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ZEC Oscillations in the Commerce Clause

Steven Ferrey*

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INTRODUCTION

In the United States, two clauses of the Constitution, the Supremacy Clause and the Commerce Clause, surround the way we utilize and exploit energy and sources of power. Professor Joel Eisen discussed the application of the Supremacy Clause to energy law at the Vermont Journal of Environmental Law Symposium. The Supremacy Clause constructs a “bright line” segregating which energy transactions are subject exclusively to federal jurisdiction and which are subject exclusively to state authority. This article brings us current on the other key article of the Constitution, the Commerce Clause, which limits state authority over energy.

There are recent oscillations in how the Commerce Clause affects energy regulation in different states. The Commerce Clause distinguishes federal, as opposed to state, jurisdiction over electric power with what the Supreme Court has designated as a legal “bright line.” The Dormant Commerce Clause is the jurisprudential-legal shadow cast by the Commerce Clause; a century of Supreme Court decisions in the penumbra of Article I of the Constitution expose the limits of the Dormant Commerce Clause. The Dormant Commerce Clause restricts state regulation of energy that, directly or indirectly, create any geographic discrimination in interstate commerce. The Dormant Commerce Clause demands that states regulate articles in commerce, including electricity, equally and impartially.

7. See, e.g., City of Philadelphia v. New Jersey, 437 U.S. 617, 624 (1978) (noting that if a statute is facially discriminatory, it is virtually per se invalid); Gen. Motors Corp. v. Tracy, 519 U.S. 278, 287 (1997) (“The negative or dormant implication of the Commerce Clause prohibits state taxation . . . or regulation . . . that discriminates against or unduly burdens interstate commerce.”); Dep’t of Revenue of Ky. v. Davis, 553 U.S. 328, 338 (2008) (affirming City of Philadelphia v. New Jersey,
While seeming straightforward, the Dormant Commerce Clause creates repeated legal tensions recently presented to the Supreme Court. Because of an ongoing transition to more distributed renewable energy as part of the U.S. energy mix, the Dormant Commerce Clause is in even sharper focus. Regulating an intangible electromagnetic power field of electricity moving near the speed of light, alone, is an intriguing challenge. In the United States, both the Commerce Clause and the Supremacy Clause control power regulation, separate state and federal jurisdiction, and limit constitutionally permissible discriminatory regulations.

This Article examines recent interpretations of the Dormant Commerce Clause applied to state energy regulations. Since electricity is unique in American law, Section II examines how electricity’s legal structure and regulation have evolved. It analyzes deregulation of retail power in one-quarter of the states, and the ongoing rapid change to renewable energy generation technologies. Section III dissects the operation of the Dormant Commerce Clause applied to energy and power. It examines the three most recent Circuit Court of Appeals decisions on energy under the Commerce Clause, all finding the state regulation, in different states, unconstitutional.

Section IV highlights recent contrary federal court decisions on the Dormant Commerce Clause. None are as persuasively reasoned as those appellate court decisions analyzed in Section III. Section IV subparts A and B examine in detail two controversial decisions of the Ninth Circuit. Among the thirteen circuit courts, the Ninth Circuit is the one federal circuit court that has not found a Commerce Clause violation. However, these two Ninth Circuit decisions contemplate liquid fuels rather than electricity. Section IV subpart C examines two recent federal trial court decisions. Those decisions take a new step to excuse state geographically discriminatory regulation of electricity as an exception to the Dormant Commerce Clause.

Section V places the recent case law in larger perspective, distinguishing de jure and de facto geographic discrimination. The Dormant Commerce Clause will continue to strictly govern state regulation of power.

8. See, e.g., United Haulers Ass’n v. Oneida-Herkimer Solid Waste Mgmt. Auth., 550 U.S. 330 (2007) (considering waste management ordinances and whether the dormant Commerce Clause allows a distinction between public and private facilities).
9. See infra Section II.A (discussing the Dormant Commerce Clause application to renewable energy policies).
10. See infra text accompanying note 25 (listing several federal cases that considered state violations of the Supremacy Clause or the Commerce Clause).
I. DIVIDING THE TERRITORY

Many countries have their own electric grids.11 The National Academy of Engineering lists electrification as the most significant engineering achievement of the 20th century.12 The World Bank concludes that access to electricity is one of the most powerful economic development enablers and multipliers.13 Without access to reliable power, all critical infrastructure and significant economic value is at risk.14 The U.S. identified sixteen critical infrastructures in the United States, including: communications, emergency services, energy, food and agriculture, health care and public health, transportation, and water and wastewater sectors.15 All sixteen of the critical infrastructure sectors have some dependence on the energy sector, specifically electric power. These aspects of infrastructure cannot function without a stable power supply.16

Unlike other commodities, electricity is an intangible asset distributed for use through a vast, physically interconnected grid.17 Today, every state has a regulatory authority for setting retail rates and reliability standards for electricity.18 Movement and delivery of electricity in the United States happens in five separate grids: 1) the Eastern Interconnection; 2) the Western Interconnection; 3) the Texas Interconnection—which by its own choice has elected not to interconnect to either the Eastern or Western interconnections; 4) the Hawaiian grid; and 5) the Alaskan grid—which is also disconnected from the contiguous 48 states.19 Figure 1 illustrates the separated grids in the

17. QER, supra note 14, at S-16, S-8, 1-2 (describing energy policy as an asset to be protected in such an interconnected system).
continental U.S. The U.S. transmission grid system operates at fifteen different voltage levels, with limited power transactions between three major interconnections.\(^\text{20}\)

![Figure 1: United States Transmission Grids\(^\text{21}\)](https://perma.cc/UQV2-LM8M)

Before diving into legal disputes around the Commerce Clause of the Constitution, which grants Congress the plenary power to regulate commerce throughout the nation and between the states, this article will first springboard from the Supremacy Clause.\(^\text{22}\) The Supremacy Clause has affected electric power for the past 80 years through the Federal Power Act.\(^\text{23}\)

These create and delineate the “bright line” for energy that states legally cannot cross but nonetheless seem to continually do, as the recent 2016 Supreme Court *Hughes v. Talen Energy Marketing* case illustrates.\(^\text{24}\)

Federal courts in 2013, including the Supreme Court, the federal circuit courts of appeals, federal trial courts, plus the Federal Energy Regulatory Commission (FERC), confronted several cases alleging state violation of the Supremacy Clause and/or the Commerce Clause of the Constitution.\(^\text{25}\)

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25. Am. Trucking Ass’n v. Los Angeles, 569 U.S. 641, 648 (2013) (holding how the Supremacy Clause and/or the Commerce Clause were expressly preempted as a “provision having the force and effect of law”); PPL Energyplus v. Nazarian, 753 F.3d 467, 468 (4th Cir. 2014), aff’d sub. nom. Hughes v. Talen Energy Marketing, 136 S. Ct. 1288 (2016) (challenging a Maryland Public...
either the trial or appellate court levels, the states lost each of these cases due to a significant aspect of the challenge. In 2016 there were two Supreme Court opinions, a Circuit Court decision, and two FERC adjudicatory decisions that each applied one, the other, or both of these clauses of the Constitution to the regulation of electric power.

The constitutional limits on the exercise of state power over energy are now altered by the accelerating change in both the technologies of electric power generation and ways in which some state governments have restructured state energy laws, causing them to surrender power. First, in 2016, for the third consecutive year, most of new electric generating capacity added to the U.S. grid was from solar, wind and other renewable technologies.

According to the U.S. Energy Information Administration, renewable energy has reached grid price parity in nearly the entire country. Figure 2 shows recent dramatic price declines.

![Figure 2: Recent dramatic price declines](image)


26. See cases cited supra note 25 (listing cases where states lost after plaintiffs raised Supremacy Clause or Commerce Clause claims).


29. Id.
Second, restructuring and deregulation of the retail electric power sector dramatically changed the operative regulatory paradigm for electric energy in one-quarter of the states. In 1997, approximately one-quarter of the states—beginning first, in Massachusetts and Rhode Island, and then spreading to a total of 17 states (see Figure 4)—adopted competition and partial deregulation of retail power. Prior to the electric sector deregulation debacle in California, nineteen of the states restructured in 2000–2001; thereafter, a half dozen states reversed course and returned to a regulated retail electric system, as illustrated in Figure 3. About 40% of the states structured; thereafter, the other 60% of the states retained traditionally structured retail electric sectors.

Today, three-quarters of the states are conventionally regulated and retain traditionally structured retail electric sectors. In a significant number of the 17 totally or partially deregulated states, this resulted—by order of the state regulator—in the regulated monopoly utilities selling their generation units to independent power companies to spur more competition in power generation. This was a major transition, which recent legal battles demonstrate, that some states did not appreciate at the time. For more than a decade, independent power (“merchant”) companies construct more new power generation each year than do regulated utilities. With several states having deregulated retail power sales and requiring their utilities to divest all of their power generation capacity, regulatory authority has shifted with these

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33. See generally FERREY, LAW OF INDEPENDENT POWER: DEVELOPMENT, COGENERATION, UTILITY REGULATION, supra note 32, at § 10:23 (indicating the other states were affected by the market after the fail in California).


35. Id. at 219; FERREY, supra note 6, at 616.

36. See U.S. DEP’T OF ENERGY, DOE/EIA-0562(00), THE CHANGING STRUCTURE OF THE ELECTRIC POWER INDUSTRY 2000: AN UPDATE 106 (2000) (illustrating the different requirements that States have passed for electricity industry restructuring legislations).

37. See infra notes 100–24 and accompanying text.

utilities having to engage in wholesale acquisition of their power from the wholesale market, as illustrated in Figure 3. The Federal Power Act shifts exclusive jurisdiction over wholesale power to federal authority and preempts state authority.

Figure 3: Deregulation of Retail Power

Third, electric-power trading has changed. An increasingly larger share of U.S. power now proceeds through wholesale power sale prior to its ultimate retail sale and consumption. This extra transaction renders this sale

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40. See infra Section II.C.1.


off-limits to state regulation. In a traditional energy regulatory structure, such state regulation would have been within state authority, as there would be no interstate wholesale sale of power when utilities, on their own, constructed the in-state power generation capacity they required. The amount of power sold at wholesale before it is sold at retail shifted from 8% in the 1960s to nearly a majority today.

Since the changes in the ownership of power generation, which have been fostered by state regulatory changes, states fundamentally forfeited their regulatory authority over key transactions in the power market. My prior articles forecast the change of state authority that states did not fully appreciate at the beginning of the current millennium when state deregulation began, at the beginning of the current decade when thirteen states had deregulated retail power transactions, and in current time. A prior article also mapped how states could reduce their authority loss if they were more reflective in how they changed their regulatory structures.

Fourth, independent system operators (ISOs) exercise more federal authority over power-trading. There are seven different Regional Transmission Organizations (RTOs)/ISOs across the United States; each is responsible for the reliability of the electric grid as well as the non-discriminatory operation of wholesale electricity markets. For example, the PJM ISO, comprised of the District of Columbia and all or part of thirteen

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43. Ferrey, Law of Independent Power: Development, Cogeneration, Utility Regulation, supra note 32, at § 5:28. See also Ferrey, supra note 6, at 607 (describing energy sales as being interstate commerce and thus under federal regulation through the Commerce Clause).
45. See id. at 10-11; Ferrey, supra note 6, at 608.
49. See generally Steven Ferrey, Solving the Multimillion Dollar Constitutional Puzzle Surrounding State “Sustainable” Energy Policy, 49 Wake Forest L. Rev. 121, 124 (2014) (discussing how states can enact energy policy and regulations to improve their authority over the energy supply).

The ISOs regulate and control all wholesale sale of power through their regional interstate, federally regulated, power markets.\footnote{Hughes v. Talen Energy Mktg., 136 S. Ct. 1288, 1292 (2016).}

With these changes in technology, utility divestiture of ownership of power generation, dramatically increased wholesale power transactions, and certain state restructuring, there has been a commensurate legal reverberation in the Supremacy Clause and the Commerce Clause.\footnote{See generally Michael J Gergen et al., United States, in THE ENERGY REGULATION AND MARKETS REVIEW 468, 469, 483( 5th ed. David L. Schwartz ed., 2016) (highlighting changes in energy regulation that result from changing technology).} Power is technologically unique—it is an intangible object in commerce that cannot easily be stored as electricity.\footnote{Bill Gates, It is Surprisingly Hard to Store Energy, GATESNOTES (Feb. 22, 2016), https://www.gatesnotes.com/Energy/It-Is-Surprisingly-Hard-to-Store-Energy [https://perma.cc/4J9U-5A9F].} Utility-scale chemical storage of converted electricity is about one and a half times the cost of gas generation while residential or distributed battery storage is about eight times the cost of natural gas generation.\footnote{William H. Carlile, Utility-Scale Electricity Storage, Distribution Seen Likely to Benefit From Solar Technology, Env’t & Energy Rep. (BNA) (June 29, 2015); FERREY, LAW OF INDEP. POWER:
stored in batteries; physical energy potential stored as compressed air; stored weight in greater elevated reservoir capacity in hydroelectric pumped storage facilities; active physical energy stored in flywheel revolution; or thermal energy as heat storage.\textsuperscript{56}

Pumped storage of water has been the only significant storage method deployed for the past half-century; however, pumped storage cannot fill the entire need, and the contribution of other storage media to date is minimal.\textsuperscript{56} Battery storage has emerged as the key future storage link for more deployment of intermittent distributed sources of renewable energy.\textsuperscript{57} Lithium-ion and lead-acid batteries could change electric technology in the near future by providing economic storage of intermittent power; though, the storage costs are still high.\textsuperscript{58} While battery storage costs are decreasing, storage is still expensive and not yet cost-effective.\textsuperscript{59} Industry expected a battery breakthrough in May 2015 when Tesla Motors announced the availability of a new advanced battery for purposes of storage for rooftop solar PV systems, but when subsequent observers assessed the technology, despite overwhelming initial popularity, they found it both unamenable for current technical operation, as it could not handle regular charging, and not yet cost-effective.\textsuperscript{60} FERC is currently investigating the ability to allow storage assets to participate in both state and federal markets.\textsuperscript{61}

Legally, power is treated differently than all other commodities in the U.S. due to the Federal Power Act, the Commerce Clause, and the Supremacy Clause of the Constitution.\textsuperscript{62} The Supreme Court has declared that electricity,
to a degree not affecting other items in commerce, is in interstate commerce, and the Court has noted that: “it is difficult to conceive of a more basic element of interstate commerce than electric energy, a product used in virtually every home and every commercial or manufacturing facility. No State relies solely on its own resources in this respect.” The following section places this unique Supreme Court distinction regarding electric power in interstate commerce in context of the Constitution.

II. THE DORMANT COMMERCE CLAUSE LIMITS STATE ENERGY REGULATION

Recently, federal courts have found leading states to have regulated energy in a manner violating the Dormant Commerce Clause of the Constitution. Two district courts have taken contrary positions in the last two months supporting discriminatory state regulation of energy to financially favor their in-state power generators. This section examines and attempts to reconcile these Commerce Clause legal frictions.

A. Dormant Commerce Clause Jurisprudence—Energy

Starting with what physically occurs with power: Electric energy can move instantaneously in interstate commerce within the lower 48 states, excluding parts of Texas. The Dormant Commerce Clause prohibits state regulations that are either facially discriminatory regarding or unduly burden interstate commerce. Geographically based restrictions on interstate commerce, whether discriminating for or against local commerce, raise Dormant Commerce Clause issues.

Courts use judicial “strict scrutiny” to review geographically discriminatory statutes under the Dormant Commerce Clause, and a state must establish that the statute serves a compelling state interest through the

66. See infra Section V.A (comparing rulings from U.S. District Court in Illinois and the U.S. District Court for the Southern District of New York that allow zero emission credits (ZECs) for in-state programs).
69. Id. at 338-339.
least restrictive means affecting commerce to achieve that interest.\footnote{70 See generally Entergy Nuclear Vt. Yankee, L.L.C. v. Shumlin, 733 F.3d 393, 429-432 (2d Cir. 2013) (requiring Vermont Yankee to allot a certain percentage of its output to satisfy local demand would likely violate the dormant Commerce Clause under a strict scrutiny analysis.); Gade v. Nat’l Solid Wastes Mgmt. Ass’n, 505 U.S. 88, 105-106 (1992) (“In assessing the impact of a state law on the federal scheme, we have refused to rely solely on the legislature’s professed purpose and have looked as well to the effects of the law.”).}

There is a general assumption among many state counsels that if they cloak a discriminatory regulation regarding energy in an environmental rationale the cloak protects the regulation.\footnote{71 See, e.g., Gade v. Nat’l Solid Wastes Mgmt. Ass’n, 505 U.S. 88, 105-106 (1992) (noting that courts must look beyond the legislature’s professed purpose to determine if the rationale is related to the effects on the law).}

However, according to the Supreme Court, “even if environmental preservation were the central purpose of the pricing order, that would not be sufficient to uphold a discriminatory regulation.”\footnote{72 West Lynn Creamery v. Healy, 512 U.S. 186, 204 n. 20 (1994).}

In sum, the cloak does not conceal or protect state discrimination based on geographic location of the commerce.


States cannot regulate in ways where the practical effect is to control conduct in other states.\footnote{74 See, e.g., Brown-Forman Distillers Corp. v. N.Y. State Liquor Auth., 476 U.S. 573, 582-83 (1986) (striking down a law with the “practical effect” of controlling liquor prices in other States).}

States also may not “provid[e] a direct commercial advantage to local business.”\footnote{75 Northwestern States Portland Cement Co. v. Minnesota, 358 U.S. 450, 458 (1959).}

States are prohibited from attaching restrictions to any goods that they import from other states.\footnote{76 C & A Carbone, Inc. v. Town of Clarkstown, 511 U.S. 383, 393 (1994).}

As such, “[s]tatutes that discriminate by ‘practical effect and design,’ rather than explicitly on the face of the regulation, are similarly subjected to heightened scrutiny.”\footnote{77 Tri-M Grp., L.L.C. v. Sharp, 638 F.3d 406, 427 n.28 (3d Cir. 2011).}

A state cannot regulate to favor or require use of its own in-state energy resources, nor can it, by regulation, harbor energy-related resources originating in the state.\footnote{78 See Wyoming v. Oklahoma, 502 U.S. 437, 455 (1992) (finding that “such a preference for coal from domestic sources cannot be characterized as anything other than protectionist and discriminatory, for the Act proports to exclude coal mined in other States based solely on its origin”); All. for Clean Coal v. Craig, 840 F. Supp. 554, 560-562 (N.D. Ill. 1993) (explaining that legislation that favors in-state industry violates the dormant commerce clause and that “the protection of Illinois’ coal industry
statute overturned by the Supreme Court involved only a 10% allocation of the market to in-state producers, which is similar to what occurs in some of the now challenged preferences for in-state carbon control and renewable energy statutes. As a result of the statute, Oklahoma utilities “purchased Oklahoma coal in amounts ranging from 3.4% to 7.4% of their annual needs, with a necessarily corresponding reduction in purchases of Wyoming coal.” The court held that even a small or de minimis degree of impact or effect of geographic discrimination is still unconstitutional.

In-state fuels cannot be required to be used by a state, even to satisfy federal Clean Air Act environmental requirements. Similarly, states cannot give income tax credits solely to in-state producers. Accordingly, a discriminatory law is “virtually per se invalid.” However, if the statute is geographically even-handed, the courts apply the Pike balancing test to determine whether the state’s interest justifies the incidental discriminatory effect of the regulatory mechanism as applied. The choice of which test a court employs often pre-ordains the legal result.

Geographically-based state restrictions on interstate commerce, either discriminating for or against local commerce, raise identical Dormant Commerce Clause concerns. Courts can invalidate a statute with even a minor discriminatory impact under strict scrutiny review. The Supreme Court held that statutes that establish regional barriers and discriminate only against some states, rather than all states, violate the Commerce and economy is not a legitimate local purpose”); New England Power Co. v. New Hampshire, 455 U.S. 331, 344 (1982) (concluding that the Federal Power Act does not allow states “to restrict the flow of privately owned and produced electricity, in a manner inconsistent with the Commerce Clause”).

80. Id. at 455; Accord All. for Clean Coal v. Miller, 44 F.3d 591, 596 (holding that even though an Illinois law did not compel use of Illinois coal or forbid use of out-of-state coal it “discriminates against western coal by making it a less viable compliance option for Illinois generating plants”).
81. Wyoming, 503 U.S. at 453 n.11.
82. Miller, 44 F.3d at 596 (“The intended effect of these provisions is to foreclose the use of low-sulfur western coal by Illinois utilities as a means of complying with the Clean Air Act. This of course amounts to discriminatory state action forbidden by the Commerce Clause.”).
85. See Pike v. Bruce Church, 397 U.S. 137, 142 (1970) (explaining the balancing test for when a statute “regulates even-handedly to effectuate a legitimate local public interest, and its effects on interstate commerce are only incidental . . . .”).
86. Id.
87. See Bacchus Imports, Ltd. v. Dias, 468 U.S. 463, 269-70, 272-73 (1984) (finding that a tax exemption for certain locally produced alcoholic beverages violated the Dormant Commerce Clause even though the state’s asserted purpose for the tax was not related to economic protection).
Subsidy of in-state commerce or businesses, even if the burdens to achieve the subsidies are imposed on all commerce regardless of its origin, are impermissible under strict scrutiny review. The Supreme Court has repeatedly held that a state regulation does not need to “be drafted explicitly along state lines in order to demonstrate its discriminatory design.” Any geographic discrimination by a state, whether along state or other geographic lines, is always subject to strict scrutiny. The dissent in Rocky Mountain Farmers Union v. Corey, a Ninth Circuit appeal, underscored this notion. A regulation need not expressly mention geography in order to be geographically discriminatory. It may appear neutral superficially, but courts evaluate the direct or indirect impact on commerce. Such a contrary view “would mean that the Commerce Clause of itself imposes no limitations on state action . . . save for the rare instance where a state artlessly discloses an avowed purpose to discriminate against interstate goods.”

