability in the electricity industry cannot support the argument that baseload power is the central means for providing reliability and resiliency."); Chang et al., supra note 119, at 16–17; Jody Freeman & Joseph Goffman, Opinion, Rick Perry's Anti-Market Plan to Help Coal, N.Y. Times (Oct. 25, 2017), http://www.nytimes.com/2017/10/25/opinion/rick-perry-coal-antimarket.html?_r=0 (on file with the *Columbia Law Review*) ("Selectively subsidizing coal and nuclear power is not the most obvious or best way to bolster the grid against sudden events.").

334. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, 2018 WL 345249, at *1.

335. The comments of bipartisan former FERC commissioners on the DOE NOPR make a similar suggestion:

> We strongly encourage the Commission to use this opportunity created by the Secretary to identify attributes of the current competitive market system that need to be improved, to crisply define them and either modify the current published proposal or initiate regional proceedings to examine resilience issues and consider the need for market rule changes.

Bipartisan Former FERC Commissioners, Comments on Proposed Grid Resiliency Pricing Rule, FERC Docket No. RM18-1-000, at 7 (Oct. 19, 2017), http://s3.amazonaws.com/

revenue stream for currently undervalued "resiliency" characteristics could help offset any resilience challenges that state-supported renewables might pose for the grid.[336] At the same time, such a reform would not undermine state climate change goals and programs by selectively providing payments to the most carbon-polluting resource in the market: coal.

The Department of Energy's proposed Grid Resilience Pricing Rule thus provides a sort of crossroads that underscores this Article's argument about why states should be cautious in ceding decarbonization to RTOs. At best, FERC may use the proposed rule as a jumping-off point for redesigning markets in a way that truly helps RTOs better accommodate state climate change policies. If this path is taken, then state and regional policies will cause less friction for markets going forward—rendering robust state decarbonization policies less problematic. At worst, certain RTOs might use the proposed rule as an invitation to create their own subsidy schemes aimed at propping up aging coal and nuclear for reasons unrelated to climate change aims—and in large part, in direct contravention of them.[337] If this path is pursued, then states will likely be glad not to have even partially ceded the goal of decarbonization to these markets, only to have them work to actively undermine it.

These concerns—that RTOs and their participating states might end up with competing objectives—highlight another potential avenue of reform. Twenty-odd years ago, FERC created RTOs as a grand experiment in new ways to manage electricity.[338] But we have moved beyond the early, experimental stage of RTOs' existence. If their initial governance

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dive_static/paychek/Comments_of_BFFC_Docket_RM18-1_1.pdf [http://perma.cc/8B34-GQV3].

336. Note that there is substantial disagreement as to whether renewables do in fact destabilize the grid. Many believe that state-supported renewables might actually enhance grid resiliency. See, e.g., Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, 2018 WL 345249, at *15 (Glick, Comm'r, concurring).

337. For example, in November 2017, the mid-Atlantic RTO, PJM, proposed a "price reformation" program that would allow for "inflexible" (that is, slow-ramping) units to set the market price so as to better reflect "the true incremental cost to serve load." PJM, Proposed Enhancements to Energy Price Formation 1–2 (2017), http://www.pjm.com/-/media/library/reports-notices/special-reports/20171115-proposed-enhancements-to-energy-price-formation.ashx [http://perma.cc/HQ9P-NPBA] (defining "inflexible units" as "those with declining average costs that are unable to economically produce power within a certain range or that require an economic minimum output"). This proposal is more market oriented than the DOE-proposed rule, but it still differentiates resources based on "inflexibility" in ways that do not appear fully justified. PJM's own market monitor opposes the proposal. See Catherine Tyler, Valuing Inflexibility Undermines Energy Price Formation, Monitoring Analytics 7–8 (2017), http://www.monitoringanalytics.com/reports/Presentations/2017/IMM_PJM_Energy%20Policy_Roundtable_Valuing_Inflexibility_Undermines_Energy_Price_Formation_20170927.pdf [http://perma.cc/YTN4-PHHX].

338. See Regional Transmission Organizations, 65 Fed. Reg. 810, 811 (Dec. 20, 1999) (codified at 18 C.F.R. pt. 35) (establishing RTOs).

structures turn out not to serve states well, perhaps it is time to consider not only tweaking market design to accommodate state policies but also more dramatically reforming RTO governance itself. There is not enough space in this section to consider the possibilities and practicalities of pursuing these larger reforms, but hopefully the concerns raised here will prompt further inquiries in this vein.

