
SYMPOSIUM PANEL

ADVANCING ENERGY POLICY

BURCIN UNEL, CHERYL A. LAFLEUR & ANDREW G. PLACE

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INTRODUCTION: PURSUING RATIONALITY TO ADVANCE ENERGY
POLICY, BY BURCIN UNEL *

In the past decade, state and federal energy policymakers have been trying to catch up with the two major drivers of grid transformation: technological innovation and climate change. With advances in technology, and, as a consequence, the increasing deployment of new resources such as distributed solar generation and energy storage, we must rethink how we regulate energy markets. These resources are changing the traditional one-way electric grid into a multi-directional platform where consumers can also generate electricity. Additionally, because these resources can provide both retail and wholesale services, they are also challenging the traditional “bright line” between state and federal jurisdictional boundaries.

* Burcin Unel, Ph.D., Energy Policy Director, Institute for Policy Integrity at New York University School of Law.

At the same time, given the lack of climate leadership by the Trump administration, states are taking ambitious actions to clean up the power sector, with an increasing number of states moving forward with 100 percent clean energy goals.¹ To achieve these goals, many states turn to new policy tools, such as zero-emission credits for nuclear plants and offshore-wind renewable energy credits. Because these tools necessarily affect the outcomes in wholesale energy markets, they create tensions between states and federal regulators as they try to figure out how energy markets should evolve with the changing generation mix.

As part of The Institute for Policy Integrity's (Policy Integrity) tenth anniversary conference, "Energy and Environmental Policy: The Quest for Rationality," I moderated a panel with three energy policy makers: Kathleen Frangione, Chief Policy Advisor, Office of the Governor for the State of New Jersey; Cheryl A. LaFleur, Commissioner, Federal Energy Regulatory Commission (FERC);² and Andrew G. Place, Vice Chairman, Pennsylvania Public Utility Commission. In their transcribed and edited remarks that follow,³ they provide insights about the future of energy policy in their jurisdictions in the face of rapid climate change and technology innovation. In this piece, I discuss some of the driving forces behind the recent state and federal actions in energy policy, describe recent successes for economic rationality, and conclude with reflections on Policy Integrity's thought leadership on energy policy.

A. *Technological Change as a Driver of Regulatory Policy*

The energy sector has been going through a significant transformation during the past ten years. One of the two major drivers of this transformation is undoubtedly technological change. Recent innovations, and the resulting cost declines, made many newer, cleaner, and more advanced resources economically viable,

¹ Hawaii, California, Washington D.C., New Mexico, Puerto Rico, and Nevada have enacted legislation committing to 100% clean energy goals with their states. See *100% Commitments in Cities, Counties, & States*, SIERRA CLUB, <https://www.sierraclub.org/ready-for-100/commitments> (last visited May 7, 2019). In addition, governors of Colorado, New Jersey, and New York are committed to 100% goals, with pending legislation. See *id.*

² In the interim between publication and the discussion, LaFleur has stepped down from FERC and become a member of the board of directors for Independent System Operator-New England.

³ The remarks of Kathleen Frangione are not published in this issue.

and hence, more common. For example, installation of residential solar panels in the United States more than quadrupled in the past ten years.⁴ Similarly, residential energy storage systems have been growing exponentially.⁵

Increasing deployment of these resources disrupts both the traditional electric grid, which has been relying on one-directional power flow from large, centralized generators to end-users, and traditional utility regulation, which has been designed around a core assumption that only utilities could provide certain electric services. These new technologies also give end-users the ability to generate electricity themselves, as well as the ability to use it, store it, or sell it to the grid. Consequently, users who could only be passive consumers of electricity up until recently, can now also be active producers who decide how much to generate, consume, and sell at a given time. Therefore, they challenge the core assumption of traditional utility regulation, threatening utility business models.

As a result, one of the main state-level policy debates during the past several years has been how to revise the existing regulatory structures to integrate these “prosumers” into the grid and compensate them, while not threatening the financial viability of regulated utilities. In many states, regulators have been struggling with how to value and compensate distributed energy resources such as rooftop solar panels and energy storage systems. For example, in 2018, nearly all states took some action on distributed solar generation compensation.⁶ Some states were supportive of these new resources, driven partly by state climate goals, while others took action to hinder these resources, driven mostly by financial concerns of utilities.⁷

⁴ See DAVID FELDMAN ET AL., NAT’L RENEWABLE ENERGY LAB., Q4 2017/Q1 2018 SOLAR INDUSTRY UPDATE 36 (2018).