State statutes or regulations that discriminate against out-of-state interests based on geography or favoring local interests are per se invalid. Subsidy of in-state businesses, even if the taxes to raise the subsidies are


89. E.g., Miller, 44 F.3d at 595 (“[T]he Illinois Coal Act, like the . . . order in West Lynn, has the same effect as a ‘tariff or customs duty—neutralizing the advantage possessed by lower cost out of state producers, ‘ it too is repugnant to the Commerce Clause and the principle of a unitary national economy which that clause was intended to establish.” (quoting W. Lynn Creamery, Inc. v. Healy, 512 U.S. 186, 194 (1994))).

90. Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070, 1097 (9th Cir. 2013) (quoting Amerada Hess Corp. v. N.J. Dept. of Treasury, 490 U.S. 66, 76 (1989)). See also C & A Carbone, Inc. v. Town of Clarkstown, 511 U.S. 383, 391 (1994) (striking local trash processing requirement as discriminatory for allowing only the favored operator to process waste that is within the limits of the town); Fort Gratiot Sanitary Landfill, Inc. v. Mich. Dep’t of Nat. Res., 504 U.S. 353, 355 (holding that the Michigan law preventing private landfill owners from receiving waste that came from outside the county to be unconstitutional); Dean Milk Co. v. Madison, 340 U.S. 349, 349 (1951) (striking an ordinance requiring milk to be processed within five miles of town).

91. Corey, 730 F.3d at 1108 (Murguia, J., concurring in part and dissenting in part) (“In making [the] geographic distinction, the [regulation] patently discriminates against interstate commerce.” (quoting Or. Waste Sys., Inc. v. Dep’t of Envtl. Quality of State of Or., 511 U.S. 93, 100 (1994))).

92. Id.

93. See Dean Milk Co. v. Madison, 340 U.S. at 354.

94. Id.; Chemical Waste Mgmt. v. Hunt, 432 U.S. 334, 341-342 (1992) (showing how the court reviewed the case to determine that New Jersey’s hazardous waste law decimates “on its face and in its plain effect”).

95. See also Trevor D. Stiles, Renewable Resources and the Dormant Commerce Clause, 4 ENVTL. & ENERGY L. & POL. ’Y J. 34, 60-61 (2009) (outlining the modern Dormant Commerce Clause analysis).
imposed on all commerce, can be stricken under strict scrutiny.\footnote{96} Even where a statute is drafted in a fashion that is facially neutral rather than expressly discriminatory, for example by not mentioning or in any other way distinguishing the geographic location of the commerce, but otherwise employs terms that result in a geographic preference, a court may apply a ‘strict scrutiny’ standard if the purpose or effect of a state law is discriminatory.\footnote{97} The trial court in Rocky Mountain Famers Union v. Goldstene noted that regulation need not facially mention discriminatory provisions against out-of-state entrants to be held in violation of the Dormant Commerce Clause.\footnote{98} A regulation that ‘evince[s]’ its discriminatory purpose against interstate commerce ‘or unambiguously discriminates in its effect, it almost always is ‘invalid per se.’”\footnote{99}

\textit{B. The Eighth Circuit—2016}

There was a significant federal court of appeals decision on the Dormant Commerce Clause in 2016. The State of North Dakota challenged the constitutionality of a Minnesota statute restricting the import of coal-fired power to Minnesota from other states.\footnote{100} The statutory provision stated, “no person shall: . . . import or commit to import from outside the state power from a new large energy facility that would contribute to statewide power sector carbon dioxide emissions.”\footnote{101} North Dakota complained that

\begin{footnotesize}
\begin{itemize}
\item 96. \textit{E.g.}, Miller, 44 F.3d at 595 (”\[T\]he Illinois Coal Act, like the . . . order in \textit{West Lynn}, has the same effect as a ‘tariff or customs duty—neutralizing the advantage possessed by lower cost out of state producers.’” (citing \textit{West Lynn Creamery, Inc. v. Healy}, 512 U.S. 186, 194 (1994))).
\item 97. \textit{See South-Central Timber Dev., Inc. v. Wunnicke}, 467 U.S. 82, 100 (1984) (“\[T\]he Court has viewed with particular suspicion state statutes requiring business operations to be performed in the home State that could more efficiently be performed elsewhere. Even where the State is pursuing a clearly legitimate local interest, this particular burden on commerce has been declared to be virtually \textit{per se} illegal. (citing \textit{Foster–Fountain Packing Co. v. Haydel}, 278 U.S. 1; \textit{Johnson v. Haydel}, 278 U.S. 16; \textit{Toomer v. Winstead}, 334 U.S. 385,”); \textit{C & A Carbone, Inc. v. Town of Clarkstown}, 511 U.S. 383, 391–92 (1994) (“The ordinance is no less discriminatory because in-state or in-town processors are also covered by the prohibition.”); \textit{Hunt}, 432 U.S. 334 (showing how the Court look to the practical financial effect of the law in making its decision); \textit{Fort Gratiot Sanitary Landfill, Inc. v. Mich. Dep’t of Nat. Res.}, 504 U.S. 353, 361 (1992) (holding a Michigan statute prohibiting the acceptance of out of county solid waste violated the Equal Protection Clause).
\item 98. \textit{See Rocky Mountain Farmers Union v. Goldstene}, 843 F. Supp. 2d 1071, 1089 (E.D. Cal. 2011) (”\[T\]he legislation favoring in-state economic interests is facially invalid under the dormant Commerce Clause, even when such legislation also burdens some in-state interests or includes some out-of-state interests in the favored classification.” (quoting \textit{Daghlian v. DeVry Univ.}, 582 F. Supp. 2d 1231, 1243 (C.D. Cal. 2007))).
\end{itemize}
\end{footnotesize}
Minnesota’s statute “interfere[d] with the interstate transmission and wholesale marketing of electric power in the integrated interstate region.”

The district court held that the statute violated the Dormant Commerce Clause because the goal of the provision is to control non-Minnesota entities. Thus, the statute violated the sparingly construed extraterritoriality doctrine incorporated as part of the Commerce Clause. The district court also upheld the plaintiffs’ motion for summary judgment and agreed with the plaintiffs that parts of the statute regulated extraterritorially and were, therefore, invalid under the Dormant Commerce Clause. The court also concluded that Minnesota’s regulation of out-of-state transactions violated the Dormant Commerce Clause.

On appeal, the Eighth Circuit Court of Appeals unanimously found the state statute unconstitutional; however, each member of the three-judge panel relied on different clauses of the Constitution as their primary reason for invalidation. The opinion of the first judge on the Eighth Circuit panel affirmed the district court opinion, which held that controlling conduct beyond the boundaries of Minnesota violated the Dormant Commerce Clause. The other two judges found that the Minnesota statute violated the Supremacy Clause of the Constitution, and was the Federal Power Act or by the Clean Air Act preempted the statute. After holding that the statute violated the Supremacy Clause, the two judges held that it was not necessary to address the Commerce Clause issue. The opinion of the Eighth Circuit, as well as the trial court’s, distinguished the flow of electricity as unique and separate from other energy sources. The Eight Circuit expressly distinguished this holding from the Ninth Circuit’s outcome in *Rocky Mountain Farmers Union v. Corey*, which involved liquid ethanol fuel.

The Minnesota law “regulate[s] activity and transactions taking place wholly outside of Minnesota.” In his concurrence, Judge Murphy stated “the actual flows of power are unpredictable, uncontrollable, and

103. *Id.* at 917.
104. *Id.* at 916–17.
105. *Id.* at 910–911, 916, 919.
106. *Id.* at 916.
108. *Id.* at 913.
109. *Id.* at 927–29.
110. *Id.* at 927–29.
113. *Heydinger,* 825 F.3d at 921.
untraceable.”

Minnesota’s law banning imports from out-of-state energy facilities was found to have an extraterritorial reach and was therefore unconstitutional under the Dormant Commerce Clause.

C. Other Circuit Courts

1. Second Circuit

In 2013, Vermont Yankee, an independent nuclear power producer located in Vermont, challenged Vermont’s attempt to regulate the wholesale of energy in interstate commerce. Vermont attempted to extract financial concessions from the private owners of Vermont Yankee as a condition for granting renewal of a state license to operate. Vermont added a new statutory amendment to state energy law, which required the state legislature to approve a state operating license renewal. The Vermont State Senate denied the Vermont Public Service Board the right to issue the license that would allow the plant to run beyond 2012, unless Vermont Yankee, which did not make retail sales of electricity in the state, agreed to sell its wholesale power to Vermont utilities at deeply discounted rates.

The district court found that federal law preempted Vermont from regulating such wholesale sales, and the regulation violated the Dormant Commerce Clause. On appeal, the Second Circuit agreed with the substantive decision of the district court that there was a state violation of the Dormant Commerce Clause. Procedurally, though, the Second Circuit held that that issue was not yet ripe for review because the uneconomic power purchase agreement (PPA) to sell wholesale power otherwise in interstate commerce rates to in-state utilities at deeply discounted rates that the state demanded that the independent power generator enter as a condition of

114. See id. at 924 (Murphy, J., concurring) (“The actual flows of power are unpredictable, uncontrollable, and untraceable.

115. See id. at 919.


117. Id. at 406.

118. Vt. Stat. Ann. tit. 30 § 248 (e)(2), (prohibiting nuclear generating plant from operating “beyond the date permitted in any certificate of public good . . . unless the General Assembly approves and determines that the operation will promote the general welfare, and until the Public Utility Commission issues a certificate of public good under this section.”).


license extension, had not been executed by the company before it brought suit. Thus, having declared the Commerce Clause issue not yet ripe for a final decision on the merits until a long-term enforceable PPA was signed by the aggrieved plaintiff, the circuit court concluded that if that Vermont PPA had been signed before the suit the energy regulation would not survive a Dormant Commerce Clause challenge. The Vermont law restricted the movement of that power interstate in the New England wholesale ISO-NE market which is federally regulated. The ISO-NE market moves wholesale power seamlessly through its six New England states to utilize the most cost-effective power on an hour-by-hour basis cost-comparative basis.

2. Seventh Circuit

Other U.S. Circuit Courts recently have addressed the Dormant Commerce Clause and electricity. The unanimous Seventh Circuit decision by Judge Posner declared unconstitutional state regulation limiting state renewable portfolio standards (RPS) when they are applied only to benefit in-state generation. The law in 29 states characterizes RPS programs as a form of “backdoor” renewable energy subsidies. A resource portfolio requirement requires certain electricity sellers to purchase an annual predetermined percentage of credits from low-carbon or renewable resources in their wholesale electric supply mixes. Michigan’s law, one of the 29 states, provided RPS credit for renewable energy certificates (REC) multipliers for in-state generation, and provided preferences for use of in-state materials for that power generation.

Such state regulation favoring in-state power generation which otherwise was part of an interstate wholesale power market, as employed in Michigan as part of the MidAmerican Independent System Operator (MISO) multi-state wholesale market, was found to be a violation of the Dormant

122. Id. In making such an in-state money-losing condition on the state permission to keep operating the power generation facility a threat on which the power generator sued before signing such a long-term agreement, the Second Circuit held that the regulated energy generation company did not have a “real injury” or standing to raise the Dormant Commerce Clause issue until it actually signed the state-demanded power purchase agreement (“PPA”) and bankrupted the company. Id.
123. Id. at 431–32.
128. See U.S. ENVTL. PROT. AGENCY, PORTFOLIO STANDARDS & THE PROMOTION OF COMBINED HEAT & POWER 9, tbl. 1 (2016) (showing the minimum RPS requirements for electric suppliers and distribution companies).
[Michigan’s argument] trips over an insurmountable constitutional objection. Michigan cannot, without violating the commerce clause of Article I of the Constitution, discriminate against out-of-state renewable energy.”\textsuperscript{130} The opinion relied on one of my prior law review articles for authority on the respective jurisdiction of state and federal government to regulate electricity.\textsuperscript{131}

This discussion was technically \textit{dicta} in the decision because the case involved not Michigan’s unconstitutional regulation of renewable energy, but whether Michigan and other Midwest states—all members of MISO—were required to share MISO transmission upgrade costs to move renewable wind power through the region.\textsuperscript{132} Still, Michigan’s attorney general chose to raise the defense that since Michigan law did not treat out-of-state renewable energy equally and non-discriminatorily compared to in-state renewable power, which received state renewable energy certificates (RECs), such discrimination against out-of-state renewable power should support the State’s refusal to share costs to move renewable power over the regional transmission grid in which Michigan participated.\textsuperscript{133}

This unanimous decision caused the Seventh Circuit to tell Michigan that it was acting unconstitutionally pursuant to the Dormant Commerce Clause regarding renewable power.\textsuperscript{134} In addition, Michigan was acting unconstitutionally under the Supremacy Clause because the allocation of regional MISO transmission cost shares to Michigan were within FERC’s regulatory power under the Federal Power Act.\textsuperscript{135} In September 2017, Michigan’s state energy regulatory commission, the Michigan Public Service Commission, doubled down on this in-state preference by ruling that it would be mandatory for in-state utilities to purchase in-state energy capacity by 2022.\textsuperscript{136} This issue of new types of RECs for in-state nuclear power would emerge again in 2017 district court and 2018 circuit court challenges addressed below.\textsuperscript{137}

\textsuperscript{130} \textit{Ill. Commerce Comm’n}, 721 F.3d at 776.  
\textsuperscript{131} \textit{Id.} (citing Steven Ferrey, \textit{Threading the Constitutional Needle with Care: The Commerce Clause Threat to the New Infrastructure of Renewable Power}, 7 \textit{Texas J. Oil, Gas & Energy L.} 59, 69, 106-07 (2012)).  
\textsuperscript{132} \textit{See id.} at 773 (noting that this case did not involve Michigan’s unconstitutional regulation of renewable energy).  
\textsuperscript{133} \textit{Id.}  
\textsuperscript{134} \textit{Id.} at 776.  
\textsuperscript{135} \textit{Id.} at 773.  
\textsuperscript{137} \textit{See infra Part V.}
To date, the Seventh Circuit is the only circuit court of appeals to make a declaration on the merits of in-state discriminatory RECs and the Dormant Commerce Clause, and it is the first federal court of appeals to address this issue. The Supreme Court refused to review the Seventh Circuit decision. Twenty-two of the 29 states providing RECs for promotion of certain renewable power do so in a manner that may be geographically discriminatory in some greater or lesser extent. In *West Lynn Creamery*, Justice Scalia submitted that, “subsidies for in-state industry . . . would clearly be invalid under any formulation of the Court’s guiding principle” for “dormant” Commerce Clause cases.

IV. No State Violation of the Dormant Commerce Clause

Not all federal circuit courts interpret the Constitution consistently. Even when the Supreme Court renders a decision to resolve circuit-court splits in interpretation of environmental or energy law, the circuit courts have found ways to circumvent the Supreme Court. For example, after a most watched 2007 unanimous decision of the Supreme Court, which reversed holdings of every circuit court in the country, some circuit courts have since interpreted the law differently than the Court’s opinion indicated.

The Ninth Circuit Court of Appeals, with jurisdiction over the nine Western states, issued opinions for two different state energy programs that are contrary to every other circuit court in the country. The Ninth Circuit, even if alone in its legal determinations regarding energy and Dormant Commerce Clause, has responsibility for the largest single number of states and geographic territory of any of the thirteen federal circuit courts.
A. The Ninth Circuit Decision

1. California’s Carbon Intensity

In California, regulations regarding greenhouse gas reduction include the low carbon fuel standard (LCFS). The purpose of the LCFS is to “reduce greenhouse gas emissions by reducing the full fuel-cycle, carbon intensity of the transportation fuel pool used in California . . . .” The LCFS regulates transportation fuels that are “sold, supplied, or offered for sale in California” and focuses on the “carbon intensity” of fuels . . . . The LCFS requires providers of gasoline and diesel fuels to calculate the carbon intensity of each fuel component, report such calculations to the California Air Resources Board (CARB), and make reductions to meet the carbon intensity standards measuring “the amount of lifecycle greenhouse gas emissions, per unit of energy of fuel delivered, expressed in grams of carbon dioxide per megajoule.” Carbon intensity is not limited to how much carbon the fuel contains but also includes the amount of carbon released in the full fuel cycle. Each pathway for producing ethanol and other low-carbon liquid fuels, under California’s regulations, is given three carbon intensity scores: direct emissions, land use or other indirect effects, and a total score. Parties calculate their Carbon Intensity Rating and then receive a credit or deficit depending on that score.

146. Id.
147. Id. § 95480.1(a).
148. Id. § 95481(a)(11).
149. Id. § 95481(a)(28) (defining lifecycle “greenhouse gas emissions as the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Executive Officer, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.”).
150. CAL. AIR RES. BD., LOW CARBON FUEL STANDARD QUESTION AND ANSWER GUIDANCE DOCUMENT (2011). Before a regulated party can generate credits for its fuel or blendstock, the regulated party must get approval from the Executive Officer of its physical pathway demonstration. Id. A “physical pathway” is a combination of actual fuel delivery methods (e.g. trucking routes, rail lines, pipelines, etc.) through which the regulated party reasonably expects the fuel to be transported to California. Id. Therefore, the requirement for a regulated party to demonstrate its physical pathway serves to document the physical route by which the product is expected to get to California, therefore providing an enforceable linkage from an out-of-state producer to the regulated party in California (e.g. fuel blender, producer, importer or provider in California). Id.
151. CAL. CODE REGS. tit. 17, § 95486(a) (2011) (outlining methods for calculating carbon intensity values); id. § 94581(a)(13) (defining credits and deficits). “The total number of credits generated through the supply of fuels or blendstocks with carbon intensity values below that of the applicable standard will be deposited in a credit account of the applicable regulated party or credit generator. Once
Location and origin affect the energy provider’s carbon intensity score. For instance, corn-derived ethanol produced in the Midwest receives a higher carbon-intensity score than chemically similar corn-derived ethanol produced anywhere in California, regardless of its transportation distance within California. The carbon intensity of ethanol in the Midwest was greater because it had to be transported to California; additionally, electricity in the Midwest is mostly generated by coal, which produces more carbon than other fossil fuels. Thus, a chemically identical ethanol imported from the Midwest can receive a higher carbon-intensity score than ethanol produced anywhere in California, ultimately rendering the Midwest product disadvantaged and more expensive for fuel providers seeking to meet California’s fuel standard requirements.

2. The District Court Strict Scrutiny

In Rocky Mountain Farmers Union v. Goldstene, which is distinct from a somewhat similar suit brought in California state court involving the LCFS rule, plaintiffs challenged the LCFS rule as being anti-competitive and violating the Dormant Commerce Clause. Specifically, the plaintiffs focused on the LCFS’ extraterritorial regulations. Additionally, the complaint challenged the carbon intensity calculations that took into account the “so-called indirect ‘land use or other indirect effect’ from the production of corn itself, predominantly in the Midwest, ascribing a penalty to all corn
ethanol based on its assumed indirect contribution to worldwide GHG emissions.\textsuperscript{157} In response, California argued that the LCFS used scientific principles to reduce emissions; therefore, it was not discriminating intentionally.\textsuperscript{158}

The federal district court invalidated certain parts of the LCFS rule and enjoined the rule’s enforcement because it “discriminate[d] against out-of-state corn-derived ethanol while favoring in-state corn ethanol and impermissibly regulate[d] extraterritorial conduct.”\textsuperscript{159} The court held that the LCFS differentiated based on the commerce’s place of origin and concluded that it discriminated on its face against out-of-state corn-derived ethanol.\textsuperscript{160} The court held that the LCFS “may not impose a barrier to interstate commerce based on the distance that the product must travel in interstate commerce.”\textsuperscript{161}

The court applied a strict scrutiny standard to the regulation’s geographic discrimination affecting multi-state commerce to uphold plaintiffs’ dormant Commerce Clause claim.\textsuperscript{162} The court concluded that “[r]egulating out-of-state conduct is not the only test applied under the Dormant Commerce Clause; the broader definition of discrimination “simply means differential treatment of in-state and out of state economic interests that benefits the former and burdens the latter.”\textsuperscript{163} The district court reached this conclusion by relying on two Supreme Court decisions, Dean Milk Co. v. Madison and West Lynn Creamery v. Healy.\textsuperscript{164} The court also explained that “legislation favoring in-state economic interests is facially invalid under the dormant Commerce Clause, even when such legislation also burdens some in-state interests or includes some out-of-state interests in the favored classification.”\textsuperscript{165}

The district court found that although the LCFS serves a legitimate local purpose, the defendants had not met their burden to show that there is not a


\textsuperscript{158} Brief for Appellants at 94–96, Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070 (9th Cir. 2013) (No. 12-15131).

\textsuperscript{159} Goldstene, 843 F. Supp. 2d at 1105.

\textsuperscript{160} Id. at 1087.

\textsuperscript{161} Id. at 1089.

\textsuperscript{162} Id. at 1105. CARB attributed the difference in carbon intensity values to multiple scientific factors in addition to geographic location factors (emissions related to shipping or transportation of fuel). Id. The court relied upon a table of carbon intensity values generated by CARB. Id.

\textsuperscript{163} Id. at 186 (quoting Or. Waste Sys. v. Dep’t of Envtl. Quality, 511 U.S. 93, 99 (1994)).

\textsuperscript{164} See id. at 1089 (noting that this court relied on both Dean Milk Co and West Lynn Creamery to extract a test to address the state’s purpose without discriminating against out-of-state businesses).

\textsuperscript{165} Id. (quoting Daghlian v. DeVry Univ., 582 F. Supp. 2d 1231, 1243 (C.D. Cal. 2007)).
less discriminatory means to adequately serve their objective. Pursuant to the requirements of Dean Milk and West Lynn Creamery v. Healy, the court found that CARB had several other means to address the state’s purpose without discriminating against out-of-state fuel products. In Dean Milk, the Supreme Court concluded that alternative means to ensure proper pasteurization of milk sold within the city were available to the city of Madison. The Court noted that alternatives with less burdensome effects on interstate commerce existed. Since its issuance, the Dean Milk standard that a state must justify its regulation by taking the least burdensome alternative has endured and been elevated in federal court precedent for two-thirds of a century.

3. Ninth Circuit—Abandoning Strict Scrutiny

In a split decision with a vigorous dissent, the Ninth Circuit reversed the district court’s decision in Rocky Mountain Farmers Union v. Goldstene and held that the Dormant Commerce Clause was not violated. The Ninth Circuit refused to apply the district court’s strict scrutiny standard in favor of a more state-deferential balancing test that interprets the Dormant Commerce Clause and extra-territorial effects of state law. The 2-1 Ninth Circuit majority instructed that, on remand, the balancing test be applied pursuant to Pike v. Bruce Church, Inc.