D. *But What About the Laggards?*

This Article focuses on a conundrum facing states that are leading the way in addressing climate change, arguing that they should cling to the right to shape their decarbonization trajectories. In articulating this argument, this Article has attempted to sketch the ways in which decarbonization is a "social" project, requiring care in crafting its contours rather than merely its end game.

But the primary problem confronting state climate change policy today isn't the underappreciated "social nature" of decarbonization. The bigger problem is the fact that a good many citizens—and state governments—deny the existence of climate change and refuse to do much of anything to promote decarbonization. Laggard states not only do little to address climate change within their own boundaries but also actively impede efforts at federal climate change policies.[339]

For those who care about action on climate change, then, this Article's argument that we should leave states to shape their own policies might seem to create a critical downside: Leaving the aims of energy policy to state legislators and regulators means accepting whatever ends they democratically determine, be they climate change goals or coal mine job preservation goals. Such risks are not hypothetical: Ohio has already pursued efforts to provide supplementary ratepayer funds to several coal plants at risk of retirement,[340] and there is considerable interest under the present Administration in protecting "baseload power" from renewable energy.[341] This interest may prompt more states to enact policies that seek to support not particular clean-energy sources but particular *dirty*-energy sources.[342]

339. See, e.g., Samantha Page, 26 Attorneys General Are Suing the EPA. The Public Only Agrees with Them in 3 States, ThinkProgress (Nov. 3, 2015), http://thinkprogress.org/26-attorneys-general-are-suing-the-epa-the-public-only-agrees-with-them-in-3-states-e935d36e42ba [http://perma.cc/M9F6-U7D9] (providing a map of the twenty-six states suing the Environmental Protection Agency to halt implementation of the Obama Administration's "Clean Power Plan" to address greenhouse gas emissions).

340. See Elec. Power Supply Ass'n v. AEP Generation Res., Inc., 155 FERC ¶ 61,102 (Apr. 27, 2016), 2016 WL 1717028, at *11–12 (rejecting an attempt by Ohio generators to pass through the costs of supporting certain in-state coal generation to captive ratepayers).

341. See Grid Resiliency Pricing Rule, 82 Fed. Reg. 46,940, 46,941–45 (Oct. 10, 2017) (to be codified at 18 C.F.R. pt. 35).

342. See Kavulla, supra note 56 (observing that such state laws "are proliferating, and they are not limited to renewables but whatever a legislature might prefer").

Such is these states' right in a federalist system with no overarching federal climate policy.[343] This state schism on climate change thus creates a powerful argument in favor of federal action, which could bind all states to achieving progress on decarbonization.[344] But these arguments are orthogonal to this Article's inquiry, which is of a narrower scope: Given the fact that no federal climate policy is likely to be forthcoming soon, should states seeking to decarbonize work together through their regional electricity markets to do so?

Using RTOs to address decarbonization simply does not have the same power to pull along laggard states. Because of RTOs' voluntary membership and stakeholder-governance processes, laggard states would be perfectly capable of blocking any RTO decarbonization proposals that required them to go above and beyond on climate.[345] And even if a region were to figure out a way to allow certain of its members to pursue decarbonization goals absent full regional participation,[346] such cooperative action would not stop other states in the region from pursuing policies aimed at propping up carbon-intensive resources.[347] Accordingly, although state polarization argues for *federal* action, it does not lend force to proposals to regionalize decarbonization policy through electricity markets.[348]

343. Of course, should the Clean Power Plan—the Obama-era regulation that sets greenhouse gas emissions reductions targets for each state—ultimately persist, it will act as a "floor" below which no state can go in terms of climate change policy. See Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60). The D.C. Circuit is currently entertaining a challenge to the regulations, which President Trump has announced his ambition to withdraw. See Order at 2, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Apr. 28, 2017) (granting a sixty-day stay of litigation); Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,094–96 (Mar. 31, 2017) (mandating the suspension, revision, or rescission of numerous federal climate change reform plans).

344. See Jonathan B. Wiener, Think Globally, Act Globally: The Limits of Local Climate Policies, 155 U. Pa. L. Rev. 1961, 1962 (2007) ("[S]ubnational state-level action is not the best way to combat global climate change. This is true even assuming that forestalling global climate change is of utmost importance, and even where the state-level policies are individually well designed.").