⁵ See John Weaver, *U.S. Triples Energy Storage Installations, Residential Grows 10X to Become Largest Sector*, PV MAGAZINE (Sept. 5, 2018), <https://pv-magazine-usa.com/2018/09/05/us-triples-energy-storage-installations-residential-grows-10x-to-become-largest-sector/>.

⁶ See AUTUMN PROUDLOVE ET AL., N.C. CLEAN ENERGY TECH. CTR., 50 STATES OF SOLAR: Q4 2018 QUARTERLY REPORT & 2018 ANNUAL REVIEW EXECUTIVE SUMMARY 5 (2019), <https://nccleantech.ncsu.edu/wp-content/uploads/2019/01/Q4-18-Exec-Summary-Final.pdf>.

⁷ See ANGELIQUE MERCURIO, ENERKNOL RESEARCH, CHANGING NET METERING LANDSCAPE RELIES ON SOLAR-PLUS-STORAGE TO SOLVE COST SHIFTING 3 (2018), <https://enerknol.com/enerknol-insights-changing-net-metering-landscape-relies-on-solar-plus-storage-to-solve-cost-shifting/>; Richard Revesz &

Despite these intense debates about distributed solar generation, so far only a few states have taken on comprehensive initiatives to rethink the regulatory structures to efficiently integrate all types of distributed energy resources, such as energy storage and electric vehicles. At best, most states are reviewing different types of resources one by one, in separate proceedings and with separate mandates, creating a possibility of distorting their relative prices, and, as a result, the economic efficiency of market outcomes.⁸ Furthermore, such one-step-at-a-time approaches, especially those with long-lasting regulatory proceedings, struggle to keep up with the pace of technological transformation. As a result, despite all the potential value these new resources offer, state-level regulatory transformation has been slow, leaving significant economic gains on the table.

At the federal level, regulators have been struggling with how to integrate these new types of resources into wholesale energy markets while respecting the current jurisdictional divide between state and federal regulators. According to the Federal Power Act, the federal government regulates wholesale sales and interstate transmission, and the states regulate retail sales, intrastate transmission, and generation and distribution facilities.⁹ When electricity was flowing in only one direction—from generators to transmission lines, to distribution utilities, to end-users—distinguishing between a “sale for resale” and a “retail sale” was relatively uncomplicated, which made drawing a “bright line” between federal and state jurisdictions relatively easy. But, the fact that these new technologies could generate electricity that can provide both retail and wholesale services is blurring this divide, creating a potential for regulatory conflict between state and federal agencies, and, in turn, economic inefficiency.

Because distributed energy resources can serve both retail and wholesale markets, it would be economically efficient to allow these resources to participate in both markets. However, allowing “dual participation” is not straightforward. It requires clear definitions of “services” that these resources provide, advanced technology to

Burcin Unel, *Managing the Future of the Electricity Grid: Distributed Generation and Net Metering*, 41 HARV. L.REV. 44 (2017).

⁸ See e.g., *Detailed Summary Maps*, N.C. CLEAN ENERGY TECH. CTR., <http://www.dsireusa.org/resources/detailed-summary-maps/> (last visited Nov. 16, 2019) (providing color-coded maps showing different energy policies by state).

⁹ See Federal Power Act, 16 U.S.C. § 824(b)(1) (2012).

measure these services, and a coordination between state and federal authorities on which of those services are retail and which of them are wholesale, ensuring that resources can get paid for all the services they can provide without getting paid twice for the same service.

Over the past several years, FERC has indeed been working on rules to incorporate distributed energy resources and energy storage into wholesale energy markets. In 2018, FERC issued Order 841, which directed wholesale market operators to create rules that would allow energy storage resources to participate in wholesale markets as long as they are technically capable of providing wholesale services.¹⁰ This order was an important milestone, eliminating entry barriers for a technology crucial to the clean energy future, while recognizing—and implicitly allowing—dual participation. However, when FERC issued Order 841, it did not take a similar action on distributed energy resources, citing insufficient information.¹¹ Therefore, a significant efficiency gap in wholesale energy markets still remains.

B. *Climate Change as a Driver of Energy Policy*

The second major driver of the transformation in electricity regulation is climate change. Climate change is already causing significant damages to our economy, environment, and public health. While the Trump administration has consistently ignored the irrefutable evidence on climate science, many states, which are already dealing with devastating consequences from climate change, have been taking decisive actions to reduce greenhouse gas emissions from the electric sector by implementing ambitious clean energy standards.