166. Id. at 1093.
167. Compare Dean Milk Co. v. Madison, 71 S. Ct. 295, 295 (1951) (holding that a limit on the sale of milk outside of a narrow geographical region unduly burdened interstate commerce) and West Lynn Creamery v. Healy, 512 U.S. 186, 202 (holding a differential burden placed at any point in the stream of commerce on out-of-state producers is constitutionally invalid), with Goldstene, 843 F. Supp. 2d at 1094 (finding that defendants failed to prove that no nondiscriminatory alternatives exist).
168. Dean Milk Co., 71 S. Ct. 295, 298 (“If the City of Madison prefers to rely upon its own officials for inspection of distant milk sources, such inspection is readily open to it without hardship for it could charge the actual and reasonable cost of such inspection to the importing producers and processors.”).
169. Id. at 295 (“A city cannot discriminate against interstate commerce even in exercise of unquestioned power to protect health and safety of people, if reasonable and nondiscriminatory alternatives, adequate to conserve legitimate local interests, are available”).
171. Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070, 1107 (9th Cir. 2013).
172. Id. at 1087–88, 1107.
173. Id. at 1107.
The majority determined that it is acceptable for a state to calculate transportation CO₂ impact as part of either the carbon emissions index or delivered fuel rating, which has a different score based on the geographical origin of the fuel.174 The Ninth Circuit majority also concluded that factoring location as a variable (which has the consequence of imposing a penalty for greater distance from California) was not facially discriminatory based on the geography of commerce because there are many reasons why location is factored in besides simple discrimination.175 According to two of the three judges on the Ninth Circuit panel, California had “valid scientific” reasons for why they took into account fuel origin, the fuels’ geographic pathways, and the distance traveled; none of these reasons were facially discriminatory.176 However, the dissenting judge found blatant facial discrimination woven into the LCFS.177

The majority opinion never carefully applied the Supreme Court’s Dean Milk analysis and construed it only for an ancillary principle.178 Similarly, the majority referred to only an ancillary point in the key Supreme Court C & A Carbone, Inc. v. Town of Clarkstown decision, avoiding the declaration in the Carbone precedent that no environmental rationale excuses discrimination based on the geography of commerce.179 Instead, the Ninth Circuit majority applied Maine v. Taylor, which is not directly on point or relevant to the facts in the California LCFS matter because it interprets the “market participant” exception.180 Note, that this inapplicable Maine v. Taylor precedent is what district courts will inappropriately apply in new ongoing matters, discussed below.181

174.  Id. at 1083.
175.  Id. at 1089.
176.  Id.
177.  Id. at 1108 (Murguia, J., concurring in part and dissenting in part) (“additional fee [on imported commerce] facially discriminates.” (quoting Chem. Waste Mgmt., Inc. v. Hunt, 504 U.S. 334, 342 (1992)).
178.  See Dean Milk Co. v. City of Madison, Wis., 340 U.S. 349, 356 n. 4 (1951) (“It is immaterial that Wisconsin milk from outside the Madison area is subjected to the same proscription as that moving in interstate commerce.”).
179.  Compare Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070, 1102 (9th Cir. 2013) (discussing the C & A Carbone, Inc. v. Town of Clarkstown decision only in regard to facially discriminatory laws) with C & A Carbone, Inc. v. Town of Clarkstown, N.Y., 511 U.S. 383, 390–91 (1994) (finding that a variety of environmental rationales are not an excuse for discrimination based on the geography of commerce).
180.  See Maine v. Taylor, 477 U.S. 131, 138 (1986) (discussing how the Court determines if a statute burdens interstate commerce incidentally or facially and then determines if the burden is excessive in relation to local benefit); Corey, 730 F.3d at 1108–09. See also Ferrey, supra note 6, at 167–69 (describing the Supreme Court’s market-participant analysis).
181.  See infra Section V (discussing how the Ninth Circuit decision regarding the Dormant Commerce Clause was an anomaly in regard to the other courts throughout the country).
4. Rehearing En Banc?

The Ninth Circuit denied a petition for a rehearing en banc, but there were members of the Ninth Circuit who dissented. The dissent noted: “California could—under the majority’s reasoning—penalize out-of-state wineries to account for the environmental effects of transporting their wines to California.”182 In the dissent Judge Smith, joined by six other judges, stated that California’s liquid fuel standard discriminates against interstate commerce; therefore, the Ninth Circuit majority is “squarely at odds with the Supreme Court precedent.”183 The dissent states, “Because ethanol from Midwestern states faces a regulatory burden that chemically identical in-state ethanol does not, California’s regime is facially discriminatory.”184

The dissent in the refusal for rehearing also made the distinction that no matter how good a state’s reason is for creating a regulation, if the regulation is facially discriminatory, that reason is legally irrelevant under the Supreme Court’s Dormant Commerce Clause precedent.185 According to the dissent, since California’s LCFS is facially discriminatory, any justification for it must pass the strictest scrutiny.186 The dissent determined that the LCFS would fail to pass strict scrutiny because CARB had conceded that the LCFS would play a de minimis role in combatting climate change.187 Thus, the dissent declared, “California admits that its scheme will have little to no effect in averting the environmental catastrophe envisioned by the majority.”188 The dissent also noted that because the LCFS factors in the transportation emissions to deliver ethanol from its place of commerce to California, the regulation discriminates against out-of-state ethanol and “will assuredly promote California’s energy industry at the expense of out-of-state competitors.”189 In conclusion, the dissent found that the LCFS has an extraterritorial reach by affecting the production and land-use decisions of other states.190

The U.S. Constitution’s Dormant Commerce Clause embodies a special concern of maintaining an individual state’s economic sovereignty, which is

182. Rocky Mountain Farmers Union v. Corey, 740 F.3d 507, 518 (9th Cir. 2014) (Smith, J., dissenting).
183. Id. at 512.
184. Id. at 516.
185. See id. (Smith, J., dissenting) ("[T]he purpose of, or justification for, a law has no bearing on whether it is facially discriminatory." (citing Chem. Waste Mgmt., Inc. v. Hunt, 504 U.S. 334, 340-1(1992))).
186. Id.
187. Id.
188. Id. at 517.
189. Id.
190. Id.
not to be infringed by other states’ regulations.\textsuperscript{191} As noted in some \textit{amici} briefs to the Ninth Circuit, there now appears to be no limit for states in the Ninth Circuit on regulating commercial imports based on their transportation distance and use of fossil-fuel-fired electricity during production.\textsuperscript{192}

5. The Supreme Court Strict Scrutiny

Neither the Supreme Court nor any other circuit court in the country has held the same way as the Ninth Circuit on the Dormant Commerce Clause. For decades prior to the \textit{Rocky Mountain Farmers Union v. Corey} decision, in more than a dozen cases decided by the Supreme Court, states have unsuccessfully attempted to block imported waste.\textsuperscript{193} The Supreme Court has consistently applied strict scrutiny to cases concerning geographic discrimination, whether along state or geographic lines. The Ninth Circuit majority in \textit{Corey} reversed the trial court’s decision and used the more lenient and discriminatory \textit{Pike} balancing test.\textsuperscript{194}

Even when a state statute is drafted in a fashion that is facially neutral rather than expressly discriminatory, the Supreme Court applies a strict scrutiny standard when the state law has a discriminatory effect.\textsuperscript{195} The Supreme Court does not permit discrimination based on the origin of electricity in enforcing the Dormant Commerce Clause.\textsuperscript{196} The Court, when

\textsuperscript{191} \textit{Id.}\textsuperscript{at} 518 (“Finally, the majority significantly underestimates the risk that California’s ethanol scheme will spur other states to enact ‘the kind of competing and interlocking local economic regulation that the Commerce Clause was meant to preclude.”).

\textsuperscript{192} \textit{See} Brief of Amici Curiae Michael Wang, Ph.D., in Support of Defendants-Appellants, Rocky Mountain Farmers Union v. Corey, 739 F. 3d 1070 (9th Cir. 2013) (Nos. 12-15131 and 12-15135), 2012 WL 2376703 (noting items whose production and use could attract lifecycle scrutiny and, by extension, regulation akin to LCFS, including: newspapers, refrigerators, light bulbs, camp stoves, and computers).

\textsuperscript{193} \textit{See}, e.g., \textit{City of Philadelphia v. New Jersey}, 437 U.S. 617, 624 (1978) (invalidating a New Jersey law that prohibited the import of most solid and liquid wastes originating outside the state).

\textsuperscript{194} \textit{See} Rocky Mountain Farmers Union v. Corey, 739 F.3d 1070, 1078 (2013) (directing the district court to apply the \textit{Pike} the balancing test). \textit{Id.} at 1108–09 (Murguia, J., dissenting) (noting that “in making [the] geographic distinction, the [regulation] patently discriminates against interstate commerce.” The burden is on California to demonstrate that no less burdensome regulatory incentives were available to control GHGs, and at oral argument, California admitted that there were less burdensome alternatives on interstate commerce than “to use lifecycle analysis to reduce GHG emissions.”) (internal citation omitted).


using strict scrutiny, almost always finds that the state action is unconstitutional.\textsuperscript{197}

The Ninth Circuit majority opinion on the California LCFS matter is not consistent with Supreme Court precedent on electricity.\textsuperscript{198} Thus, distance of transportation and the largely uncontrollable random fate of whether the electricity used to produce ethanol comes from high-carbon coal or zero-carbon nuclear energy, hydropower, or renewable energy are now critical variables in the Ninth Circuit’s calculation of energy regulations from all geographic regions. Now, for the first time in a judicial decision, distance travelled from producer to consumer is elevated to a new valid factor on which states may discriminate against interstate commerce.\textsuperscript{199}

Because transporting all physical goods uses fossil fuels, a state can regulate to disfavor goods originating and travelling a greater distance from out-of-state as a per se component of its regulatory effort to minimize CO₂ emissions.\textsuperscript{200} This new metric permits regulatory discrimination on the distance goods travel in interstate commerce, which is geographic discrimination based on the point of origin.\textsuperscript{201} The Ninth Circuit majority stated, “The dormant Commerce Clause does not require California to ignore the real differences in carbon intensity among out-of-state [product] pathways” to California, including the types of emissions resulting from electricity generation where the goods are produced, and the distance the product travels to California.\textsuperscript{202} This creates, for the first time, a basis for routine state discrimination based on the distance of travel of any out-of-state articles in interstate commerce.\textsuperscript{203}

\textbf{B. Ninth Circuit Oregon Energy Regulation}

\textsuperscript{197} See generally ERWIN CHEMERINSKY, CONSTITUTIONAL LAW 567 (Chemerinsky et al. eds., 5th ed. 2015) (describing the general use of strict scrutiny and how when courts use strict scrutiny laws are often ruled unconstitutional).

\textsuperscript{198} Compare New England Power Co. v. New Hampshire, 455 U.S. 331 (1982) (creating precedent that states may not restrict the flow of privately owned and produced electricity in interstate commerce in a matter inconsistent with the Commerce Clause), with Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070 (9th Cir. 2013) (finding LCFS regulations did not exceed California’s authority under dormant Commerce Clause by regulating extraterritorial conduct). See also Wyoming v. Oklahoma, 502 U.S. 437, 437 (1992) (illustrating how the Ninth Circuit was inconsistent with the Supreme Court precedent); All. for Clean Coal v. Miller, 44 F.3d 554, 596–97 (N.D. Ill. 1993) (holding that the Illinois Coal Act, which favored in-state coal, violated the Commerce Clause).

\textsuperscript{199} See COREY, 730 F.3d 1070, 1083 (holding that California’s Low Carbon Fuel Standards (LCFS) do not impermissibly regulate extraterritorial conduct by taking into account distance and is exempted from the Clean Air Act’s preemption provision).

\textsuperscript{200} Id.

\textsuperscript{201} Id.

\textsuperscript{202} Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070, 1093 (9th Cir. 2013).

\textsuperscript{203} Id.
In 2015, Oregon’s Environmental Quality Commission (EQC) enacted a LCFS very similar to California’s LCFS regulation.\(^{204}\) Starting in 2016, the regulated parties participate in a trading system similar to California’s; they use credits and deficits “generated when clean fuel is produced, imported, dispensed or used in Oregon.”\(^{205}\) Producers buy or sell their credits to offset any deficits they may have based on their carbon intensity scores.\(^{206}\) As in California, Oregon calculates carbon intensity scores based on the type of fuel, its means of production and distribution, and other factors.\(^{207}\) Opponents challenged that it “discriminates in favor of Oregon industry at the expense of out-of-state industry.”\(^{208}\)

The American Trucking Association and two petroleum industry trade groups asked a federal judge to enjoin the Oregon low-carbon fuel standard on the grounds that it violates the Dormant Commerce Clause and federal statutes preempt it.\(^{209}\) Plaintiffs challenged the Oregon Program pursuant to the Dormant Commerce Clause, arguing it:

\begin{enumerate}
    \item discriminates against out-of-state commerce in violation of the Commerce Clause; 
    \item regulates extraterritorial activity in violation of the Commerce Clause; 
    \item expressly is preempted by section 211(c) of the Clean Air Act and the Environmental Protection Agency’s (“EPA”) Reformulated Gasoline Rule (“RFGR”); and 
    \item is conflict preempted by the Act’s Renewable Fuel Standard (“RFS”) as amended by the Energy Independence and Security Act (“EISA”).\(^{210}\)
\end{enumerate}

Plaintiffs argued that the LCFS is as an incentive to in-state producers and impermissibly regulates out-of-state conduct.\(^{211}\)

\(^{204}\) See Am. Fuel & Petrochemical Mfrs. v. O'Keefe, 134 F.Supp.3d 1270, 1276 n.6 (D. Or. 2015). The program began in 2009 when the Oregon EQC was directed by the State to adopt rules aimed at decreasing greenhouse gases produced by transportation fuels. Id. at 1271. Phase 1 began on January 1, 2013, when the state began requiring regulated parties, i.e. “[a]ll persons that produce in Oregon or import into Oregon any regulated fuel,” “to register for the Oregon Program and record/report the volumes and carbon intensities of their transportation fuels. Id. at 1275. Then, in January of 2015, Phase 2 began, which “require[d] regulated parties to meet annual clean fuel standards.” Id.

\(^{205}\) Id. at 1275–76.

\(^{206}\) Id. at 1280. Each entity that produces fuel in Oregon or imports fuel into the state must meet average carbon intensity limits across all of its products. Id. It can demonstrate compliance by producing or importing only fuels that meet the standard, by producing or importing fuels that meet the standard in aggregate, or by purchasing credits generated by fuels below the standard to reduce the average intensity of its products. Id. at 1275.

\(^{207}\) Id. at 1277.

\(^{208}\) Id. at 1277.

\(^{209}\) Id. at 1284.

\(^{210}\) Id. at 1276.

\(^{211}\) Id. at 1277.
A federal judge in the state of Oregon dismissed the suit, finding that the regulation did not discriminate against out-of-state commerce in violation of the Commerce Clause. Relying on the prior Ninth Circuit decision in *Rocky Mountain Farmers Union v. Corey*, the judge said, “Whatever effects the Oregon Program may ultimately have on Oregon’s biofuels market, there are no plausible allegations demonstrating that out-of-state producers will be commercially disadvantaged or considerably burdened.” The trial court rejected this plaintiff’s attempt at “selective comparison, which excludes relevant [competing] fuel pathways and held that discrimination claims, whether premised on ethanol or petroleum, must be viewed ‘in context of the full market.’”

The Ninth Circuit found that there was not a Dormant Commerce Clause violation, consistent with the California LCFS case. No other federal circuits nor the Supreme Court have held similarly regarding the Dormant Commerce Clause. This places the Ninth Circuit, and the relatively large number of nine states within its jurisdiction, in a unique and juxtaposed position in constitutional jurisprudence.

### V. The District Courts and ZECs

In 2017, two district court decisions involved nuclear electric generation plants that exceeded their initial federal Nuclear Regulatory Commission licenses and lapsed into extension periods—the states where these plants are located chose to subsidize the plants in the same manner that the states subsidize renewable energy. Both of these trial court decisions proceeded to their respective circuit courts on appeal in 2018.

Twenty-nine states and the District of Colombia have subsidy programs for renewable energy portfolio standards, and several of these programs have encountered facial Dormant Commerce Clause challenges alleging the programs discriminate against renewable power generation based on its out-

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Id. at 1271.

Id. at 1283.

Id. at 1279 (internal citations and quotations omitted).

Id.


of-state geography of where the power is generated.\textsuperscript{218} Challenged states typically only survived those legal challenges by either: (1) modifying the challenged aspect to remove geographic discrimination; or (2) precluding the court from the merits of the challenge by asserting the claimants lack standing and private rights of action defenses.\textsuperscript{219} In both of these 2017 federal district court decisions, the states employed the latter strategy, arguing that the challengers lacked standing.\textsuperscript{220} The courts dismissed the suits procedurally; however, each judge opined that it would uphold the state subsidy even if it could reach the merits because the Dormant Commerce Clause's strict scrutiny standard for geographic discrimination would not apply.\textsuperscript{221}

\textbf{A. Illinois ZECs}

In July 2017, the U.S. District Court in Illinois found that Illinois’s Zero Emission Credit program (ZEC) survived allegations of violating the Dormant Commerce Clause.\textsuperscript{222} The primary basis of the holding was a procedural bar the court implemented because the plaintiffs could not demonstrate personal injury from implementation of the Illinois ZEC law.\textsuperscript{223} Traditionally, standing is shown if there is an injury in fact to plaintiffs.\textsuperscript{224} The district court stated that if the harm is not traceable to the discrimination of the regulating state against the commerce of other states, then any out-of-state plaintiffs lack standing because, being out of state, they do not present a case or controversy.\textsuperscript{225} This logic may appear somewhat circular; although, it resulted in dismissal of plaintiffs’ claims.

Notwithstanding this procedural holding, opining on the merits, the court stated that the purpose of the Dormant Commerce Clause is to “guard against the evils of economic isolation and protectionism.”\textsuperscript{226} Laws that facially discriminate against interstate commerce and favor in-state

\begin{flushleft}
\textsuperscript{218} CAROLYN ELEFANT & EDWARD A. HOLT, THE COMMERCE CLAUSE AND IMPLICATION FOR STATE RENEWABLE PORTFOLIO STANDARD PROGRAMS 3, 7 (2011).
\textsuperscript{219} See infra Section V (discussing the ways in which district courts have treated dormant commerce clause challenges to ZEC’s).
\textsuperscript{220} Zibelman, 272 F. Supp. 3d at 583 n.30; Vill. Of Old Mill Creek, 2017 WL 3008289, at *16.
\textsuperscript{221} Zibelman, 272 F. Supp. 3d at 586, n.36; Vill. of Old Mill Creek, 2017 WL 3008289, at *53–54.
\textsuperscript{222} Vill. of Old Mill Creek, 2017 WL 3008289, at *7.
\textsuperscript{223} Id.
\textsuperscript{224} See generally FERREY, supra note 6, at 52 (using environmental case law to describe the requirements of a plaintiff to have an “injury-in-fact”).
\textsuperscript{225} Vill. of Old Mill Creek, 2017 WL 3008289, at *7.
\textsuperscript{226} Id. at *15 (quoting City of Philadelphia v. New Jersey, 437 U.S. 617, 623–624 (1978)).
\end{flushleft}
economic interests over out-of-state economic interests are invalid per se.\textsuperscript{227} Here, plaintiffs argued that the Illinois statute discriminated against interstate commerce on its face because the State had already determined that it would award ZECs to the existing in-state Clinton and Quad Cities nuclear energy facilities.\textsuperscript{228} State regulations mandate that utilities purchase the Illinois ZEC certificates and pass the costs on to retail electricity ratepayers.\textsuperscript{229}

The district court undertook only a \textit{de jure} examination of the law: it highlighted that the state statute did not explicitly bar out-of-state nuclear generators from submitting bids for Illinois ZECs.\textsuperscript{230} However, the reality was that the state only awarded Zero-emission Energy Certificates to in-state plants.\textsuperscript{231} \textit{De jure}, the court found the statute facially non-descript as to which plants would be recipients of the state regulatory benefits; thus, the court found it geographically non-discriminatory, despite the \textit{de facto} reality of that State awarded benefits only to in-state nuclear facilities.\textsuperscript{232} The court decided that it should and would trust the state regulatory agency, the Illinois Commerce Commission (ICC) to administer the statute without geographic discrimination.\textsuperscript{233} Plaintiffs contended that, in practice, the ZEC program has the clear effect of favoring in-state economic interests for commerce in electric energy over out-of-state interests.\textsuperscript{234} In response to this claim, the court articulated:

Assuming that only Illinois nuclear generators are selected, the ZEC program would not be invalid, necessarily, because there are many ways to explain how a valid program could produce that end. For example, it is possible that no out-of-state generator will submit a bid, thereby mooting plaintiffs’ discriminatory effects claim. It is also possible that the ICC will decide that Illinois generators are in the best position to reduce air pollutants in Illinois, which would justify a decision to select only Illinois generators. In light of plaintiffs’ facial challenge, and accepting the allegations of how the

\begin{itemize}
\item \textsuperscript{227} Id.
\item \textsuperscript{228} Id. (“Specifically, the complaint alleges that the ZEC program distorts the market by driving out and deterring the entry of more cost-efficient, environmentally-friendly, out-of-state generators, and that the reduction of carbon emissions can be achieved through means that do not discriminate against interstate commerce”) (internal citations omitted).
\item \textsuperscript{229} Id. at 1.
\item \textsuperscript{230} Id. at *15.
\item \textsuperscript{231} See id. (explaining that Clinton and Quad Cities, both in Illinois, have been the only locations awarded with certificates).
\item \textsuperscript{232} Id.
\item \textsuperscript{233} Id.
\item \textsuperscript{234} Id. at *16.
\end{itemize}
program will work in practice, I conclude that there is a substantial possibility that the statute will be non-discriminatory in effect.\textsuperscript{235}

However, this ignores the argument that Illinois’s similar RECs program favoring in-state electric commerce could be identified as geographically discriminatory in favor of in-state renewable energy and against out-of-state renewable energy.\textsuperscript{236} The Seventh Circuit Court of Appeals had previously declared in \textit{dicta} that Midwest states could not award RECs only to in-state renewable energy without violating the Constitution.\textsuperscript{237}