345. See supra sections III.B–.C.

346. Cf. PJM, Advancing Zero Emissions Objectives, supra note 190, at 2 (proposing that a subregion of states within PJM could pursue carbon pricing, although these might have to be contiguous states).

347. There might be a legal differentiation, however, between state policies aimed at decarbonizing and state policies aimed specifically at keeping old plants from retiring simply to preserve jobs and economic benefits to the state. The latter type of state policy might be more vulnerable to a Dormant Commerce Clause challenge than state environmental initiatives. Cf. Vill. of Old Mill Creek v. Star, Nos. 17-cv-01163 & 17-cv-01164, 2017 WL 3008289, at *16 (N.D. Ill. July 14, 2017) (accepting the environmental purpose of Illinois's ZEC program but hinting that a program aimed exclusively at in-state economic benefits would be vulnerable on these grounds).

348. Unless, of course, a laggard state is willing to up its ambition as a condition of other states proceeding through the market construct—a contingency accounted for in my three variables. See supra section IV.A.

CONCLUSION

Scholars, regulators, and market participants all recognize that electricity markets, in their current form, do not incentivize the rapid decarbonization of the electricity sector necessary to respond to climate change, thereby forcing states to act on their own. This realization has provoked conversations at FERC, at RTOs, and among states as to whether these markets should be redesigned to accomplish states' climate change goals. This Article has questioned the use of redesigned electricity markets as a driver of decarbonization in the United States. In particular, this Article has pointed out the ways in which decarbonizing electricity is a social project that should be managed by politically accountable entities, working through public processes capable of channeling and incorporating numerous goals related to decarbonization.

Those who are committed exclusively to the most rapid decarbonization possible are unlikely to be persuaded by this argument. It is true that in the present political climate, using electricity markets to respond to climate change would be an expedient and efficient pathway forward. Nevertheless, this Article has highlighted the risks that attend expediency. If climate change policy is shunted into these markets rather than left open for public debate, states will have lost a significant amount of control over *how* decarbonization proceeds. Instead, these decisions will be made in quasi-private governance institutions with complex voting rules and opaque power structures, under murky jurisdictional boundaries that may make it hard for states to assert concordant control.

The technical intricacies inherent in discussions over integrating climate policies and regional electricity markets often drive participants to put aside larger questions regarding the animating forces of climate policy—at great peril. Debates over using electricity markets to accomplish decarbonization should in fact highlight the question of why climate change is a problem in the first place. After all, civilizations have crumbled and species have gone extinct due to climatic changes.[349] For many, the answer to this question is that the continued peaceful existence of humans on Earth—and the minimization of their suffering—is a worthy aim.[350] If the project of decarbonization is in service of the continued

349. See Jared Diamond, Collapse: How Societies Choose to Fail or Succeed 77–308 (2005) (documenting and theorizing the collapse of many past societies); Elizabeth Kolbert, The Sixth Extinction: An Unnatural History 101–04 (2014).

350. See Dale Jamieson, Reason in a Dark Time: Why the Struggle Against Climate Change Failed—And What It Means for Our Future 164–67, 179 (2014) (exploring this rationale for climate action and the challenges it presents for "commonsense" morality and concluding that the task at hand is "to live in productive relationship with the dynamic systems that govern a changing planet"); see also Steven C. Sherwood & Matthew Huber, An Adaptability Limit to Climate Change Due to Heat Stress, 107 Proc. Nat'l Acad. Sci. U.S. 9552, 9552 (2010) (explaining why an uninhabitable planet is a distinct possibility, since a temperature increase of around 7°C would "call[] the habitability of some

wellbeing of humanity—and, potentially, species beyond humans[351]—it must be part of a larger social conversation about how we want to live in communities in the future. These conversations are worth preserving for the public forum, in which debate, dissent, experimentation, and long-term social visions can continue to develop within and alongside decarbonization policies in the coming decades.

regions into question" for humans, and that "[w]ith 11–12°C warming," most of "human population as currently distributed" would reside in uninhabitable regions).

351. See Kolbert, supra note 349, at 268 (arguing that humans are not "what's most worth attending to"); Jedediah Purdy, After Nature: A Politics for the Anthropocene 249, 272 (2015) (arguing that understanding our present world as one where there is no "nature" apart may open space for reimagining a "post-humanism" that gives all forms of life equal value).