Clean energy standards require that a certain percentage of electricity delivered to a state comes from resources that do not emit carbon dioxide, such as solar, wind, and nuclear. To achieve these goals, states usually pay these resources separately for their “environmental attribute.” For example, in some states, renewable energy resources get renewable energy credit payments, separate from whatever they earn in the wholesale markets.¹² Some states opt

¹⁰ See Order 841, 162 FERC ¶ 61,127 (2018).

¹¹ See *id.* ¶ 5.

¹² See, e.g., *Maryland Renewable Energy Portfolio Standard Program: Frequently Asked Questions*, MD. PUB. SERV. COMM’N (2019), <https://www.psc.state.md.us/>

for more technology-specific payments, such as zero-emission credit payments for nuclear plants and offshore-wind renewable energy credits.¹³

Increasing penetration of clean energy resources creates three challenges for policymakers. The first challenge is related to infrastructure. Because it makes sense to build wind turbines only where there is abundant wind power, and to build solar farms only where there is abundant solar potential, significant investment in new transmission lines is necessary. At the same time, the existing infrastructure needs to be updated to better accommodate the variability of these resources.

The second challenge is related to the design of wholesale energy markets. Currently, wholesale market operators manage most of the power supplied in the United States.¹⁴ These operators' goal is to ensure reliability at lowest cost. To achieve this goal, they rely on carefully designed auctions, which optimize the operation of all generators based on generators' marginal costs and other operational characteristics to determine prices that would ensure economic efficiency and sufficient generation to provide reliable electricity service.¹⁵ However, given that most renewable resources have almost zero marginal cost of generation, it is a non-trivial task to figure out how exactly to set economically efficient prices that would also be sufficient to incentivize enough generation for reliability.¹⁶ Furthermore, because there could be significant

electricity/maryland-renewable-energy-portfolio-standard-program-frequently-asked-questions/ (last visited Oct. 4, 2019); *About the Pennsylvania Alternative Energy Credit Program*, PA. PUB. UTIL. COMM'N (2019), <http://www.pennaeps.com/aboutaeps/> (last visited Oct. 4, 2019).

¹³ See, e.g., Press Release, N.J. Bd. of Pub. Utils., NJBPU Approves Zero Emission Credit Program and Application Process for Nuclear Power Plants (Nov. 19, 2018), <https://www.state.nj.us/bpu/newsroom/2018/approved/20181119.html>; *Offshore Wind Renewable Energy Credits*, N.Y. STATE ENERGY RESEARCH & DEV. AUTH., <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-Solicitations/ORECs> (last visited Nov. 16, 2019).

¹⁴ See *Electric Power Markets: National Overview*, FED. ENERGY REGULATORY COMM'N, <https://www.ferc.gov/market-oversight/mkt-electric/overview.asp> (last updated Apr. 10, 2019).

¹⁵ See Peter Crampton, *Electricity Market Design*, 33 OXFORD REV. ECON. POL'Y 589, 594–96, 598 (2017).

¹⁶ See *Wind's Near-Zero Cost of Generation Impacting Wholesale Electricity Markets*, DEP'T OF ENERGY (May 8, 2018), <https://www.energy.gov/eere/wind/articles/winds-near-zero-cost-generation-impacting-wholesale-electricity-markets>; see also *Hydropower Upgrades to Yield Added Generation at Average Costs Less*

variability in the output of these resources, for example due to cloud cover that reduces solar output, market designs need to evolve to more accurately value services, such as ability to quickly increase or decrease production, that were not as crucial (and, hence, neglected) before.

The final challenge is related to the interaction between state and federal authorities. Any state-level policy initiative to achieve a certain composition of generators will inevitably affect wholesale rates because changing the composition of generators would also change the market price. Two separate court cases have explored whether or not this indirect effect means that a state policy instrument like a zero-emission credit would be preempted. In these cases, both the Second Circuit and the Seventh Circuit upheld states' use of these instruments, and the Supreme Court denied to hear the case, affirming states' rights.¹⁷ However, as FERC described in its brief to the Second Circuit, it has the authority "to ameliorate, as needed, detrimental effects on markets within its jurisdiction."¹⁸ Whether these policies in fact cause "detrimental" effects on wholesale markets has indeed been the focus of many contentious debates between states, wholesale market operators, and FERC. And, if and how FERC will use its authority to "ameliorate" these indirect effects will necessarily affect the cost-effectiveness and the pace of clean energy transition.

The economic efficiency of energy policies will depend on if and how we address all of these questions, and state and federal regulators' willingness to rely on economics and science in policy design as we tackle them.