The plaintiffs in the ZEC case argued that the law has a discriminatory purpose and noted that it was enacted for political reasons, specifically to save jobs and property tax revenues from the two nuclear power plants in Illinois.\textsuperscript{238} The district court, however, stated that it must assume that objectives articulated by the legislature are true, unless circumstances force the court to conclude that it could not have been the goal of the legislature.\textsuperscript{239} The court also found that the Illinois governor’s political pro-discrimination statements did not negate the environmental goals of the ZEC program.\textsuperscript{240} Of contrasting legal note, the federal district court in Vermont, the Second Circuit, and the Supreme Court, have each held the opposite and do not defer to government statements on supposed purpose of a law—instead those courts look at the law’s true purpose, rather than the government-stated purpose.\textsuperscript{241}

The district court concluded that the Illinois ZEC program created a new market.\textsuperscript{242} Although the program may affect the wholesale power market, which states may not influence or regulate (even indirectly), the district court explained that burden is merely incidental on the channels of interstate commerce:

\textsuperscript{235}. \textit{Id.}
\textsuperscript{236}. \textit{See 20 ILL. COMP. STAT. 3855/1-20} (2007) (providing that the power is to be supplied to facilities within the state of Illinois).
\textsuperscript{237}. Ill. Commerce Comm’n v. Fed. Energy Regulatory Comm’n, 721 F.3d 764, 776 (7th Cir. 2013) (citing Steven Ferrey, \textit{Threading the Constitutional Needle with Care: The Commerce Clause Threat to the New Infrastructure of Renewable Power}, 7 TEX. J. OIL, GAS & ENERGY L. 59, 80 (2012)).
\textsuperscript{238}. \textit{Vill. of Old Mill Creek}, 2017 WL 3008289, at *16 (Explaining that plaintiffs cited statements by the Illinois Governor to demonstrate a discriminatory purpose while defendants claimed that the law was intended to “advance public health and protect the environment by reducing the emissions of air pollutants created by energy generators.”).)
\textsuperscript{239}. \textit{Id.} (quoting Minnesota v. Clover Leaf Creamery Co., 449 U.S. 456, 463 (1981) (finding that the statute was environmental and job-saving legislation that did not demonstrate discrimination by the legislature).
\textsuperscript{240}. \textit{Id.}
\textsuperscript{242}. \textit{Vill. of Old Mill Creek}, 2017 WL 3008289, at *16.
As a matter of law, the state's legitimate interests include not only environmental concerns, but also the right to participate in or create a market and the right to encourage power generation of its choosing.\footnote{Id. at *17 (internal citations omitted).}

However, following precedents, this is not the correct application of the market participation exception under the Dormant Commerce Clause. The market participant exception, as set forth in \textit{Hughes v. Alexandria Scrap Corp.}, applies where the state or government entity elects to place its own income held in general state revenue accounts into commerce or owns the nuclear plant generating the affected power.\footnote{FERREY, supra note 6, at 167–168.} It does not apply when the government agency compels a result by enacting a law or regulation of private industry and/or does not own the facility creating the electricity commerce.\footnote{See generally id. (inferring that the market participant analysis refers to when a state is an actual economic participant, not when the state has chosen to regulate through statute or regulations).}

The facts here are transparent: Illinois acted through state regulation of its private utility companies, requiring them to purchase ZECs it bestowed only on privately owned in-state nuclear power plants.\footnote{See \textit{Vill. of Old Mill Creek}, 2017 WL 3008289, at *3–5 (explaining how the weighted factors of the ZEC procurement process tend to favor in-state nuclear generators).} Illinois does not own the nuclear plants awarded REC certificates or the utilities that are required to purchase the ZECs.\footnote{See id. at *1 (explaining that Exelon, not Illinois, owned the power plants in question).} The district court’s decision ignores prior Supreme Court application of the market participant exception by allowing geographic discrimination regarding interstate commerce.\footnote{See \textit{FERREY}, supra note 6, at 167–68 (explaining that a state cannot ordinarily discriminate on the basis of geography unless it controls the infrastructure in question and, therefore, is a market participant).}

Instead, the district court found the discrimination against interstate commerce in electricity through the 13 PJM states, including Illinois, not excessively discriminatory.\footnote{See \textit{Vill. of Old Mill Creek}, 2017 WL 3008289, at * 15 (discussing how the court views the statute to not discriminate against the interstate commerce clause); \textit{Who We Are}, PJM, http://www.pjm.com/about-pjm/who-we-are.aspx [https://perma.cc/5HEP-2JHQ] (last visited Apr. 18, 2017) (“PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.”).} The district court violated Supreme Court...
precedent that discrimination is not justified when a state pursues environmental goals.250

B. New York ZECs

In July 2017, the U.S. District Court for the Southern District Court of New York upheld a similar New York state ZEC program awarding incentives to in-state existing nuclear power plants.251 Plaintiffs alleged that the ZEC program violates the Dormant Commerce Clause because it facially discriminates against out-of-state energy producers (including other nuclear and carbon-free energy producers).252 Plaintiffs further alleged the program imposes an undue burden on interstate commerce “by distorting market pricing and incentives, which will cause energy generators, including out-of-state energy providers, to leave the market or discourage their entry into the market.”253

Here, as is typical where states have been successful in deflecting legal challenges to state energy regulation under the Dormant Commerce Clause, the district court held that the plaintiffs lacked standing to bring any claims.254 The court first noted that the plaintiffs did not have a cause of action because they did not show a nexus between their injury and the ZEC program.255 The court found the plaintiffs’ allegations to not be within the “zone of interests” provided by the Dormant Commerce Clause.256

Setting aside the justiciability issue, the court stated that a state law or regulation only “violates the dormant Commerce Clause only if it (1) it ‘clearly discriminates against interstate commerce in favor of intrastate commerce,’ (2) ‘imposes a burden on interstate commerce incommensurate with the local benefits secured,’ or (3) ‘has the practical effect of an ‘extraterritorial’ control of commerce occurring entirely outside of the boundaries of the state in question.’”257 This is the Pike balancing test, rather than, the strict scrutiny test that the Supreme Court applies to any type of

250. See West Lynn Creamery, Inc. v. Healy, 512 U.S. 186, 188, 205 (1994) (holding that discrimination involving milk pricing, though might be seen as environmental preservation, would not be sufficient to uphold discriminatory state regulation).
252. Id. at 580.
253. Id.
256. Id. at 582.
257. See id. at 580 (quoting Selevan v. N.Y. Thruway Auth., 584 F.3d 82, 90 (2d Cir. 2009)).
state geographic discrimination against commerce based on its geographic origin. The court stated that the Dormant Commerce Clause claim failed because New York is a market participant as opposed to a regulator when it created ZECs. Yet, New York neither owns these nuclear plants nor uses general revenues in the state treasury for the ZEC in-state only subsidies, facts that would make New York a market participant in these projects. In fact, New York acts through its regulation of private utilities, rather than as a market participant owning the nuclear plants or expending its state treasury to subsidize these plants. Ultimately, the costs from the ZEC contracts were paid through state regulation and by New York ratepayers—not taxpayers.

The district court stated that although the Supreme Court has not addressed the constitutionality of subsidies, it has struck down a subsidy that was attached to a discriminatory tax (the tax rate was lower for in-state producers). The district court then declared that the New York ZEC program is not tied to a tax incentive/disincentive, and that was sufficient to distinguish ZECs from an unconstitutional subsidy. In addition, the court applied a market participation exception to the Dormant Commerce Clause:


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260. Id. at 585.
261. Id.
262. Id.
263. Id. at 586 (quoting Camps Newfound/Owatonna, Inc. v. Town of Harrison, 520 U.S. 564, 589 (1997); West Lynn Creamery, Inc. v. Healy, 512 U.S. 186, 199 (1994)).
264. Id. at 573.
However, the court is simply wrong that these ZECs are funded out of general revenue—it fundamentally misconstrues what state ZEC programs do. This is the same conclusion as the Illinois district court in its similar ZECs case, and the conclusion suffers from the same misapplied analysis. 266 Neither Illinois nor New York placed its own state treasury revenue into commerce, owned any of the nuclear power plants benefiting from ZECs, or owned the retail utilities (which were ordered by state regulation to purchase the ZECs and pass those costs on to their captive ratepayers). 267 In each case, the state acts through regulation of private industry, rather than owning the facility(ies) engaged in electricity commerce. 268 Each state acted by regulating private electric power industry participants regarding ZECs. 269 Neither state had any ownership of the nuclear plants or the utilities, which were required to purchase the ZECs. 270

Notwithstanding this, the district court concluded on the potential merits that “[e]ven if Plaintiffs had a cause of action, their dormant Commerce Clause claim would fail because New York was acting as a market participant, not as a regulator, when it created ZECs.” 271 The trial court went on to flip upside down the Supreme Court analysis in Hughes v. Alexandria Scrap Corp., which allowed state use of tax subsidies, by declaring “neither is New York required to provide financial assistance in the form of ZECs to out-of-state power plants when the ZECs are ultimately paid for by New York rate-payers.” 272 The court further blurred the precedent construing the Dormant Commerce Clause when it stated:

New York is paying the nuclear power plants a set dollar amount for each MWh of electricity they produce in recognition of the zero-emission attributes of their electricity. This is no different than

266. Id. at 566-67 n.11-12 (citing Vill. of Old Mill Creek v. Star, No. 17 CV 1163, 2017 WL 3008289, at *9-14 (N.D. Ill. 2017)).
268. Ferrey, supra note 6, at 168.
270. Zibelman, 272 F. Supp. 3d at 585. See also Vill. of Old Mill Creek, 2017 WL 3008289, at *1 (stating that only the true owner, Exelon, may receive the credit).
Maryland paying a set bounty to hulk processors. Whether the subsidy amount is at a government-set rate, as it is here and as it was in *Alexandria Scrap* or set by market forces, as it was in *Alco*, has no impact on the market participant analysis.²⁷³

The district court neglects to reconcile that in all the Commerce Clause market participant exceptions recognized by the Supreme Court, the states have expended tax revenues already in state coffers.²⁷⁴ In New York and Illinois, the states instead used regulations to compel private industry to spend their (and their customers’) private funds, rather than employing state-owned revenues.²⁷⁵ Moreover, state utility commission regulations mandated that these private revenues subsidize designated in-state market participants at the expense of other out-of-state market participants who sell wholesale power in interstate commerce in the state.²⁷⁶

This can constitute in-state geographic discrimination of commerce embodied in state regulations. The New York trial court states, “The dormant Commerce Clause does not restrict which in-state businesses a State may subsidize when it is expending its own funds to do so . . . ”²⁷⁷ However, New York and Illinois are not expending their state-owned funds; rather, they use regulations to order private industry to expend consumers’ funds when the state does not own the industry.²⁷⁸ So, the quoted declaration above by the district court is incorrect, and this does not accurately describe what occurred in New York.

Moreover, if either of these district courts were right that using a regulation instead of a tax or creating a subsidy funded with regulated ratepayer and regulated utility funds ordered by state regulation was enough to exempt a geographically discriminatory regulation, then any state could justify almost any discriminatory regulation it wished. It is not that simple to successfully evade application of the Dormant Commerce Clause before the Supreme Court, to date.

VI. THE DORMANT COMMERCE CLAUSE

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²⁷³ Id. (internal citations omitted).
²⁷⁴ See id. at 586 (acknowledging that the Supreme Court has never confronted the constitutionality of subsidies).
²⁷⁵ See id. at 585 (discussing privately owned New York facilities); Vill. of Old Mill Creek, 2017 WL 3008289, at *3 (discussing privately owned Illinois facilities).
²⁷⁶ Zibelman, 272 F. Supp. 3d at 585.
²⁷⁷ Id.
²⁷⁸ See Zibelman, 272 F. Supp. 3d at 585 (discussing the state created program for ZECs); Vill. of Old Mill Creek, 2017 WL 3008289, at *3–5 (discussing a state statute that regulates the private energy industry in Illinois).
There are ZEC oscillations in the interpretation of the Commerce Clause. These two 2017 district court opinions do not appear to follow Supreme Court and Circuit Court precedent. Both are on appeal in 2018.279 States often tend to favor their own in-state interests at the expense of out-of-state interests, but states may not “provid[e] a direct commercial advantage to local business.”280

However, a long and consistent line of Supreme Court and federal circuit court decisions applying the Dormant Commerce Clause forbid not only in-state discrimination but also any geographic discrimination against interstate commerce.281 The Supreme Court has held that statutes establishing regional barriers (not necessarily just one-state isolation) and discriminating only against some states (rather than all states) violate the Commerce Clause.282 Thirty-five years ago, the Supreme Court ruled that there is nothing in the U.S. more basically in interstate commerce than electricity.283 Moreover, both Illinois and New York participate in ISOs, which independently regulate and distribute federally regulated interstate wholesale power, as illustrated by Figure 7.284 State regulations that discriminate against out-of-state power, subsidize power using regulation of utility rates, or pass subsidies through to ratepayer rates rather than fund them by state treasury revenues represent geographic discrimination subject to the “strict scrutiny” under the Dormant Commerce Clause.285 Even if somehow justified as serving a compelling state interest, the state typically must establish that the statute or regulation employs the least restrictive means affecting commerce.286

Applying only a *de jure* test to state statutes does not comport with the Dormant Commerce Clause. Even when a statute is drafted in a fashion that is facially neutral rather than expressly discriminatory, a court applies a “strict scrutiny” standard when the state law has a discriminatory effect.287

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284. See Electric Power Markets: National Overview, FED. ENERGY REG. COMMISSION, https://www.ferc.gov/market-oversight/mkt-electric/overview.asp [https://perma.cc/YN53-SDJS] (last updated Apr. 13, 2017) (showing a map that depicts the different national energy markets such as MISO, which includes Illinois and NYISO, which includes New York).
285. See generally PERREY, supra note 6 (discussing how the Commerce Clause and the level of scrutiny that courts apply to state laws discriminating against out-of-state distributors).
286. See id. (describing that when using strict scrutiny the courts must apply the least restrictive means).
287. Hunt, 432 U.S. at 352–53. See also C & A Carbone, Inc. v. Town of Clarkstown, 511 U.S. 381, 392 (1994) (refering to a the strict scrutiny standard as a rigorous standard that when applied
Even when there is no obvious facial discrimination in the language of a state statute against out-of-state or other geographically based commercial interests, where the effect or unstated purpose is to discriminate, the ultimate effect is enough to make the regulation unconstitutional. 288 “Statutes that discriminate by practical effect and design rather than explicitly on the face of the regulation, are similarly subjected to heightened scrutiny.” 289 A regulation which evinces discriminatory purpose against interstate commerce, “or unambiguously discriminates in its effect . . . almost always is ‘invalid per se.’” 290

The only exception to this result is the “market participant” exception, which applies where the state injects its general funds from its state treasury to fund geographic discrimination, or if the state owns the subsidized plants that create the commerce in electricity. 291 The facts in the cases of New York and Illinois did not qualify the states for the market participant exception, despite the court’s application of the exception. 292

In similar exercises of a state energy commission’s regulation of privately owned wholesale power generation facilities, the Second and Eighth Circuits recently recognized that “strict scrutiny” applies, there is no “market participant” exception, and such geographic discrimination based on the source of power violates the Dormant Commerce Clause. 293 Similarly, the Supreme Court has also held electricity qualifies as interstate commerce. 294 Unconstitutional state regulation, when challenged, can result in the challengers’ attorneys’ fees being picked up by state taxpayers—so there is much at risk. 295

acts as a per se standard against discrimination).

288. Hunt, 432 U.S. at 352. See also C & A Carbone, Inc., 511 U.S. at 390 (describing how the statute on waste was not written to differentiate solid waste based on its geographic location).


292. Compare South-Central Timber Dev., Inc. v. Wunnick, 467 U.S. 82, 97 (stating that the market-participant doctrine allows states to influence “a discrete, identifiable class of economic activity in which [it] is a major participant”) (quoting White v. Mass. Council of Const. Emp’r, Inc., 460 U.S. 204, 211 (1983)), with Vill. of Old Mill Creek, 2017 WL 3008289, at *16 (describing how although Illinois created a new market their participation is only “incidental” and does not qualify for the market participant exception).

293. See North Dakota v. Heydinger, 825 F.3d 912, 919–21 (8th Cir. 2016) (discussing the unconstitutionality of Minnesota’s power discrimination based on the dormant commerce clause by applying the per se standard, when used is equivalent to the strict scrutiny standard); Allco Fin. Ltd. v. Klee 861 F.3d 82, 103–08 (2d Cir. 2017) (applying strict scrutiny to a possible violation of the dormant commerce clause).


Even a small or indirect discriminatory impact can be stricken under strict scrutiny review. A geographically discriminatory impact is not required to expressly mention geography and can appear neutral but have an unconstitutional geographically direct or indirect impact on commerce: "Such a [contrary] view, we have noted, 'would mean that the Commerce Clause of itself imposes no limitations on state action . . . save for the rare instance where a state artlessly discloses an avowed purpose to discriminate against interstate goods.'"


NET-METERED INFRASTRUCTURE-BASED HYDROPOWER

Russell King*

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INTRODUCTION

Climate change is upon us, and its effects are dire. Caused by anthropogenic greenhouse gas (GHG) emissions,¹ our changing climate

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unabated. Indeed, the Environmental Protection Agency (EPA) estimates the average social cost of carbon as $11–56 per metric ton of carbon dioxide (CO₂) in 2015, an amount that will steadily increase to $26–95 by 2050. This amounts (conservatively) to almost $120 billion in lost wages, productivity, and health effects by 2050, assuming that carbon emissions do not increase. These figures only consider CO₂; other GHGs, such as methane and sulfur oxides, threaten similar harm in addition to that caused by CO₂. Moreover, these are the direct effects of climate change; the consequences are not limited to these effects. In essence, climate change invites catastrophe. Therefore, public and private actors must seek answers to the globe’s most pressing issue.

One of these answers is energy policy. Fossil fuel electric generation is the nation’s single largest source of GHGs. By reducing or even ending fossil fuel generation, the U.S. can significantly reduce its GHG emissions. Of course, the U.S. will still need electricity. Thus, in place of fossil fuel generation, the U.S. should build renewable energy generation—generation with no GHG emissions from electricity.
production. Renewable energy takes many forms including solar, wind, geothermal, biodigesters, and hydropower. No one source of renewable power is sufficient to meet all U.S. energy needs. Nor should it: diversification of our energy supply increases the security and reliability of our grid. As such, energy policy must reflect the value and necessity of renewable energy.

Increasingly, it falls to the states to address and mitigate its contribution to climate change through policy. On the international stage, several agreements, such as the Kyoto Protocol, bind countries to reduce their GHG emissions. However, the United States is not a party to the Kyoto Protocol. Further, agreements to which America was a party—the Paris Agreement—may now be back on the table.

The federal government has few renewable energy policies. It promotes renewable energy through tax credits, grants, and funding research and development. Additionally, federal agencies have jurisdiction over leasing

12. See JOSEPH P. TOMAIN & RICHARD D. CUDAHY, ENERGY LAW IN A NUTSHELL 509–511 (2nd ed. 2011) (describing a case for the “seemingly limitless renewable resources” as “inexpensive or costless, and relatively environmentally benign.”).


15. See infra, Part II.A.


Federal Energy Regulatory Commission (FERC) regulates wholesale electricity—bulk electricity in interstate commerce for resale\textsuperscript{24}—with an eye towards resource neutrality.\textsuperscript{25} Again, the Trump administration has expressed interest in traditional fossil fuels rather than renewable sources.\textsuperscript{26} Support is waning or deficient at international or federal levels and the states are left to shoulder the burden of developing energy policies addressing climate change.

And states have been doing just that.\textsuperscript{27} States support renewable energy through tax credits and tax breaks,\textsuperscript{28} direct subsidies,\textsuperscript{29} and a host of other programs that finance projects and reduce barriers to renewable energy adoption.\textsuperscript{30} However, this support is not evenly spread amongst renewable technologies.\textsuperscript{31} Most notably, hydropower receives the short end of the stick in several states. While many states\textsuperscript{32} (and the federal government\textsuperscript{33}) have removed some of the significant permitting and administrative barriers to hydropower, one significant barrier remains—financial barriers. Simply
put, state policies that create necessary financial incentives for other renewable technologies do not extend these policies to hydropower. In light of these policies, and because of hydropower’s advantages as a renewable energy source, this note argues that state policies should at least put hydropower on equal footing with other renewable energy technologies. Part I of this note examines the advantages of hydropower and the varieties of hydropower available. In doing so, it notes that lack of awareness may explain these policies. Part II looks at the role that the federal and state governments play in hydropower, revealing that states have primary responsibility for supporting hydropower. This section also gives an overview of all financial incentive programs, with an emphasis on net metering. Part III looks at Vermont’s net metering program and compares it to examples in other states to evaluate and recommend a better template for renewable energy programs. This note concludes that hydropower is one of our nation’s answers to global warming, equal to other sources of renewable power, and must be treated as such. Further, the recommendations in this note apply to all distributed renewable energy generation resources. Ultimately, hydropower “will never be a complete answer . . . [but] it can be a useful part of the answer.”

I. HYDROPOWER, LARGE AND SMALL

A. The Advantages of Hydropower

Hydropower, aside from emitting no GHGs during power production, offers many advantages over other renewable technologies: a reliable electric supply, high and predictable capacity factors, and wide availability. States must draft policies that capitalize on the wealth of benefits hydropower provides. First, hydropower increases grid reliability and resiliency through portfolio diversity and because it does not rely on
the grid: should one technology become unavailable (such as solar at night), other technologies can pick up the slack. Diversification reduces the cost of power, saving upwards of $93 billion per year. Hydropower is reliable because it runs on flowing water, rather than fuel—water does not need to be purchased and delivered through pipelines or rails. Thus, unlike fossil fuel generation, hydropower is insulated from geopolitical events and natural disasters in far-flung regions.

Second, hydropower has a capacity factor higher than other sources of renewables, zero-emission energy such as photovoltaic (PV), solar thermal, and wind. For example, the average capacity factor for hydropower nationwide in 2015 was 35.9%, higher than wind’s 32.5%, and utility-scale PV’s 28.6%. In certain regions, the difference in capacity factors between renewable energy technologies is even higher. The Northeast (including

df (proposing that FERC initiate rulemaking to compensate baseload generators for having fuel reserves on site) with FERC, ORDER TERMINATING RULEMAKING PROCEEDING, INITIATING NEW PROCEEDING, AND ESTABLISHING ADDITIONAL PROCEDURES, 162 FERC ¶ 61, 12 (Jan. 8, 2018), https://www.ferc.gov/CalendarFiles/20180108161614-RM18-1-000.pdf. (rejecting DOE’s NOPR and passing the issue to the RTOs and ISOs) This paper will not weigh in on this debate; however, because hydropower does not rely on fuel, it may meet DOE’s proposed resiliency criteria).


43. Tierney, supra note 40, at 24.
44. ROCÍO URÍA-MARTÍNEZ ET AL., U.S. DEP’T OF ENERGY, 2014 HYDROPOWER MARKET REPORT 36 (2014), http://www.energy.gov/sites/prod/files/2015/04/f22/2014%20Hydropower%20Market%20Report_2015 0424.pdf (“The capacity factor of a hydropower plant is the ratio of actual output to potential output [nameplate capacity] over a given period of time where the potential output is computed by multiplying the number of period hours times the nameplate capacity of the plant.”).
46. Id.
Vermont)—a region with high hydropower potential—sees solar capacities of about 15%. These capacity factors for hydropower reflect an average across all regions and all hydropower technologies. Small; run-of-river additions to non-powered dams, and conduit hydropower see capacity factors of over 55%. While hydropower is an intermittent electricity source like wind and solar, its intermittency is predictable and varies seasonally rather than hourly. For example, the nationwide average capacity for hydropower increases in the rainy months and decreases in the drier winter and summer. Hydropower’s peak capacities correspond to when wind’s production is at its lowest, therefore complementing other renewable technologies. In sum, when the wind does not blow and the sun does not shine, water still flows downhill.

Lastly, hydropower is widely available, particularly in regions where other common renewable technologies are less available. The Department of Energy (DOE) notes that small, low-impact hydropower has great potential in the Northeast. All Northeastern states (except New York) could at least double their hydroelectric output. Some states, like New Jersey, have the potential for a tenfold increase in hydropower. Ultimately, the Northeast has about 1,891 megawatts (MW) of hydropower potential. If fully developed, the electric output from these hydropower facilities would represent a small but significant portion of the

49. U.S. ENERGY INFO. ADMIN., supra note 45.
50. URÍA-MARTÍNEZ, supra note 44, at 36.
52. U.S. ENERGY INFO. ADMIN., supra note 45.
53. See Lea Kosnik, The Potential for Small Scale Hydropower Development in the U.S., 38 Energy Pol’y 5512, 5513 (2010) (showing that hydropower complements other technologies) [hereinafter Kosnik, Hydropower Development]; see Kosnik, Potential of Water Power supra note 36, at 7 (comparing wind, solar, and hydropower capacities and finding that hydropower balances the former two).
55. HALL ET AL., supra note 47, at 26.
56. Id.
57. Id.
potential hydropower on non-powered dams and conduits is abundant.61

Additionally, hydropower is most available in regions where other renewable technologies are not, or cannot, be fully realized. For example, Northeastern states have low solar capacity due to their latitude.62 The region has onshore wind potential,63 but resistance to wind projects, particularly on ridgelines, suggests that this potential may remain at least partially untapped.64 Even if the region’s wind and solar are fully developed, these resources may not be able to fully cover the region’s energy needs. If these states wish to produce zero-carbon electricity, solar and wind power may not be enough. Thus, these states must—and can—install additional hydropower capacity.

A. Large Hydropower

The classic image of hydropower is that of a large, concrete dam that spans the length of a river, takes years and millions of dollars to complete, and leaves a massive reservoir behind it. The classic image is essentially the Hoover Dam.65 This note does not consider financial and administrative burdens on large-scale hydropower. However, an examination of large-scale hydropower serves to illustrate just how different other hydropower technologies are from the classic bigger-is-better model.

Large hydropower differs from small hydropower in two ways. First, there is limited potential for new large-scale hydropower development in

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61. Gina S. Warren, Hydropower: Time for a Small Makeover, 24 IND. INT’L & COMP. L. REV. 249, 253 (2014) (noting that there were an estimated 54,000 non-powered dams that could be powered to increase the current hydropower generation in the United States by 15 percent) (emphasis added) [hereinafter Warren, Small Makeover 2014].
62. BLACK, supra note 48, at 3.
63. WALT MUSIAL ET AL., NAT’L RENEWABLE ENERGY LAB., 2016 OFFSHORE WIND ENERGY RESOURCE ASSESSMENT FOR THE UNITED STATES viii (2016), http://www.nrel.gov/docs/fy16osti/66599.pdf. (explaining that this region has considerable offshore wind potential, which once fully developed can meet a substantial portion—if not all—of this region’s energy needs).
Simply, all of the rivers with this potential are used up. Even if there were untapped rivers, the public has shown that it will not stomach further damming. Essentially, the biggest difference between traditional, large-scale hydropower and other hydropower technologies is that there is no more room for large hydropower development. In contrast, small hydropower has considerable room to grow.

Second, large hydropower comes with a correspondingly large price tag. Eventually, large hydro pays for itself, especially considering that the fuel—moving water—is essentially free. However, in the short run of about fifty years, large hydropower has proved extremely expensive. The average nameplate capacity of a hydroelectric facility is 40MW. Such a facility requires a capital investment of about $80 million. This investment makes financial incentives for hydropower correspondingly more expensive for hydropower developers. Small hydropower incentives need to cover only a fraction of what large hydropower incentives would because the construction of small facilities costs less than the large hydro project with 100MW capacity or more. Small capital investment makes small-hydro capacity projects more accessible to small, distributed
justify.

Notably, the large and small hydro cost comparisons do not include levelized costs. The levelized cost is the net present value of the hydropower system. The current research on levelized cost is incomplete and somewhat inconsistent. There are three takeaways from the data on levelized cost analysis. First, more research must be done before levelized cost can be used to compare small and large hydropower projects. Second, the presence of existing infrastructure seems to have the greatest impact on levelized cost. Third, and perhaps most importantly, small hydropower can offer significant “soft” benefits to the local communities.

Lastly, the environmental impact of large hydropower is greater than small hydropower. Large hydropower generally creates a reservoir behind a dam. While hydropower is an emission-free source of power, the reservoirs behind these large facilities are not emission-free. For example, the total GHG emissions of all reservoirs may be equivalent to all of the rice paddies in the world. In addition to emitting GHGs, dams also produce...
serious ecological impacts for the rivers they block: dams reduce sediment flows, block fish migrations, change river temperatures, and flood riparian ecosystems. Indeed, dams are a significant contributor to declining fish stocks. Large hydropower, for all its benefits, comes at a terrible cost to our rivers and ecosystems. In short, large hydropower is large: large prices and large environmental impacts.

B. Small Hydropower

In the same way that large hydropower comes with large price tags and large environmental impacts, small hydropower comes with small price tags and small environmental impacts. Definitions vary from state to state, but, generally speaking, small hydropower is no more than 20 MW and is usually 10 MW or less. This is the upper limit—there are sub-classifications for projects dipping into the 100 kW or lower range, for example. Whatever the definition or terminology used, the fact of the matter is that small capacity hydropower is significantly smaller than large capacity hydropower.

Another distinction is that small hydropower is usually run-of-river or dam-free. Run-of-river hydropower can include the dams of large hydropower; however, it returns water to the river immediately, rather than storing water. This avoids most of the negative impacts associated with

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87. IRENA, supra note 73, at 27.


89. IRENA, supra note 73, at 11 (noting that the maximum nameplate capacity for small hydropower is 20MW).


91. IRENA, supra note 73, at 11.


93. IRENA, supra note 73, at 8.
dams—sediment buildup, temperature change, and large-scale flooding.94 Run-of-river hydropower is mostly devoid of serious environmental impacts.95

Still, most dams block fish passage.96 However, the small-scale nature of these hydropower projects allow for fish bypasses around the section of the river dammed.97 Further, small-scale hydropower can use weirs instead of dams, preventing any blocking of fish passages.98 In essence, small hydropower has significantly fewer drawbacks of large hydropower, but has all of the benefits.

C. Infrastructure-Based Small Hydropower

Small-scale, run-of-river technologies have a small impact to be sure,99 but they first must be built. Small-scale hydropower’s cost per kW is similar to that of large-scale hydropower.100 Thus, small-scale infrastructure’s only downfall is the expense which could be lessened with the right financial incentives.101 However, two other breeds of hydropower exist: conduit hydropower and adding hydropower capacity to non-powered dams.102 Both of these are unique in that their cost is minimal, their environmental impact is already justified, and they are built on pre-existing infrastructure.103

First, conduit projects are, legally speaking, a fairly recent invention.104 They are the simplest of all hydropower technologies. Essentially, conduit projects put a turbine on a preexisting flow of water, such as one used for

94. See Scheer & Moss, supra note 85, for an explanation of the chief environmental concerns from dams.
95. Hydropower Development, supra note 53, at 5514.
97. Id. at 77.
100. See ZHANG ET AL., supra note 75, at 7 (reporting the per kilowatt price for initial hydropower projects ranging between US $1800 and $8000); but see IRENA, supra note 73, at 18 (finding that the cost of hydropower can vary from $500/kW to $3,500/kW).
101. Id. at 2.
102. Id. at ix.
103. Id.
municipal water delivery. This has two substantial benefits. Primarily, conduit projects require lower investments per kW than large or small hydropower, averaging around $500/kW to build—a difference of $1500/kW. This is because the infrastructure needed for the hydropower has already been built; all a developer needs to add is a turbine to produce zero-emission electricity. Adding capacity at a non-powered dam has a similar cost. The expense of conduit projects and adding to non-powered dams is further reduced because they forgo the need for additional transmission lines. To that end, adding to non-powered dams and conduits costs less, and therefore is of great benefit.

Because conduit projects employ preexisting infrastructure to produce electricity, they have two additional benefits. First, they are widely available. Hydropower is dependent upon geography—there must be streams and rivers with enough flow to generate electricity. Conduits are dependent not on geography, but rather the presence of infrastructure. Conduits include pipes, flumes, ditches, or canals, and where conduits exist, hydropower can also exist. Because infrastructure is everywhere, even states with negligible hydropower potential have the potential for conduit projects.

Second, restructuring dams and conduits to make them hydropower compatible has minimal environmental impacts. Actually, such may produce a positive environmental impact when accounting for new operation and maintenance technologies. In the case of conduits, that impact is already minimal—drinking water pipes do not block fish

106. BAILEY & BASS, supra note 81, at 41.
108. Qin Fen Zhang et al., supra note 75, at 16.
109. See Warren, Small Makeover 2014, supra note 61, at 254–255 (building generation near populated areas forgoes the need for additional transmission lines because they already exist).
110. See TOMAIN & CUDAHY, supra note 12, at 477 (noting that hydropower development is limited to certain rivers and streams).
112. OFFICE OF ENERGY PROJECTS, supra note 99, at 5.
113. HALL ET AL., supra note 47, at 26
115. Id.
migrations, for example.\textsuperscript{116} However, for non-powered dams, the impacts are more significant.\textsuperscript{117} Even if there are environmental impacts from the preexisting infrastructure, those impacts are justified by the purposes that the infrastructure serves.\textsuperscript{118} Many dams serve important flood-control functions that make areas around rivers livable for people.\textsuperscript{119} In some cases, conduits can deliver water.\textsuperscript{120} If the environmental impact these structures create is justified based on their use, adding renewable energy only increases their value.

Small hydropower is varied and widely available, unlike large hydropower. Small hydropower is also just that: small. Whether it is the cost or environmental impact, small hydropower requires only minimal expenditure (relative to large hydropower) and a minimal (or no) environmental impact. Of all of the renewable energy systems available, hydropower is more reliable than other sources of zero-emission energy such as wind or solar.\textsuperscript{121} Thus, policies should reflect the value of small hydropower.

II. FEDERAL AND STATE RESPONSIBILITIES OVER HYDROPOWER

Traditionally, the federal government has had exclusive jurisdiction over hydropower siting and licensing,\textsuperscript{122} as well as many of the environmental impacts of hydropower.\textsuperscript{123} Over time, states have gained some jurisdiction over hydropower, particularly in regards to the water-

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\textsuperscript{116} See, e.g., Portland Now Generating Hydropower in its Water Pipes, KUOW.org (Jan. 20, 2015, 4:45 PM), http://kuow.org/post/portland-now-generating-hydropower-its-water-pipes (“Portland start-up [Lucid Energy] has tapped the city's water pipes as a new source of renewable hydropower that doesn't disrupt fish migration or stream flows.”).

\textsuperscript{117} Environmental Impacts of Hydroelectric Power, \textsc{Union of Concerned Scientists}, https://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/environmental-impacts-hydroelectric-power.html (last visited Apr. 8, 2018) (describing the environmental impacts from dams and hydroelectric energy projects and comparing degrees of impact depending on size of the electrical generation and the topography of the land placement).

\textsuperscript{118} Warren, Small Makeover 2014, supra note 61, at 255.

\textsuperscript{119} URIA-MARTINEZ, supra note 44, at 10.

\textsuperscript{120} NAT’L HYDROPOWER ASS’N, supra note 105.

\textsuperscript{121} See KOSNIK, supra note 36, at 7 (noting that renewables, such as wind and solar power, are limited by weather consistency).

\textsuperscript{122} Hydropower Transmission Siting and Interconnection Overview, \textsc{OpenEI} https://openei.org/wiki/RAPID/Roadmap/8 (2) (last visited Apr. 17, 2018).

\textsuperscript{123} See generally TOMAI\& CUDAHY, supra note 12, at 494–500 (summarizing the interactions between hydropower and the Clean Water Act, the Wild and Scenic Rivers Act, and the Endangered Species Act).
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quality impacts of hydroelectric dams. 124 State and federal regulation of hydropower has served as the primary barrier to hydroelectric development, creating expensive and time-consuming licensing and permitting processes that disproportionately affect small, low-impact hydropower. 125 However, the administrative hurdles related to permitting and siting are slowly eroding. 126 Congress has passed several laws to reduce the burden on small hydropower, and states have significantly reduced the state licensing process. 127 However, another type of impediment remains: financial barriers. 128

A. Federal Licensing and Permitting

This section discusses federal permitting and licensing in only enough detail to describe the barriers to hydropower. 129 The hydropower regulatory scheme at the federal level is onerous at best. Indeed, hydropower is the most regulated form of energy in America. 130 Most of the licensing is done through FERC under the Federal Power Act (FPA). 131 Other statutes in the environmental realm, such as the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA), create additional regulatory schemes for hydropower. 132 All of these combine to ensure that our waterways, 133 the Earth’s species, 134 and the quality of our environment 135 remain intact and healthy for generations to come. However, this worthy

126. See Regina Cline, Hydropower in U.S. Gets Boost from New Laws. Will Congress Do More?, BLOOMBERG (Jan. 30, 2014), https://www.bna.com/hydropower-us-gets-b17179881735/ (showing that the new laws have reduce the burden on hydropower).
127. See id. (showing that the new laws have reduce the burden on hydropower).
129. See generally Tomain & Cudahy, supra note 11, at Ch. X (exploring the interactions between the Federal Law and hydropower generation).
130. Warren, SMALL WORLD 2013, supra note 66, at 958.
132. See Warren, SMALL WORLD 2013, supra note 66, at 938–42 (discussing the interplay between hydropower licensing and the Wild and Scenic Rivers Act, the National Environmental Policy Act, and the Endangered Species Act).
133. See id. at 933 (“The purpose of the FPA was to set forth a comprehensive plan for development of the Nation’s water resources that were within the jurisdiction of the federal government.”).
goal has the side effect of creating a difficult, and expensive to navigate, web of regulations. First, the licensing process takes a long time to complete, sometimes longer than installing the facility itself.136 This delay causes expenses to rise as the interest on capital begins to accrue.137 Second, the actual cost of permitting is prohibitively expensive, costing at minimum $10,000 (and usually significantly more) per license.138 The cost of installing small hydropower runs about $2,000/kW.139 As such, a hydropower facility must increase production to make licensing a small portion of the total project cost worthwhile.140 Simply preparing and filing the paperwork and documentation for a license can exceed the cost of the project itself.141 Understandably, the licensing and permitting processes are the most significant barriers to small hydropower.142

These policies are reasonable for their intended technology: large hydropower.143 As noted above, large hydropower has a large environmental impact,144 one that must be regulated to reduce the negative externalities of hydropower. However, small hydropower has a proportionally smaller (or non-existent) environmental impact, and policies must reflect this. Congress noted this disconnect between the administrative apparatus and environmental impact when it passed the Hydropower Regulatory Efficiency Act of 2013 (HREA).145 In doing so, Congress created a small/low-impact exemption (a less-onerous licensing process) for small hydropower and a special process for Qualified Conduit Hydropower Facilities.146 This process is exclusively for conduit projects under 5 MW that are added to conduits designed for agricultural, industrial, or municipal

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136. See Warren, Small Makeover 2014, supra note 61, at 260 (noting that the licensing process can take years to complete).
137. Lea-Rachel D. Kosnik, Sources of Bureaucratic Delay: A Case Study of FERC Dam Relicensing, 22 J. L., ECON., & ORG. 258, 259 (2005) (identifying the challenges in delaying licensing for the investments in hydropower); see generally ENVTL. PROT. AGENCY, DISCOUNTING FUTURE BENEFITS AND COSTS, GUIDELINES FOR PREPARING ECONOMIC ANALYSES 6-4 (Dec. 2010), https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf (providing methods to account for the compounding interest on the price of capital and acknowledging the potential for increasing regulatory costs).
139. IRENA, supra note 73, at 18.
141. Id.
142. Id. at 957, 962–63.
143. Id. at 935–36.
144. See Scheer & Moss, supra note 85 (describing some large environmental impacts from dams).
146. Id. at 493–94
purposes. The Act removes the aforementioned expensive paperwork and documentation process and replaces it with a notice of intent, a less-than-ten-page template accessible to any developer. Not only is the paperwork reduced, but also the time—the whole process takes 60 days. In short, the federal government recognizes the potential of small hydropower and is removing administrative barriers to its development.

B. State Licensing and Permitting

States have far less control over hydropower permitting and licensing than the federal government. However, their influence still creates administrative barriers. State administrative barriers fall into two categories: state responsibilities over federal statutes and state-specific licensing. An example of the first category is the NPDES permit under the Clean Water Act. All hydropower that eventually discharges into waters of the United States requires a Section 401 water quality permit, or at least a waiver of the discharge permit. State agencies are usually involved in the issuance of Section 401 permits. Having to communicate with several agencies (and having the agencies communicate amongst each other) increases the cost and time required to obtain a permit. Much like Congress’ assessment that current federal permitting and licensing schemes create an undue burden on small hydropower, states have created policies to ease the administrative burden. A good example is Vermont’s Act in which Vermont’s Agency of Natural Resources entered into a memorandum of understanding with other concerned agencies to streamline

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147. Id. at 494.
149. 127 Stat. at 496.
151. Id.
154. VT. DEP’T OF PUB. SERV., supra note 152
155. 10 VT. STAT. ANN. tit. 10, § 1006.
the permitting process. In doing so, interagency cooperation and communication quicken the Section 401 permitting process.

Not all administrative barriers to hydropower are federally created. States require electric generation facilities to obtain a certificate of public good (CPG). How a facility receives a CPG varies from state to state and even within states; some methods are onerous while others are simple. Vermont has both of these methods. Some generation facilities must go through an application process, a complicated procedure that resembles litigation. The registration process is the exact opposite, such as a notice of intent under HREA. Registration merely requires the facility to fill out a form to receive a CPG. Formerly, hydropower went through the application process, adding another level of licensing to an already onerous process. Under the current revision to Vermont’s net-metering rules, a hydropower facility generating 500 kW or less must complete the far simpler registration process, eliminating the need to engage in what amounts to litigation. Ultimately, states add another layer of complexity to hydropower licensing and permitting, but like their federal counterparts, they are easing or eliminating these burdens.

157. VT. DEP’T OF PUB. SERV., supra note 152.
158. See DEVIN HARTMAN & TOM RUSSO, R STREET POLICY STUDY NO. 105, EBBING THE FLOW OF HYDROPOWER RED TAPE I (2017) (describing the “de facto power [that state agencies] have over permitting approvals, denials, and delays of hydropower licensure.”).
159. VT. STAT. ANN. tit. 30, § 248(a). The name of this certificate varies from state to state and at the federal level. For the purposes of this note, CPG will refer to the licensing document permitting construction and operation.
162. VT. STAT. ANN. tit. 30, § 248(j).
165. Id.
166. Id. at § 5.104(E).
C. Financial State Programs

For non-administrative programs (most notably financial incentives), the situation is the reverse of administrative barriers. States do far more to incentivize renewable technologies than the federal government does. However, the situation is not much different from administrative laws. Just as state and federal licensing and permitting programs tend to treat small hydropower the same as large hydropower, so do some state programs that deal with financial incentives. States have numerous tools at their disposal to incentivize renewable technologies. As the next sections discuss, rarely do these policies benefit hydropower as much as other renewable technologies, and rarely do the policies consider the value and benefits of hydropower. Essentially, states ought to recognize that “small facilities are not similarly situated [to large facilities], and should not be treated equally...” when given financial incentives.