C. Policy Integrity's Contributions

In the past ten years, Policy Integrity has participated in numerous local, state, and federal proceedings to provide input to

Than 4 cents per kWh—Without New Dams, DEP'T OF ENERGY (Nov. 4, 2009), <https://www.energy.gov/articles/hydropower-upgrades-yield-added-generation-average-costs-less-4-cents-kwh-without-new-dams> (touting extremely low marginal cost of power produced by new hydroelectric technology); *Geothermal FAQs*, DEP'T OF ENERGY, https://www.energy.gov/eere/geothermal/geothermal-faqs#geothermal_energy_cost (last visited Sept. 12, 2019).

¹⁷ See *Elec. Power Supply Ass'n v. Star*, 904 F.3d 518, 518–25 (7th Cir. 2018), cert. denied 587 U.S. 868 (2019); see also *Coal. for Competitive Elec. v. Zibelman*, 906 F.3d 41, 45–46 (2d Cir. 2018).

¹⁸ *Coal. for Competitive Elec.*, 906 F.3d at 45–46.

improve the design of regulations, as well as the quality of the accompanying economic analyses. Our comments in these proceedings generally focused on three main issues: improving the use of cost-benefit analysis; internalizing greenhouse gas and air pollution externalities in markets; and improving the economic efficiency of market designs.

1. *Advancing State Energy Policies*

Policy Integrity has provided extensive input to multiple states on how to conduct cost-benefit analysis to achieve economically efficient outcomes in electricity regulation.¹⁹ In our comments, we generally have argued for using societal cost-benefit analysis, and monetizing all costs and benefits, including values that are not traditionally monetized such as pollution reduction and resilience. Our comments have been well received and many of our suggestions have been adopted in several states, including industry-leading states such as California and New York.²⁰

¹⁹ See, e.g., Inst. for Policy Integrity, Comment Letter on Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (Aug. 21, 2015), https://policyintegrity.org/documents/REV_Comments_Aug2015.pdf; see also Inst. for Policy Integrity, Comment Letter on Investigation into Modernizing the Energy Delivery Structure for Increased Sustainability (Aug. 31, 2015), https://policyintegrity.org/documents/Institute_for_Policy_Integrity_Comments_on_FC_1130_Investigation_into_Modernizing_the_Energy_Delivery_Structure_for_Increased_Sustainability.pdf; Inst. for Policy Integrity, Comment Letter on the Matter of Benefit Cost Analysis Handbooks (Sept. 26, 2016), https://policyintegrity.org/documents/BCA_Handbook_Reply_Comments.pdf; Inst. for Policy Integrity, Comment Letter on Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Distributed Energy Resources (Oct. 2, 2014), https://policyintegrity.org/documents/Policy_Integrity_SCT_Comments.pdf; Inst. for Policy Integrity, Comment Letter on Discussion Draft, 2030 Target Scoping Plan Update (Dec. 16, 2016), https://policyintegrity.org/documents/Policy_Integrity_ARB_use_of_SCC_under_AB_197_FINAL.pdf.

²⁰ See Decision Adopting Cost-Effectiveness Analysis Framework Policies for All Distributed Energy Resources, 2019 Cal. PUC LEXIS 233 (Cal. P.U.C. May 16, 2019); see also Cal. Pub. Util. Comm'n, Ruling Seeking Responses to Questions and Comment on Staff Amended Proposal on Societal Cost Test, attachment 1 at 8 (Mar. 14, 2018), <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M212/K023/212023660.PDF> ("Staff was persuaded by the arguments of the Institute for Policy Integrity to use the value recommended by the Interagency Working Group (IWG) for the social cost of carbon."); Order Adopting a Clean Energy Standard, 2016 N.Y. PUC LEXIS 425, 230 (N.Y.P.S.C. Aug. 1, 2016) ("As emphasized by the Institute for Policy Integrity, the value of avoided carbon emissions is most accurate if tied to the value of the avoided

We have been especially successful in our efforts to have regulators incorporate greenhouse gas externalities in electricity rulemakings. In particular, New York State relied on our comments²¹ in deciding to use the social cost of carbon (SCC) in various resource compensation mechanisms, such as to calculate zero-emission credit payments for nuclear resources and to calculate a price floor for the environmental value of distributed energy resources.²² In subsequent litigation on the zero-emission credits, we have submitted amicus briefs explaining how the state's use of the SCC was consistent with economic methodology.²³ And, the fact that the state, relying on our comments, calculated the payments to nuclear resources as a separate environmental attribute based on the SCC instead of a value "tethered" to wholesale energy markets played a key role in the federal court decision upholding the state's policy.²⁴ New York's example lead other states, including New

external damage, or the value of avoiding the carbon emissions that would be emitted if zero-carbon generators are replaced by other generators.”).