III. NET-METERING LAWS

A. Net-Metering and the Value of Distributed Generation

Net-metering is by far the most common policy states employ to promote renewable energy. Each state-specific policy includes the same basic framework. Net-metering is a payment system for behind-the-meter, customer-owned generation. Net-metering only applies to specific technologies.
types of generation. Usually, these systems are renewable technologies (primarily solar),\textsuperscript{177} although some laws allow efficient combined heat and power facilities.\textsuperscript{178} These systems are customer owned, and unlike other generation facilities, they are connected to the distribution grid rather than the transmission grid.\textsuperscript{179} Because of this and state-mandated caps on facility nameplate generation, distributed generation tends to be small, usually less than 1 MW.\textsuperscript{180} Once interconnected to the distribution grid, generators are paid for their electricity on a per kWh basis.\textsuperscript{181} This payment policy makes net-metering attractive and has created a boom in distributed generation, particularly photovoltaics.\textsuperscript{182} It can even eliminate energy bills.\textsuperscript{183} Eventually, net-metered systems pay for themselves, with some having short payback periods and good returns on investment.\textsuperscript{184}

Net-metering policies exist because of the benefits of distributed generation.\textsuperscript{185} In exchange for free or low-cost energy, net-metered customers provide benefits for the grid and state as a whole.\textsuperscript{186} First among them is a reduction in GHG emissions; eligible facilities must be zero-emission technologies or at least very efficient fossil-fuel technologies like anaerobic digesters.\textsuperscript{187} In addition, distributed technologies increase system reliability and decrease system cost by foregoing the need for transmission.\textsuperscript{188} Distributed generation serves load on-site, displacing

\footnotesize{\textsuperscript{177}. Net Metering by State, SOLAR ENERGY INDUSTRIES ASSOCIATION, https://www.seia.org/research-resources/net-metering-state (last visited Apr. 6, 2018) ("Net energy metering is primarily used for solar photovoltaic (PV) systems ").
\textsuperscript{178}. See e.g., Me. Stat. tit. 35-A, §3210 (C)(1)-(2) (2015) (defining a “renewable resource” as a source of electrical generation that is derived from combined heat and power production facilities).
\textsuperscript{179}. Warren, supra note 61, at 256.
\textsuperscript{181}. Id.
\textsuperscript{182}. See Mark Muro & Devashree Saha, Rooftop Solar: Net Metering is a Net Benefit, BROOKINGS (May 23, 2016), https://www.brookings.edu/research/rooftop-solar-net-metering-is-a-net-benefit/ (describing a wave of state policies aimed at reeling back net-metering policies because they have met their objective of incentivizing solar).
\textsuperscript{183}. Net Metering (Rhode Island), DATABASE OF STATE INCENTIVE FOR RENEWABLES & EFFICIENCY (Jan. 24, 2018), http://programs.dsireusa.org/system/program/detail/287.
\textsuperscript{184}. Id.
\textsuperscript{186}. See, e.g. Muro & Saha, supra note 182 (giving examples of states and academic organizations whose studies show net-metering benefits for the grid and the state).
\textsuperscript{187}. E.g., 220 Mass. Code Regs. 18.04 (2) (allowing anaerobic digestion to be net-metered).
\textsuperscript{188}. Warren, supra note 61, at 256.
Net-Metered Infrastructure-Based Hydropower

generation on a more than one-for-one basis by preventing transmission loss.\textsuperscript{189} A distant generator must produce more power than an end-user requires because some of that power is lost as a matter of physics.\textsuperscript{190} Utilities can avoid building expensive transmitters because their customers already have distributed generation located right at the demand for its power.\textsuperscript{191} This has two effects. First, reliability increases.\textsuperscript{192} Transmission is a choke point in the grid.\textsuperscript{193} Relative to the number of end-users and generators, there are few transmission lines.\textsuperscript{194} If a transmission line goes down, entire regions can follow.\textsuperscript{195} Second, transmission is expensive, running upwards of a billion dollars for a new line.\textsuperscript{196} Because utilities can defer these transmission investments, all customers’ costs go down.\textsuperscript{197}

These benefits are in addition to any advantages that the renewable technology itself brings. Thus, net-metered hydropower has a high capacity factor, low variability, and displaces the need for new transmission, thereby increasing grid reliability and decreasing cost. Despite this long list of benefits, states net-metering policies put hydropower on unequal footing with far more intermittent technologies.\textsuperscript{198} In some cases, hydropower is treated as less valuable than other technologies.\textsuperscript{199} States must consider the value of hydropower relative to other technologies and reflect this in their incentive systems.

\textsuperscript{189.} See Von Meier, \textit{supra} note 58, at 8–9, 74 (detailing that 1 MW solar array generating for one hour will deliver less than 1 MWh due to line losses if the power produced is delivered over the transmission grid).
\textsuperscript{190.} Id. at 74.
\textsuperscript{191.} Id. at 274-75.
\textsuperscript{192.} Id.
\textsuperscript{193.} Id.
\textsuperscript{194.} See id.
\textsuperscript{197.} Jim Lazar, \textit{Electricity Regulation in the U.S.: A Guide}, 51–53, 61 (Regulatory Assistance Project 2nd ed., 2016) (stating that capital investments (e.g. transmission costs) are included in electricity rates).
\textsuperscript{198.} See, e.g, \textit{Net Metering (New Jersey), Database of State Incentive for Renewables & Efficiency} (Nov. 9, 2016), \url{http://programs.dsireusa.org/system/program/detail/38} (stating New Jersey offers net metering to more intermittent renewable energy sources, such as wind and solar, but not to hydropower).
\textsuperscript{199.} See Kosnik, \textit{supra} note 53, at 5513.
B. Net-Metering Laws

All northeastern states allow customers to net-meter hydropower.200 But no state in the northeast has a net-metering law that reflects the value of hydropower relative to other renewable technologies. Some states disadvantage hydropower more than others.201 These net-metering laws fall into two main categories: (1) net-metering laws that put hydropower on equal footing with other renewable technologies; and (2) those that actively disadvantage hydropower relative to other technologies.202 The first group is by far the largest; Maine,203 Rhode Island,204 Connecticut,205 New Hampshire,206 and New York207 all treat hydropower as they treat other resources. While the specifics of each law are different, the basic structure is the same. All renewable or eligible technologies are on equal footing regardless of the benefits they provide. Under these laws, solar power, a low-capacity and highly variable technology, is treated the same as hydropower, a high-capacity and seasonally variable technology.208 Nevertheless, the laws do incentivize hydropower. Considering the alternatives in the second group of net-metering, this is perhaps the second-best option for hydropower.


201. See e.g., Net Metering (New Jersey), DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://programs.dsireusa.org/system/program/detail/38 (last updated Nov. 9, 2016) (stating New Jersey offers net metering to renewable energy sources, such as wind, biomass and solar, but not to hydropower); see also Net Metering (Rhode Island), DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://programs.dsireusa.org/system/program/detail/277 (last updated Jan. 24, 2018) (stating Connecticut offers net metering to hydropower alongside other renewable energy technologies).

202. Id.


208. See generally KOSNIK, supra note 36 (showing that hydropower is treated the same as other renewable energy technologies under state laws although it has a higher capacity).
The second group does not give hydropower the same incentives as other renewable technologies. This group is far less homogenous than the first group. The strictest state is New Jersey, which does not consider hydropower a renewable resource and does not allow hydropower to net-meter. Thus, there is no financial incentive to build hydropower in New Jersey, and its significant potential may never be realized. The two other states—Massachusetts and Vermont—do allow hydropower, but treat it differently than other resources.

Massachusetts deals two blows to hydropower through unequal incentives. First, Massachusetts creates three classes of resources, and treats those classes differently. Solar, wind, and generation located on agricultural land are part of each class, and thus their compensation rate only differs based on nameplate capacity. Hydropower, however, is only part of class I and is limited to no more than 60 kW of capacity. This has the effect of significantly limiting small hydropower to the lower portion of its range. Larger units that can take advantage of economies of scale are left without a funding source. Considering that there are a finite number of locations for hydropower, Massachusetts has capped the maximum possible energy from hydropower in its state, and in doing so may jeopardize its GHG emission goals.

Second, Massachusetts does not compensate hydropower as much as other resources. Non-solar, non-wind class I net-metered renewable technologies are compensated at the wholesale rather than retail rate. This entails a significantly longer payback period for net-metered hydropower systems. On average, a 60 kW small hydropower system not based on preexisting infrastructure runs about $2,000/kW, or $120,000.

209. Compare Net Metering (New Jersey), DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Nov. 9, 2016), http://programs.dsireusa.org/system/program/detail/38 (stating New Jersey offers net metering to renewable energy sources, such as wind, biomass and solar, but not to hydropower) with Net Metering (Vermont) DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Mar. 17, 2017) http://programs.dsireusa.org/system/program/detail/41 (showing Vermont offers some net metering incentives for hydropower facilities, but that those incentives are different from other renewable energy technologies).

210. Net Metering (New Jersey), DATABASE OF STATE INCENTIVE FOR RENEWABLES & EFFICIENCY (Nov. 9, 2016), http://programs.dsireusa.org/system/program/detail/.

211. 220 MASS. CODE REGS. 18.02.

212. Id.

213. Id.

214. IRENA, supra note 73, at 18.

215. 220 MASS. CODE REGS. 18.07.

216. Id. at 18.04 (2).

217. IRENA, supra note 73, at 18.
At 50% capacity factor, a small hydropower system is paid about $5,000 per year. A small hydropower system creates a best-case-scenario payback period of 24 years, assuming no operations and maintenance costs. A similarly situated solar system could pay for itself in less than ten years. In short, Massachusetts caps capacity and pays hydropower less than half what other technologies receive.

Vermont’s treatment of net-metered hydropower is a different beast altogether. Vermont is unique because it considers more than just the retail (or wholesale) cost of power when creating its net-metering rule. It considers where the power is located when deciding how to compensate distributed generators. For systems located on existing infrastructure, such as roofs, utilities are required to pay an additional $0.01/kWh. In addition, the utility must purchase a generator’s renewable energy credits for $0.03/kWh unless the generator elects to take a significant penalty. Infrastructure-based small hydropower, then, appears to have found an ideal jurisdiction in Vermont. However, Vermont excludes hydropower from receiving the benefits it offers other technologies. Despite being a cost-effective, reliable, and zero-emission source of power, hydropower is not considered as valuable as other technologies, even though it would otherwise meet the citing requirements Vermont rewards.

However, Vermont’s additional credit adders are not set in stone. Included in the net metering rule is a biennial update requirement. Once every two years, the Vermont Public Utility Commission (PUC) must reconsider adjustors, amongst other factors. This built-in review program creates the flexibility needed to respond to changing electric system conditions. Also, the built-in review program corrects the omission of

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218. URIA-MARTINEZ, supra note 44, at 36.
222. Id. at § 5.126.
224. Id.
226. Id.
hydropower from the regulatory benefits.\footnote{Net Metering (Vermont) DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Mar. 17, 2017) http://programs.dsireusa.org/system/program/detail/41 (showing Vermont does not offer credit adjustors to hydropower facilities).} Any net metering law should include this review, especially when the benefits of hydropower become more apparent and net metering conduit hydropower becomes a more prevalent resource.

Ultimately, the best hydropower can expect in the northeast is equal treatment to that of other technologies, despite not being similarly situated. Other states go even further and actively disadvantage hydropower relative to other technologies, excluding hydropower from net-metering incentives altogether or cutting it out of more lucrative reward schemes. Hydropower’s value in the fight against climate change is significant; state incentives must—but as of yet do not—reflect this value to receive hydropower’s full potential.

C. Value-Based Compensation: A Potential Solution?

While no state currently creates a net-metering system that treats hydropower equitably vis-à-vis other technologies, a value-based net metering tariff may do so. Generically, net-metering laws compensate the generator at the retail rate.\footnote{30-000-5100 VT. CODE R. § 5.127 (A) (2018).} This, however, is about administrative convenience rather than a fair and accurate compensation structure.\footnote{See Karl R. Rábago, Value of Solar Tariff: Net Metering 2.0, ICER CHRON., 45, 46 (Dec. 2013) (showing that administrative simplicity rather than cost calculations is a motivator for using net-metering systems) [hereinafter Rábago, Solar Tariff].} Moreover, there are equity considerations with the retail rate. Utilities cannot always collect the cost of service and a fair rate of return under a retail rate tariff, forcing other non-net-metered customers to pay proportionally more.\footnote{Id. at 45; see Karl R. Rábago, The Net Metering Riddle, ELECTRICITYPOLICY.COM, Apr. 2013, at 4–5 (describing “access fees” used to cover revenue deficits for the utility to cover the cost of grid management and reliability).} If the retail rate is less than the value of the distributed hydropower, there may be no incentive to augment our infrastructure with clean energy. Numerous researchers and policy makers have begun looking into a “value of solar tariff” to respond to these inherent issues.\footnote{See e.g., Rábago, Solar Tariff, supra note 229, at 47–49 (detailing Austin Energy’s value of solar tariff).} While solar is popular, the value of distributed generation
and the drawbacks of using only the retail rate apply to all resources.\textsuperscript{232} States must consider a resource-neutral alternative.

New York is developing a resource-neutral, value-based net metering tariff.\textsuperscript{233} Net metering can be more valuable than the retail rate, particularly if the net-metered technology offers less intermittency and the ability to be an addition to existing infrastructure.\textsuperscript{234} One state—Vermont—attempts to codify these benefits with a siting adjustor, but fails to apply it to hydropower.\textsuperscript{235} New York proposes to go beyond this with a formula for calculating net-metering compensation based on the value of the resource to the grid.\textsuperscript{236}

New York bases this value on a simple formula: $LMP+D$,\textsuperscript{237} which will replace traditional retail-rate compensation. $LMP$ is the locational marginal price, which is the wholesale price of electricity for each zone within New York, modified by congestion and loss charges.\textsuperscript{238} The LMP will not change based on any of the attributes of a renewable technology,\textsuperscript{239} and will likely not influence compensation vis-à-vis other technologies.\textsuperscript{240} Further, some regions have only one zone and as such LMP cannot change.

\begin{thebibliography}{99}
\item 234. See generally KOSNIK, supra note 36 (showing that net metering can be more valuable than the retail rate); see Warren, \textit{Small Makeover} 2014, supra note 61, at 255 (detailing how micro-level transmission and distribution grids are more resilient than distributed generation).
\item 236. STAFF REPORT, supra note 233, at 2 (“An integrated grid that enables dynamic operation of DERs will require more accurate pricing for the products and services that such DERs will provide.”).
\item 239. See id. (listing the factors in calculating LMP as only the wholesale cost modified by congestion and line loss charges).
\end{thebibliography}
regardless of the technology employed.\textsuperscript{241} The D value, on the other hand, is far more variable and influenced by choice of technology.\textsuperscript{242} D is composed of several factors that encompass the value of distributed generation to the grid.\textsuperscript{243} These values currently theoretical; they do not have a set numerical value or formula for calculation.\textsuperscript{244} However, many of the listed variables promise to value hydropower equitably relative to other technologies.

1. Key Metrics and Hydropower

New York’s formula consists of three variables that have great potential to benefit hydropower. First, the D value includes a temporal variable that encompasses the intermittency and dispatchability of a technology.\textsuperscript{245} New York recognizes that intermittent resources require a greater balancing of the grid to ensure stability; those with high capacity factors require less balancing. These high-capacity technologies make it easier to meet peak demand by providing a constant, predictable flow of power.\textsuperscript{246} Further, demand is not constant throughout the day. A high-capacity-factor technology provides power both when demand is lowest and highest.\textsuperscript{247} Low-capacity factor technologies, such as PV, do not always produce when they are needed most.\textsuperscript{248} Hydropower has a high capacity factor, and if its

\begin{itemize}
\item \textsuperscript{241} See, e.g., ISO New England, \textit{Real-Time Maps and Charts}, ISO NEW ENGLAND, https://www.iso-ne.com/isoexpress/ (last visited Apr. 6, 2018) (illustrating that Massachusetts is the only state in New England able to change its LMP rate because it has more than one LMP zone).
\item \textsuperscript{244} STAFF REPORT, supra note 233, at 5.
\item \textsuperscript{246} \textsuperscript{246} STAFF REPORT, supra note 233, at 33 (“Intermittent technologies . . . have no control of when they generate and . . . may miss the [peak] hour due to due to uncontrollable, purely random events . . .”).
\item \textsuperscript{248} See Jeff St. John, \textit{The California Duck Curve is Real, and Bigger than Expected}, GREENTECH MEDIA (Nov. 3, 2016), https://www.greentechmedia.com/articles/read/the-california-duck-curve-is-real-and-bigger-than-expected (describing how the load-supply balance with electricity source output that varies hourly and consumer use of electricity does not match causing a need for higher ramps in the grid during off-peak production hours).
output varies, it does so seasonally.\textsuperscript{249} Hydropower is the dependable technology that New York’s formula seeks to reward.

Second, the D value encompasses a location value.\textsuperscript{250} Distributed generation is usually located right next to the load it serves.\textsuperscript{251} This saves on transmission and distribution costs because no power is lost during transmission.\textsuperscript{252} The maintenance costs of the transmission and distribution systems are reduced because less power is flowing through lines\textsuperscript{253}, and can even avoid blackouts caused by overloaded transmission.\textsuperscript{254} All distributed generation provides these benefits, but infrastructure-based hydropower—the variety with most of the administrative barriers already removed\textsuperscript{255}—is poised to benefit most from this proximity rule because it is necessarily located next to the demand.\textsuperscript{256}

Third, the environmental benefits are included in the D variable.\textsuperscript{257} This encompasses the avoided costs high-carbon technologies impose upon society.\textsuperscript{258} This value may not be limited to just carbon; New York is considering whether to include the costs of other GHGs, such as Nitrogen Oxides (NOx) and Sulphur Oxides (Sox).\textsuperscript{259} This value, of course, will not differ between carbon-free technologies: carbon-free is carbon-free. This does directly reward hydropower for its contributions to state climate goals, something conspicuously lacking from other net-metering schemes.\textsuperscript{260} Ultimately, New York seeks to encompass the value of distributed generation in its net-metering compensation scheme, something other states have not done. Because the true value of distributed generation is rewarded, hydropower’s value is rewarded.

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249. U.S. ENERGY INFO. ADMIN., \textit{supra} note 45.
250. \textit{STAFF REPORT, supra} note 233, at 36.
252. \textit{Id.}; \textit{VON MEIER, supra} note 58, at 274–75.
254. \textit{INITIAL BLACKOUT TIMELINE}, \textit{supra} note 195.
257. \textit{STAFF REPORT, supra} note 233, at 35.
258. \textit{Id.}
259. \textit{Id.} at 38.
260. See generally Luis Berga, \textit{The Role of Hydropower in Climate Change Mitigation and Adaptation: A Review}, 2 \textit{ENGINEERING} 313, 313 (2016) (discussing the positive impacts of hydropower on climate change and the reduction of GHGs).
\end{flushright}
2. Potential Issues

The variables that encompass the D value may nevertheless pose some issues to hydropower development. First, the formula equates intermittency and dispatchability: these two qualities are considered together in the temporal variable in the D value. This equivalency is problematic. Intermittency refers to how constant a technology’s generation is—essentially the capacity factor. The value of high capacity factor is that it requires no stabilizing because it is a constant. Utilities can easily account for the amount of power produced, and high-capacity technologies produce power when needed most. Hydropower meets all of these characteristics. Dispatchability, on the other hand, refers to the ability of a technology to respond to demand, rather than always being on. Dispatchable technologies can turn on and off upon request. This feature is most common in fossil-fuel generation, such as combined heat and power. Equating these two means that hydropower’s high capacity goes unrewarded, despite the benefits to the grid. A value-based compensation system must recognize the benefits of these two qualities separately, so, it may reward resources that provide one system benefit without the other, like hydropower.

Second, LMP+D is not the retail rate and may be lower than the retail rate, even with the most favorable calculations for the D value’s variables. The purpose of net-metering is to provide an incentive to build distributed, renewable generation. Without sufficient incentive, projects cannot get off the ground. Value-based compensation may be a worthy goal, particularly for undervalued technologies like hydropower, but traditional net-metering is better if LMP+D fails to provide sufficient

261. STAFF REPORT, supra note 233, at 20–21.
262. Id.
264. Id. at 10.
266. STAFF REPORT, supra note 233, at 21.
267. Id.
268. Id.
269. See generally, Jordan Hanania et al., Dispatchable Source of Electricity, ENERGY EDUCATION http://energyeducation.ca/encyclopedia/Dispatchable_source_of_electricity (last visited Apr. 6, 2018) (discussing dispatchability in energy resources and the rate of hydropower).
270. Kann, supra note 245.
incentive. New York is aware of this and recommends that additional incentives provided outside of net-metering schemes remain in place. This solution only works if the state provides other incentives. Thus, states should augment their value-based compensation schemes with additional incentives to fully realize the benefits of hydropower.

Finally, the value of proper siting is not considered. Location on the grid looks only at proximity to the load. It does not see whether the hydropower (or other resource) is damming a river.

Ultimately, value-based compensation is still in its infancy; this is merely a proposal for further research and not a law. Nonetheless, it underlies a key principle of energy policy: resources that benefit the grid the most deserve to be valued for their contributions. Because of hydropower’s significant contributions, value-based compensation for net-metering will properly reward hydropower and thereby help states meet their climate goals.

CONCLUSION

Climate change is one of the world’s most pressing problems and is a problem in dire need of solutions. Electricity generation is responsible for a third of U.S. GHG emissions. Part of the solution, then, is to shift from fossil fuel generation to zero-emission renewable generation. Increasingly, the policy burden for this shift falls on the states, usually through policies such as net metering.

Not all renewable energy is created equal. Hydropower complements the more common and intermittent solar and wind energy. However, barriers exist towards hydropower’s implementation. Previously, these were permitting and licensing barriers. Increasingly, governments are removing these barriers, recognizing the promise of hydropower. Remaining are financial barriers. While not all renewables are created equal, hydropower systematically receives less than its value in net-metering laws. Some proposals are in the works to fix this inequity, but laws currently on the books give hydropower the short end of the stick. With a crisis as large as

271. STAFF REPORT, supra note 233, at 28.
272. Id. at 4.
global warming, all solutions are necessary. Thus, states must recognize the
value of hydropower and grant it the financial incentives it is due.
Pat Parenteau, thank you so much. What an inspirational opening and thank you for your kind introduction of me. What my wife says is—I can’t keep a job so that’s the real story—but I am so thrilled to be among so many people who are such good friends here. It starts with Pat; but, [also] Steve Dycus, whom I worked with long ago at the Natural Resources Defense Council. Peter Bradford who I’ve known for years and years, who’s on the faculty here as well. Michael Dworkin-Michael will be here later-[I’ve] known for years and years. And, I actually have a boss—an old boss-in the room, Tony Roisman. I didn’t know Tony was here, I didn’t know he’s heading up—that he’s chairing—the Vermont Public Service Board, the Public Utility Commission here. I worked for him as a lowly paralegal at the Justice Department, I don’t know, 75 or 80 years ago-Tony, it must have been, something like that. Then, I also want to thank Russell King and Elizabeth Doherty for helping me get here and helping to put on this whole wonderful event. You guys have been great and I appreciate it.

I didn’t get too lost getting here this morning. It’s also great to be back in Vermont. I lived over in Norwich not too many years ago. [I] still have a home up in the Mad River Valley and have some unusual things that happened to me and my family here, which I will get to in a moment.

So, my job this morning is not to talk about solar, and wind, and all those good things—which I do love—but, to talk about the real workhorse in all of this which is energy efficiency. And I’d like to do that for about 40 minutes and then take your questions, any that you have, any good jokes—I’m looking for whatever you have.

So, let’s dive in. So, Pat put it well—we have storms on steroids. The future is in fact not what it used to be, and you need only look at Houston or Florida or the real sadness in Puerto Rico, to kind of get a sense about what

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we’re up to right now. And, of course, it all does come back to our global carbon footprint. We can debate how big a cause all of those sorts of things that the scientists are debating but when it comes right down to it the emissions that we’re seeing from carbon are having a profound effect and the three biggest emitters are China, the U.S., and India.¹

We are the heel, we’re the heel in this diagram,² [and] I’m not sure how they picked that for our position, but—and then there’s much of the rest of the world that makes this up—but, this is kind of the root cause of so much of what we’re seeing. It also though, creates the great opportunity and that’s part of what I want to talk to you about today. There is an extraordinary opportunity in going out and not just transitioning our energy system, but, fundamentally rebuilding it in so many different ways. So, if the future is not what it used to be, the best way to predict the future is to invent it—and that’s what I find so exciting about this moment that we find ourselves in. There is a lot of doom and gloom but there’s an extraordinary opportunity to basically build the future that we want in the energy area, in this energy transition as you’re calling it today.

This not how we’re going to get there, for those of you who can’t read it, “Sorry, Harold, but I’m reducing our carbon footprint.”³ That’s the way we’re not going to get to a clean energy future nor from the academy is this it. Whoops. “Then a miracle occurs.” (These are two Stanford or Vermont Law School talking to each other.)

In fact, how we’re going to get there, in my view, is this: This is my favorite triangle (there is a rumor at Stanford I have this tattooed on my back). I will not either confirm nor deny that this morning. But, if we’re going to build a more sustainable energy future, it’s about technology, policy, and finance. And technology is science. Technology [is] engineering. Policy is law; policy—and all those related areas; and, finance is economics, marketing, business, finance—you name it—but, these are how I have crystallized these. What I say to friends, colleagues, students is—if you’re interested in this whole area, get good at one point of this triangle; but, do not ignore the other two. I’ve seen so many people invent technologies all over this country—really interesting, compelling technologies—but, [they] stumble in the law and policy world. [They] find themselves unable to raise

³. Lee Lorenz, Wife About To Shoot Husband, NEW YORKER CARTOON (July 2, 2007) (photo licensed from the Conde Nast Collection, home of The New Yorker, Vogue).
early stage capital, or down the road from there, to secure project finance—to actually get full-scale deployment with technology.

We’ve got to integrate across this triangle; and, as you go out into the world as students, you might be here—but, be sure you have some understandings about those other two points if you want to work in this whole area of sustainable energy. So, I’m going to walk you around this triangle with respect to energy efficiency and then take your questions. So, just a few fundamentals, because I understand there’s some folks who don’t come directly from the energy world, some of you come from the environmental law world so I just wanted to talk about a few things that will set the stage a little bit for my talk but also for today.

The first is no surprise, energy sources evolve over time. We were a largely wood or biomass powered world, this goes all the way to the 1800s. Coal came in, pushing a big amount of that biomass out. From there, we went to oil; natural gas came in; the era of hydro began to take some piece of this; nuclear arrived; and then, that small, little [bit] up there-called other renewables. This is a chart from 2013, it would be a bigger slice today and it’s a fast-growing one-still not huge but, a fast-growing one. So, this is kind of the evolution.

I want to tell you you’re sitting in a state that I think was the birthplace of modern renewable energy[, Vermont]. Seventy-five years ago, last October, the first megawatt scale wind turbine in the world, the first wind turbine hooked up to a large-scale utility grid was built on a mountain called Grandpa’s Knob in southern Vermont. It’s a great, great story; there’s a book you ought to read called Power from the Wind written in 1948. The plan with this—but for World War II—this was put up in 1941. The plan was to put another 10 to 15 turbines along the ridge of the Green Mountains, and I would make the case that we would be 30 or 40 years further ahead in the wind industry had that happened. But, World War II intervened; coal came in, in a much bigger way; the nuclear era began; and, we didn’t get back to a megawatt scale wind turbine until the 1970s. It was a brilliant team that put

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7. Reicher, supra note 5.
this together and it was an interesting fork in the road when it comes to the history of energy technology.

And now, [as] we’re going to see, I am involved with a floating offshore wind company. We’re not only putting turbines on the bottom, in the shallow water; we’re now beginning to put turbines in deep water—20, 30, 40, 50 miles offshore. This is this 50, 60, 70-year evolution of technology, that Pat rightly said, we got to speed up. The good news is though, (a lot of this is speeding up)—and this is one of those in the North Sea off the coast of Norway—in a hurricane, [this turbine] does very well, and I can tell you about that later if anyone’s interested. Full-scale project now being built off the coast of Scotland. Very deep water, massive winds, and the best off-shore wind resource in the United States is off the coast of California, the deep water, and in the Great Lakes, who would’ve thought.

Don’t get too scared about this chart, this is the ultimate wiring chart of U.S. energy consumption put together annually, I recommend it to you, if you really want to understand where energy goes in our economy in the U.S. So, you start with petroleum; most of it goes into transportation, some of it goes into industrial use, [and] literally none of it, almost none of it goes into electricity production. We don’t make electricity from oil in this country anymore. Natural gas, on the other hand, goes into the industrial sector, the commercial sector, residential sector, and we make a lot of electricity. Take nuclear: [it] all goes into electricity, none goes into these other sectors of the economy.

Why do I show you all this? Well, first, I think it’s important to understand where these different sources go in our economy. But, the second is, of all this energy that goes in, a hundred quadrillion BTUs or a hundred quads, a little under 40 comes out as useful energy, and guess what, the other
60 comes out as rejected energy, the energy we waste. That’s why we’re talking about energy efficiency. Hundred quads of energy in, 40 outperforming useful work, and 60 gets thrown away. That’s why energy efficiency is so important in our economy and why yes solar, yes wind, yes to all the renewables—but, we [have] got to start with energy efficiency.

For climate, we need all of these renewables—carbon capture, changing the fuels in power plants, and use fuel switching; and then this big one—the biggest one of all—at 38% according to the International Energy Agency—that’s energy efficiency. The brown segments here are where energy efficiency makes up big chunks of what we got to get done. Efficiency’s needed in industry, it’s needed in transportation, it’s needed in our buildings, and it’s needed in a host of other sorts of things. So, energy is the big dog in all of this when it comes to this energy transition and I think that’s why we’re starting out with energy efficiency this morning.

The good news regarding “EE,” or energy efficiency, is [that] it’s our lowest cost resource. It’s cheaper than wind or natural gas or all of these other things. These are the standard kind of cost numbers that one of the big investment banks in New York, Lazard, puts together on a regular basis and look where energy efficiency comes out. This is in cents per kilowatt hour—this is the cheap stuff. So, what do we say? We say, efficiency first-and I love what Amory Lovins has to say about [this], “All people want is cold beer and hot showers.” We want the services energy provides, [and] if we can do it with less energy, we’re going to save in our pocketbook, we’re going to save in a climate context. So, we want the services and the less we can provide those services, the less energy, the better off we’re going to be.

17. Id.
Another complicated chart-but, this is the famous McKinsey curve for what the cheap and the expensive stuff is when you’re going to fix climate change.\textsuperscript{24} This is all the cheap stuff, the low cost, and in fact-in many ways, negative cost: insulation, fuel-efficient vehicles, lighting, air conditioning, water heating.\textsuperscript{25} It doesn’t get much more boring than that, but, this is-this is the important stuff when it comes to energy efficiency-and, I want to focus for a second on lighting. This is of course the LED.\textsuperscript{26} This is the highly efficient technology developed decades ago but now coming into its own. These are those old fashioned incandescent bulbs, lumens per watt is how we measure light per unit of power, very inefficient, thirteen to eighteen lumens.\textsuperscript{27} Compact fluorescents, those curly ones, somewhere in the 55 to 70 lumens per watt.\textsuperscript{28} And, LEDs in the old days couldn’t really beat compact fluorescents, but now they’re rising.\textsuperscript{29}

The amount of light you get out for the amount of energy you put in, gets better and better and better; and, the great news is [that] they used to be extremely expensive-LEDs-but, they’ve come down radically in cost. I was at a hardware store a couple months ago (and it was a real freight for an energy nerd like myself)—[it] was exciting to go in and see that I could buy four LEDs for the same price as buying four old-fashioned, old fashioned incandescents. The same price you would have gone into a hardware store not too many years ago and they would have been five or six or eight times as expensive. So, this has become not only a great technology, but a cheap one.

I owned a house over in Norwich, Vermont-I guess John Echeverria almost bought this house as it turns out-and, I learned about another energy technology called the blower door test.\textsuperscript{30} What the heck is that? Well, houses in cold and hot places leak a lot of energy if they’re not well-insulated; and, what you do is, you essentially put a giant fan in the door and you blow air out-having sealed up the whole house and closing off everything. So, this guy comes over and he does the blower door test; and, 20 or 30 minutes later, he comes back and he says “You know, I’ve never had a house that failed this test so miserably.” He said, “I can’t get this thing to depressurize at all”-because you depressurize it, and then all the cold air starts coming in, and

\begin{thebibliography}{9}
\bibitem{25} Id.
\bibitem{26} Id.
\bibitem{28} Id.
\bibitem{29} Id.
\end{thebibliography}
you can identify it with all sorts of things. He says, “I can’t get this to do anything!”

Now, the rule is, the auditor will need to close all exterior doors and windows, open all interior doors, close any fireplace damper, doors, and woodstove air inlets. We did everything! But, we couldn’t get it done. I said, “What do we do?” He said, “I don’t know.” He came back a half an hour later though, and he said, “How many chimneys do you think you have in this house?” I said, “Two?” He said, “Well actually, you’ve got a third.” He discovered a third chimney—and for the last seventy years, it was open. Just leaking all of the heat in the house, and [now] we finally knew why this house was so cold and so expensive. [So], I said, “Is it a big job to fix it?” He said, “No.” Five minutes, a bunch of insulation, and some foam, and it was done. So, some of this stuff is really cheap and really effective!

“If you can’t measure it, you can’t improve it.” This is Lord Kelvin as in the Kelvin scale. We call this “ET meets IT,” energy technology meets information technology. This is a very exciting area, something we spend a lot of time at Google on—there’s lots of start-up companies, lots of big companies. We developed something called the “Google power meter,” our tagline was, “Knowledge is less power.” And, we gave people real time information on their kitchen counter with a little meter… what was going on every moment of the day.

My then-seven-year-old ran down one morning and he said, “How does this work?” I said, “Go put some bread in the toaster and make some toast.” And he saw the thing shoot up. And [then] he ran all over the house, turning things on and off, running down to the kitchen, and—I swear—after about twenty minutes, he knew more about energy use in a home than about 95 percent of Americans. This thing kind of worked. Unfortunately, many other people thought it as well. “Began using Google PowerMeter yesterday. Time to buy a more-efficient clothes dryer today.” Unfortunately, Google did not go ahead [with the meter], but the good news is—one energy number people do know—one energy number we all know—and people really focus on, and that’s the cost of gasoline. I know this for a very peculiar reason, because my third child was born at a Shell station on a cold day in April in Waterbury, Vermont. We made it to the hospital, the doctor sent us home, we drove 50 miles home, we went, we had to go back, and we didn’t make it. So, every year, we go back to this

... might have argued they could have saved 2.9 billion had we gone on with power meter, but that’s another story for another day.

Alright, there is one energy number people do know—one energy number we all know—and people really focus on, and that’s the cost of gasoline. I know this for a very peculiar reason, because my third child was born at a Shell station on a cold day in April in Waterbury, Vermont. We made it to the hospital, the doctor sent us home, we drove 50 miles home, we went, we had to go back, and we didn’t make it. So, every year, we go back to this

32. Id.
same gas station and take his picture as he grows up. His nickname is indeed, “Car-son.”

Alright, let’s keep going. So, what’s been not driving our improvement in automobile fuel economy for years has been the CAFÉ requirement. I’m going to talk a little about that in a few minutes but we are finally now, as many of you know, on a path where, as a result of regulation set in the Obama administration, we’re on our way to fifty-four and a half miles per gallon. From where we were stuck at about 27 miles per gallon for years and years and years.

How are we going to get there? This is not going be the answer. As much as some people like to think that you could do this. But, in fact, it’s cars like this. You know, everybody’s favorite—Prius. Chevy now—with not only the Volt—but, the Bolt is now out. You know, thirty-five thousand dollars, two-hundred and twenty mile range—this is a big, big deal. And, of course, everybody’s favorite car in California—the Tesla. This is the “S,” but, coming soon is the “3”—also 35,000; we put our thousand dollars down, we are number 278,451 on the list. Sometime between now and 2020, we may get this car, but I’ll have to tell you, I’m a little nervous about this car. This is the dashboard. There are no dials on the dashboard. And I said to my kids, “How am I going to drive this thing? I gotta keep doing this.” They said, “You’ll figure it out.” So, we’ll see.

Anyway, the great thing about these plug-in cars, is that they can integrate themselves with the grid, not only taking electricity from the grid but sending electricity back to the grid. And, at Google, we did some early work on this two-way flow of electricity between a plug-in vehicle and the electric grid. And why would that be interesting? Well, you know, on a day when, the, we’re, we’re facing brown outs in California, the two much of a draw from the grid as a result of serious air conditioning load, if you’ve signed up some of those cars you could say, “You know that power that, ugh, that power that you bought for four cents a kilowatt hour? Um, we’d like some of that and we’ll pay you three times what you paid—send that back to us.” And you can—can you can move this in two directions, and that’s what very exciting about this whole opportunity with plug-in vehicles.

So, where did this take us? Not to tomorrow’s smart grid, and we actually used to talk about tomorrow’s smart grid, but we really are looking at today’s smart grid with renewables, advanced transmission and distribution, an increasingly smart home, with the sort of metering that I talked about, and then a plug-in vehicle. All of this is here today—all of this is rapidly advancing lots of small companies and big companies in this, in this game and moving forward quite smartly.

So, policy. That was a quick run through technology, now let’s get to the next point of the triangle. And, I don’t— I’m not going to use an energy efficiency example, I’m going to use a wind example. Policy really, really, really does matter—as most of you in this room knows—when it comes to energy and environment. This is a chart of the wind production tax credit; 35 this is the tax credit that has driven wind deployment of the United States since the 1990s. When it’s in place, we see substantial wind deployment. 36 When it expires, as it regularly does, we see massive drops, and the biggest was in 2012. 37 13,000 megawatts built in 2012, the credit expired, and look where we ended up—at about a thousand. 38

Policy really matters. Fortunately, we moved forward in 2015; and, as some of you know, both the solar tax credit and the wind tax credit were extended over five years, but the wind tax credit is now coming down, 39 but that’s a predictable decline. That’s the way it was set by Congress. It wasn’t a one-year authorization, so policy really can make a big difference and I always have thought this is a—that is quite a visible example of that.

I want to talk about two issues regarding energy efficiency and the policy context that is low consumer demand, in the finance context that is investor concerns about risk. I think these are the two fundamental problems that we face with energy efficiency today, so let’s talk about those. “This is fundamentally a demand challenge.” This comes from a building energy efficiency specialist at the Lawrence Berkley National Lab. “People just don’t care that much about their energy use. . . . You’ve got to solve a problem people feel like they have.” And, I really think that’s one of the

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36. See id. (showing that when the production tax credit is in place, wind production increases).

37. Id.

38. Id.

things we’re up against when it comes to selling this cheap energy resource called energy efficiency. Our cheapest energy “resource.”

Now, President Obama did think that insulation is “sexy stuff.” Of love that quote. I started to talk about it—but most people do not think that insulation is sexy stuff. Our current President—well, I won’t go into that.

Alright, so let me ask you, what’s cooler? The Vermont house with solar panels or the high efficiency furnace in your basement? Yeah. I mean, this is a fundamental problem. If I could get solar panels on my house, boy that would be exciting, I’d love to do that. I’ll struggle to do that. I’ll go online. A high efficiency furnace? It doesn’t get much more boring than that. And I say that because I think this is one of our problems in selling energy efficiency. And we’re up against this across pretty much the entire range of energy efficiency technologies.

We owned a house in Washington, D.C., and when I was in the Clinton Administration, I decided it was time to walk—walk the talk. So, we did a renovation; we did a green renovation of this house in 1998. We did all of the sort of things you need to do. We put in a high efficiency CR-15 air conditioner, we redid the furnace, we put in insulation, all of that. But the cool part of it were the solar panels on the back. And you know, we got to write a piece for the Washington Post about it back then in the late 90s about actually selling power back to the local power company. So I got a taste of that— you know, when it comes to the press, when it comes to a whole host of people—this is the exciting stuff. I will tell you, we had a two-and-a-half-foot snow storm in D.C. one night six months after these panels were put in. I heard a big boom on the roof, and I went out the next morning and the entire solar system had collapsed. Had the wrong rack, and it was destroyed, and my insurance agent said he had never heard of solar power before. That was our six-month first experience with solar on the roof.

One of the answers to this is psychology and behavior, and there’s a whole group of people out in the world, an annual conference [was held] earlier this month [actually], [that] look[ed] at the relationship between behavior and energy use. I’m not going to talk about this, but I do

recommend this whole area to you if you really want to dig into the kind of-
some of the psychological and behavioral barriers we’ve got to moving
energy efficiency forward.

What I do want to quickly go through, are some of the policy tools to
stimulate energy efficiency demand. There’s a whole set of tools we’ve put
in place at the federal, state, and local level to stimulate energy efficiency. It
was a recognition-decades ago-that energy efficiency wasn’t going to sell
itself very readily. So, let’s walk through these.

The first are federal energy efficiency standards, this is the, the unsung
work horse of federal energy policy, federal climate policy. This is a long
standing program at the Department of Energy now covering more than sixty
products, a huge percentage of residential energy use, as well as fairly
substantial commercial and industrial, things like washing machines,
refrigerators, air-conditioning, pumps and motors, the efficiency of an
electric motor, the efficiency of a pump. This is also really boring stuff, but
this is really gets deeply into energy use in this country. The savings over
time as a result of these many standards have been very substantial.
Remember, we use a hundred quadrillion BTUs in the US economy. This
is what we saved- it is well over one year’s [worth] of overall energy use and
seven billion metric tons more than what we annually emit in terms of carbon
dioxide, so-over the life of these standards.

The legal basis, these go way back to the 1975 Energy Policy Act and
the key is the Secretary of Energy sets them. They have to be determined
to be both technologically feasible and economically justified. Technologically feasible and economically justified. Those are the two
prongs, and we battle over that when each of these standards get set. There’s
a very elaborate process for setting these standards. It generally takes three

46. Saving Energy and Money with Appliance and Equipment Standards in the United States, supra note 46.
48. Id. § 6295.
49. Id. §§ 6295(o)(2)(A).
or four years. There can be litigation, but there’s a lot of analytical work that gets done looking at all sorts of impacts: manufacturing impacts, consumer impacts, emissions related impacts. There’s a regulatory impact. You put out a “NOPR,” as you know, a notice of proposed rulemaking, lots of comments, and these get these get adopted.

I had the honor of setting the 2001 U.S. Standard for refrigerators, and you can see where we were back in the early 70s. Those refrigerators were using almost 2000 kilowatt hours a year on average in the United States. And, as a result of this standard, we were down at about 500.

Now, as I keep saying, this is pretty boring stuff. The Secretary of Energy at the time said we were going to do a little press conference on the release of these standards. And the Secretary at that time was a guy named Bill Richardson, the former governor of New Mexico, former U.N. Secretary. And he says to me, “So, what am I going to get up and say at this press conference, you know, who’s going to write about energy efficiency of refrigerators?” So, I thought to myself very quickly. A few weeks earlier President Clinton had given his final State of the Union, and the theme of that was this transition we were making from ’99 into 2000. And he, he talked about building a bridge to the 21st century. So, I thought to myself quickly, I said to the Secretary, “Why don’t you get up and announce that we’re building a fridge to the twenty-first century.” It was the quote of the week in Newsweek, it was my greatest day as a bureaucrat. By far.

A few weeks later, we had to do a press-conference on an even more boring topic which is washing machines. So, he says, “Reicher, what am I going to say at this one?” And I thought fast, and I said, “Well, Mr. Secretary, why don’t you announce that we’re agitating for change.” And he said, “No, you do that one.”

So, I showed you this chart and these are these federal standards, and I want to point out very quickly because we will come back to this in a few

51. Id.
52. Id.
53. Id.
minutes: the actual original standards didn’t come from the federal
government, they came from the State of California.57

I also want to point out that the volume of these refrigerators has gone
up; the price since 2014 has gone down. So, we’re building bigger
refrigerators, they hold more stuff, and they cost less than they used to cost.
And they now talk to us. I mean these refrigerators—they have all sorts of
smart features. I’m not so sure about that feature, but . . . . Alright!

So, that’s one thing that we do. The second are these yellow energy
guides, which I’m sure you’ve seen. This came early. One of the early laws,
the Energy Policy and Conservation Act58 basically said to the Federal Trade
Commission, “At least tell people how much energy all these appliances and
equipment use.” And that is the yellow energy tag. Again, getting people
engaged, getting them more interested, in energy use.

This was the bigger one that came out of the EPA in 1992: Based on all
the Department of Energy (DOE) data, we started to put the energy star label
on the more efficient appliances and equipment. And this might be 20 or 30
percent better than the average—it might be the top five percent. There are
various ways this gets measured. And we now also have an Energy Star
buildings program.59 [For] the most highly efficient [buildings]. Again,
giving people some motivation; highlighting things that do better.

Now, going to the state-level, there is also a whole set of energy
efficiency building codes that have been put in place over many decades by
the American National Standards Institute;60 and the Heating, Refrigerating
and Cooling Association.61 The white are states that haven’t done anything
on this in terms of this, in terms of energy efficiency codes, these are building
codes.62 The dark greens are the ones that are already using the most
advanced codes. And these browns, these browns are kind of middle-tier.
You can spend an entire career on this—and people do—but these codes have
helped a lot when it comes to buildings and making sure that they’re energy
efficient. And some of the states have been real leaders.

57. Lee Schipper & James E. McMahon, American Council for an Energy
Efficient Economy, Energy Efficiency in California: A Historical Analysis
(directing the Federal Trade Commission to prescribe energy labeling rules).
(establishing the Energy Star Program).
60. David Conover, Pacific Nw. Nat’l Lab., Slideshow: Background on Building Energy
Codes (Aug. 14, 2012), at slide 3, (indicating that states requested a standard for new building energy
efficiency that resulted in the development of ANSI/ASHRAE standard 90.1 and 90.2).
61. Id.
https://codewatcher.us/codes/stretch-codes-offer-a-way-to-fast-track-energy-savings-in-slow-to-adopt-
states/ [https://perma.cc/7436-FXK6].
We also have Energy Efficiency Resource Standards. This is kind of energy-efficiency’s version of a renewable portfolio standard, or “renewable energy standard.” Again, [in] a fair number of states, some of these [efficiency standards] are combined with the renewable portfolio standards that have been adopted in various states; some have been set by public utility commissions; some have been set by state legislatures. The darker the color, the more the energy reduction on an annual basis. So again, another approach to this. And this says to utilities, “As you go out and do your work providing electricity in the state, we want you to work to cut energy use.”

Going from the state to the city-level, there are now a variety of cities, around the U.S.—D.C., Austin, Washington, New York, Seattle, San Francisco, Philadelphia, and actually the entire state of California—that has adopted what are called “Energy Benchmarking and Disclosure.” This is essentially a system where commercial building owners have to become transparent about the energy use in their commercial buildings. So, it says to people out looking for commercial space, “You are moving into either an efficient or an inefficient one”; it sets up some competitive juices among commercial building owners—there are a whole host of things this can drive. So again, highlighting the energy efficiency situation that we find ourselves in, in commercial buildings, particularly in big cities.

And this is, maybe, my favorite. So, any of you who’ve bought a home know that you go through an appraisal, and then you go through mortgage underwriting. They see what you can qualify for when you go out to get a loan to purchase the house. Home appraisals typically look at all of these things: termites; lead paint; soil, you know—is it going to slip down a hillside; health and safety; water and sewage. But strangely, we haven’t looked at energy use in a house, typically.

Similarly, when you go to get a mortgage, they want to make sure you can pay the monthly mortgage. So, they look at what the principle costs on the loan are going to be, what the interests, taxes, and insurance—the taxes on the house, the insurance on the house. But interestingly, we’ve never looked at energy. What’s it cost, in a cold state like Vermont or a hot state like Arizona, to actually power the house? Electricity, heating, cooling, and all of that. This is called PITI. It’s a kind of common formula. We’ve said, “add
the ‘E’ to it, add energy to it,” and also, “Add energy to home appraisal.” So, the tagline, “Buying an energy efficient home? Get a better mortgage!” Talk about motivation for people to think about energy efficiency!

Now, remember, we’re trying to sell energy efficiency to people out in the marketplace. If you knew, first of all, that home is $5,000 a year to heat, cool, and provide electricity; that one is $1,500, and you’re relatively indifferent as between the two. That $3,500 difference would qualify you for a bigger mortgage because you have less of a monthly or annual payment.

The Sensible Accounting to Value Energy Act66: Introduced in the U.S. Congress, it’s originally in 2013, it is now in the pending Senate energy bill.67 One of the two sponsors, Senator Isakson, a Republican from Georgia, is a former real estate agent. He got this, was not a hard sell at all. And it would basically say, “HUD–Housing and Urban Development–would provide criteria for appraisal and underwriting that would take energy savings of an efficient home into account, based on a qualified energy report.” So, this would be injected into the federally regulated system of mortgages and underwriting, and you would get this cranked into the system. Again, how do you get people to take a greater interest in efficiency than they normally do?

Now, of course the new factor, [President Trump], when it comes to this whole policy realm—obviously, this [Paris Climate Accord – COP21] is a big question mark, where we’re headed. But, I wanted to very quickly mention these three, the big three U.S. Energy Standards, and where we find ourselves. The first of course, as many of you know, is the Clean Power Plan.68 I’m not going to spend any time on this, but this is the big one that is very much at risk right now.

This is the CAFE Standard.69 On our way, as I said, to 54.5 miles per gallon by 2025. This I think is the single biggest environmental accomplishment of the Obama administration. Getting the EPA and the Department of Transportation to sit down with the Detroit Automakers and work out that very steep Green line—and they got it done. But, they agreed to a kind of mid-course review, which is what’s happening right now.70 President Obama, before he left, set this up well, and we probably would

have continued on this path, but the Trump administration has pulled back from that.\textsuperscript{71} And this is very much a question mark, whether we’re going to continue on to 54.5 miles per gallon.

Coming back to this: The Federal Energy Efficiency Standards. Through thick and thin, Democratic and Republican administrations, back to the 1970s, have been putting out these standards. The Little Engine That Could.\textsuperscript{72} But, there is a real risk that we now have an administration that won’t. These have to come out of DOE, as I said, and then they have to be reviewed by OMB, the Office of Management and Budget. And, there is a real risk that the many standards that are pending—several of which are actually required standards—are not going to find their way out of the U.S. federal government. And that would be a real shame because this is kind of the unsung energy efficiency success story of the U.S. federal government.

Alright, California to the rescue: The sixth largest economy in the world,\textsuperscript{73} an aggressive climate program,\textsuperscript{74} a 50% RPS (we may well move to 100%)\textsuperscript{75}; and even independent climate agreements with other states and nations.\textsuperscript{76} Governor Brown and the Premier of China reached an agreement in June on climate change.\textsuperscript{77} But, here is what I wanted to quickly focus on: California both has independent authority for energy efficiency standards, and independent authority for fuel economy standards. The two things we just talked about.

So, remember I told you: California actually was ahead of the federal government—ahead of federal regulation—so [it] actually has independent

\begin{footnotes}
\item[71] Id.
\item[76] Collaboration on Climate Change, CAL. CLIMATE CHANGE, http://climatechange.ca.gov/climate_action_team/partnerships.html [https://perma.cc/9ZKN-JRU5] (listing the climate change international agreements to which California is a signatory).
\end{footnotes}
authority that it could continue to assert, even if the Trump administration puts a big “X” through the current DOE energy efficiency standards program. And, a number of states are following California’s lead on the corporate average fuel economy, because again, California was there earlier. So, we may see—we are seeing—even if the Trump administration does not continue on this 54.5 mile per gallon path, we may well see California and this group of states continue. I was speaking in Minnesota a few weeks ago. They’re not on this list and there is a big debate there about whether Minnesota ought to sign up for the same agreement, with the same authority.

Alright, the final stop on our tour around my favorite triangle. Let’s talk about finance. Don’t get nervous, you can handle this. Alright, here are some really, really, really important numbers. This is what we’re spending globally on all clean energy, according to the International Energy Agency. The average between 2010 and 2015—750 billion dollars a year on all clean energy . . . 750 billion dollars a year on all clean energy globally. This is not just solar and wind, this is all of the zero-carbon sources, including energy efficiency and low carbon sources. This is what the International Energy Agency says we should be spending—very quickly—if we want to have any chance of staying in the 450-parts per million, 2ºC that Pat Parenteau talked about. We need to very quickly—like right away—triple current global spending on clean energy.

I used to take great comfort that there was a lot of money on the planet that institutional capital as we call it—the big pension funds; insurance companies; mutual funds; sovereign wealth funds, which is like Saudi Arabia’s oil fund, the Norwegian’s oil fund; and then lots of billionaires—the total is about $100 trillion dollars. And I used to say, until I met a very smart guy from Goldman Sachs, “We got plenty of money.” It turns out, that’s the wrong number. This is the right number, this is what’s available annually—the investable capital as they call it—on everything globally.

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79. ENVIRONMENT CALIFORNIA, FACT SHEET: THE CALIFORNIA CLEAN CARS PROGRAM 2 http://cdn.publicinterestnetwork.org/assets/7oFiTG-2MdTF4T7J-U8g/Fact-Sheet---CA-Clean-Cars-Program.pdf [https://perma.cc/ER7F-U6UX].
80. INT’L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2016 82 (2016).
81. Id.
82. Id.
spend on everything. Set that aside, set that next to the 2.3-trillion-dollar need that I just talked about, and what you’re beginning to see is that what we’ve got to be spending on clean energy to have a shot at dealing with climate, is a pretty big percentage of this—of all the capital—that’s available annually.

A complicated chart, but what the story is here, this is a breakdown of all the pension fund investments. Anyone who’s got a pension fund, you’ve got people in New York who are out investing your pension fund, and they put it into mutual funds, and government bonds, and private bonds, and shares of public companies. It turns out, a very tiny slice of that is even available to go into energy. And it’s not just an 8% slice, it’s a much smaller slice of that. In part because of the risk that comes with much of the energy investing globally.

What do I mean by that. We talk about four big risk categories when it comes to investing in energy projects around the world: there’s policy risk, emissions rules, trade policy (we’ve got a big mess right now in Washington that may result in a solar tariff. If you’re an investor, and you’re looking out at the prospect of a big tariff being placed on solar, you’re saying to yourself, “well that’s a risky investment.”), low and unstable electricity prices, low and volatile natural gas and oil prices. We’ve got cheap natural gas. What if it becomes expensive natural gas? We’ve got cheaper oil, what if it changes? Over-generation and curtailment; this is, we’ve got a problem in California now where in certain parts of the day, certain seasons, we’re producing more electricity than we can use, we are over-generating, and we are curtailing the solar and wind projects that are producing more than we can use. That does not sit well with an investor in a solar or wind project, the prospect that you may not get paid at all for some of the electricity you’re producing.

Now, the good news is there’s opportunities for storage that are coming down the road. You can build more transmission, but all of that’s complicated and that has its own set of costs. Permitting: it’s tough to get certain projects

85. Id. at 6.
86. Id.
87. Id.
91. REICHER, supra note 93, at 40.
permitted in this country and a lot of places around the world. Transmission: we’ve used up a lot of the good transmission and interconnection sites for a lot of projects in the U.S. and in some countries they don’t exist in the first place. And then, a whole set of things, the investment regime, unstable currencies, for example, in the developing world, you put dollars in, if you’re a foreign investor, you get their currency back, what if it’s volatile? Again, these are the sort of complexities that make much of the investment in clean energy projects around the world not the sort of risk that a lot of investors want to take, and it’s what gets you into that pretty small slice of the pension fund pool that I mentioned a few minutes ago.

Now, there’s good news here: we know how to fix a lot of these things, and we have a project at Stanford that’s digging into each one of these investment risks and what can be done. We’re working with some of the big investment banks, we’re working with governments, we’re working with a variety of people. How can we lower the risk that attends many of these kinds of clean energy projects? And I want to be clear, I’m not just talking about solar and wind projects, I’m talking about the rest of the renewables, I’m talking carbon capture, nuclear projects, and even energy efficiency. There are a variety of challenges with energy efficiency as we’ve talked about a little bit.

So, what happens is, these four risks compound and make a desirable investment—nice tall green bar and a nice short red one, it makes the green bar drop and the red ones go up—CO2 prices unstable, electricity prices unstable, an uncertain EPC (that means an Engineering, Procurement, and Construction Contract), you have a technology that’s not fully ready, the contractor’s going to say, “Sorry, it’s going to cost you more to get it done,” and then the debt term, you’d like a nice long term loan of 25 years, but if you’ve got a risky project, the lender may say: “I’ll give you seven years.” That raises the price.

That’s the bad news. The great news is this is a massive economic opportunity. We’re going to spend, one way or another, about 50 trillion

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92. Id. at 5.
93. Id.
94. Id.
95. Wendy N. Duong, Partnerships with Monarchs—Two Case Studies: Case Two Partnerships with Monarchs in the Development of Energy Resources: Dissecting an Independent Power Project and Re-Evaluating the Role of Multilateral and Project Finance, 26 U. Pa. J. INT’L ECON. L. 69, 75 (2005) ("From the lender’s perspective, under Project Finance principles, when it is contractually established that the project can pay for itself over an extended period of time, bankers may be persuaded to make loans based on demonstration of the project’s long-term self-sustaining capabilities and economic viability.").
dollars between now and 2035 on energy — and I didn’t say clean energy.\footnote{World Needs S48 Trillion in Investment to Meet Its Energy Needs to 2035 (June 2014), INT’L ENERGY AGENCY (June 2014), https://www.iea.org/newsroom/news/2014/june/world-needs-48-trillion-in-investment-to-meet-its-energy-needs-to-2035.html [https://perma.cc/MA8T-QMZR].} We’re going to make that choice, how clean or not clean it is. But we’re going to be spending tens of trillions of dollars building and rebuilding global energy infrastructure. So, it’s a massive economic opportunity. And some, like the International Energy Agency, call it the biggest economic opportunity of the 21st century, bar none.\footnote{Id.}

The great news is that energy efficiency has nice returns and relatively low risk. So not only is it cheap, as we saw at the beginning, but among investors, it’s looked at as a pretty attractive investment given its relatively low risk.\footnote{Peter Sweatman, Energy Efficiency is a ‘Win-Win’ for Investors, GREENBIZ (July 11, 2017, 1:15 AM), https://www.greenbiz.com/article/energy-efficiency-win-win-investors [https://perma.cc/9E3C-SE5W].} You pretty much know that if you put in this advanced lighting system, it’s probably going to work, and you’ve got a lot of experience with it. And again, we saw this before: a low levelized cost of electricity.

We’re spending about 230 billion dollars a year on energy efficiency globally,\footnote{INTERNATIONAL ENERGY AGENCY, ENERGY EFFICIENCY MARKET REPORT 2016 (2016) (“In 2015, investors directed USD$221 billion into incremental energy efficiency improvements – up 6% from 2014.”)} and what that original chart I showed you from the International Energy Agency says is, we’ve got to multiply that by 5 or 6.\footnote{Id.} It’s the single biggest increment of increased investment that we need if we’re going to have a shot, again, at staying within that 450 parts per million, 2 degrees centigrade.\footnote{Id.}

Here’s an interesting example of the U.S. efficiency opportunity—a 300 billion dollar investment opportunity.\footnote{See United Nations Paris Agreement (2015).} This is Deutsche Bank; [they] looked at this. A trillion dollars in energy savings over ten years—and you could cut about 10 percent of U.S. climate emissions.\footnote{DEUTSCHE BANK, UNITED STATES BUILDING ENERGY EFFICIENCY RETROFITS: MARKET SIZING AND FINANCING MODELS 3 (2012).} That’s a pretty sweet deal. The capital is there in the United States, but it is not flowing. So, three percent of existing commercial space is renovated each year.\footnote{Id.} Just one-tenth include a state-of-the-art energy efficiency upgrade.\footnote{Id.} And it’s even lower, people, you know, the granite counter tops are much more interesting than the efficient furnace. That’s our basic dilemma.
This is the second issue: We talked about low consumer demand in the policy context; let’s finish up talking about investor concerns about risk. There’s three kinds of risks. There’s credit risk (think-Is the borrower, the person who’s borrowed the money, likely to pay you back?), and that comes up in both the residential and commercial contexts.106 “MUSH” means “municipalities, universities, schools, and hospitals,” this is another category of investment opportunities where energy efficiency is a big deal.107 Asset risk, are we going to compromise the value of the property if we make an energy efficiency upgrade? And, what the heck do I mean by that? Well, we’ve had experiences for example, where you tighten up a house too much and you have indoor air quality problems; you put in windows that don’t quite work; there’s a variety of things you can do. I don’t want to overstate this problem, the asset risk problem, but investors do take a serious look at it. And then this [performance risk] is a big one. The engineer tells you, you make the following five improvements and you’re going to get a 34 percent decrease in energy use, but when you actually go in and measure it, it’s 27 percent. That’s a real problem for a financial model for an investor. He or she wants to know: are you really going to get 34 percent, because if you don’t, and I’m six percentage points below that, this investment doesn’t look very good.

So, there’s again, just like we saw the policy tools to stimulate demand, there’s a whole set of tools to stimulate efficiency investment, I’m going to go through these fast, because I want to be sure we have some time for questions. The first are energy efficiency tax credits. Not many people know that they exist. They’re pretty modest, but they do, or I should say, they did exist.108 When the solar and wind tax credits were extended,109 there are the orphan tax credits that didn’t get extended: geothermal, biomass, energy efficiency.110 All of these got left on the cutting room floor. The only ones

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110. 26 U.S.C. § 45 (codifying the energy production tax credit available to various kinds of renewable energy projects.). See also 26 U.S.C. § 45(d)(4)(B) (ending the energy production tax credit for geothermal projects commencing construction after January 1, 2018).
that got extended were solar and wind.\textsuperscript{111} The orphan tax credits, and this is one of them, was a really unfortunate result, and there’s all sorts of finger pointing about why it happened, but what we need to do, is in this current tax discussion in Washington, we should put these orphan credits back in place like we did in solar and wind.

Alright, these are complicated, so I’m going to go through them fast. There’s lots of ways to make it easier for people to renovate in an energy efficient way, either a residential or commercial building. One is, let them pay it back on their energy bill, their electricity bill. Give them a loan, and this is a monthly payment they make anyway, put it on that bill, and that can help the investor say: ‘Ah ha, I have a better assurance this is actually going to get paid.” Another one, Property Assessed Clean Energy, is put it on the annual property tax bill.\textsuperscript{112} Essentially float the loan and have it paid back on the property tax bill. We call that PACE, and there’s something called the PACE Assessment.\textsuperscript{113} [There are] lots of complexities in this one, it works in a commercial space, but Fannie Mae and Freddie Mac have problems in the residential area, I won’t get into it, but it’s an interesting concept and it’s getting some traction.\textsuperscript{114}

This is one of my favorites, called Energy Savings Performance Contracts (ESPCs).\textsuperscript{115} This is where big companies, you’ve probably heard of a company like Honeywell, it takes its own money, goes into a building (commercial building, and frequently a federal building), does the energy retrofit under a contract, and pays itself back, well, let me say it this way, the company that owns the building or the federal agency pays this back, but has already achieved some savings, so this is the debt service, and this is the reduced energy bill, but it’s already saving. And then when the contract is over, when Honeywell has been fully paid back, you have a big, a much-

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\textsuperscript{111} 26 U.S.C. § 48 (codifying the solar energy business investment tax credit). See also Consolidated Appropriations Act of 2016, Pub. L. No. 114-113 (December 18, 2015) (extending the solar energy investment tax credit).
\textsuperscript{113} Id.
\textsuperscript{114} Id.
\end{flushleft}
reduced energy bill. So, the company puts the money in, and it essentially pays itself back out of the savings, and the owner of the building five or ten years later, gets a vastly cheaper building to operate. Utilities also do something like this, a version of the ESPC; it’s called utility energy service contracts.116

And then this last one is a purely private sector approach that’s being advanced by a variety of companies, one is a small one in Washington D.C. called Sparkfund.117 Actually some students who came out of Middlebury and Dartmouth who set this company up a few years ago, and it’s doing very, very well, with something called the “technology subscription service,” and they’ve raised lots of money and they’ve got lots of clients.118 So, yet another approach to this.

Now the exciting thing for me, because this is where things get really well-integrated, was when Solar City announced, “we’re coming over to your house anyway, why don’t we also do the energy efficiency upgrade.” Lyndon Rive, the CEO, says: “our goal is to manage all the energy needs of the home.”119 They got a loan from a bank in Boston and they started to do this. Unfortunately, nine months later, they gave up on it, because, they realize, that unlike putting panels on the roof, going in and doing efficiency retrofits to homes was a lot more complicated. Every home is different. And it just was taking time and money they couldn’t spend. And, they didn’t say this, but of course, if you cut the electricity load in a home, what happens to your solar panel sales? So that didn’t work very well for Solar City either. So, this was a bright and shining moment, but I think we can get back to this, I think there are ways to do it, and I think that’s ultimately providing an integrated solution, solar on the roof, that new furnace in the basement, insulation in the walls, there’s a whole variety of ways to do that.

This State, [Vermont], has the first Energy Efficiency Utility, Efficiency Vermont, that has been pioneering a lot of very important mechanisms for getting this done. The State Public Utility Commission, you have current and former commissioners sitting here who have] done a lot of very creative things to get things done in this way.120 So, I would give Vermont a lot of

116. Id.
119. X
120. See, e.g., In re Energy Efficiency Plan, 196 P.U.R.4th 476 (Sept. 30, 1999) (Vermont Law School Professor Michael Dworkin establishing the nation’s first energy efficiency utility as Chairman of the Vermont Public Service Board).
credit for being a very pioneering state when it comes to what we can do with energy efficiency.

And then the last one is the biggest user of energy of all, on the planet. And that is the U.S. Federal Government. 23-billion-dollar energy bill.\footnote{121} 400,000 buildings. Even more vehicles. Lots and lots of energy efficiency tools: federal procurement, federal finance, technology demonstrations, these energy savings performance contracts, a whole host of other things.

I co-chaired a report last year, that we submitted to the Secretary of Energy, about all these opportunities in federal energy management to pioneer some of the things we need to be able to do in energy efficiency. And, I did a piece in The Hill, just after Trump was elected, saying as President, Trump will be CEO of U.S. Energy Incorporated.\footnote{122} And I pointed out to the President (I don’t think he read it), but he owned a mere two million square feet of real estate, he was now taking over an empire with three billion square feet of real estate.\footnote{123} And I thought it was a great opportunity for the President to step up, take a look at this report we did, and really do some great things in the federal context.

So, the biggest economic opportunity of the twenty-first century, and the way I will leave this for you is, it’s an unprecedented chance to do good and do well. And I think it’s that intersection that’s going to motivate people more than anything else when it comes to moving the unprecedented amounts of capital that is going to have to start flowing if we’re going to fix this problem. So, don’t forget the triangle as you go out. And with that, I thank you and I would be happy to take your questions.


\footnote{123}{Id.}