²¹ See Inst. for Policy Integrity, Comment Letter on Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard (Jan. 8, 2018), https://policyintegrity.org/documents/Comments_to_NYDPS_on_CES_Tief_2.pdf; see also Inst. for Policy Integrity, Comment Letter on Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard (Oct. 31, 2016), https://policyintegrity.org/documents/Policy_Integrity_CES_Petition_Comments.pdf; Inst. for Policy Integrity, Comment Letter on Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard (Jul. 22, 2016), https://policyintegrity.org/documents/Policy_Integrity_Comments_on_Staffs_Responsive_Proposal_for_Preserving_Zero-Emissions_Attributes.pdf; Inst. for Policy Integrity, Comment Letter on Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard (Apr. 22, 2016), https://policyintegrity.org/documents/Comments_on_Clean_Energy_Standard_White_Paper.pdf.

²² See Order Adopting a Clean Energy Standard, 2016 N.Y. PUC LEXIS 425; Re Value of Distributed Energy Resources; Re Community Net Metering Program, 339 P.U.R.4th 335 (N.Y.P.S.C. Sept. 14, 2017).

²³ See Proposed Brief of the Institute for Policy Integrity at New York University School of Law as *Amicus Curiae* in Support of Defendants-Respondents, *Hudson River Sloop Clearwater, Inc., v. N.Y. Pub. Serv. Comm'n*, No. 16-07242 (N.Y. Sup. Ct. Mar. 28, 2018), https://policyintegrity.org/documents/03.28.18_ZEC_NY_State.pdf; see also Brief of Independent Economists, *Coal. for Competitive Elec., v. Zibelman*, 906 F.3d 41 (2d Cir. 2018) (No. 17-2654), https://policyintegrity.org/documents/Independent_Economists_Brief_for_Defendants-Appellees.pdf; see also Brief of the Institute for Policy Integrity, *Coal. for Competitive Elec., v. Zibelman*, 906 F.3d 41 (No. 17-2654), https://policyintegrity.org/documents/Coalition_for_Competitive_Electricity_-_Policy_Integrity_Amicus_Brief_As_Filed.pdf.

²⁴ See *Coal. for Competitive Elec.*, 906 F.3d at 54.

Jersey and Illinois, to similarly use the SCC in their calculation of zero-emission credit payments.

We have also been successful in our advocacy to encourage the use of the SCC in energy decisionmaking, including in California, Nevada, Colorado, and Minnesota.²⁵ These states have adopted the SCC to use in resource-planning decisions or cost-benefit analysis, both of which improve the economic efficiency of resulting regulatory decisions.²⁶ The growing number of states that use the SCC indicates that the SCC is gaining momentum in electricity rulemaking as a flexible tool. To increase this momentum, we researched states' existing statutes and regulations on their ability to value climate impacts in electricity policy. Our analysis shows that there are twenty-two other states that have either an environmental cost statute or a public interest mandate that would allow this valuation, providing opportunities for continuing Policy Integrity's advocacy efforts to have states implement rational policies by internalizing climate damages from the electricity sector.²⁷

Finally, Policy Integrity has been playing an active role in multiple states to improve the economic efficiency of market designs by helping to determine the appropriate methodology for compensating distributed energy resources for their full value,

²⁵ See Pub. Util. Comm'n of the State of California, Ruling Seeking Responses to Questions and Comment on Staff Amended Proposal on Societal Cost Test, attachment 1 at 8 (Mar. 14, 2018), <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M212/K023/212023660.PDF>; see also Nev. Pub. Util. Comm'n, Final Order Adopting Regs Pursuant to SB 65 (Aug. 20, 2018), http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2017-7/32153.pdf; Inst. for Policy Integrity, Comment Letter on Investigation and Rulemaking to Implement the Provisions of SB 65 (2017) (Oct. 17, 2017), https://policyintegrity.org/documents/WRA_EDF_IPI_Reply_Comments_Final.pdf; Inst. For Policy Integrity, Comment Letter on Investigation and Rulemaking to Implement the Provisions of SB 65 (2017) (Oct. 11, 2017), https://policyintegrity.org/documents/2017-10-11_Joint_Comments_on_NV_SB65.pdf.

²⁶ See Herman Trabish, *Carbon Calculus: More States Are Adding Carbon Costs to Utility Planning Guidelines*, UTIL. DIVE (Aug. 31, 2017), <https://www.utilitydive.com/news/carbon-calculus-more-states-are-adding-carbon-costs-to-utility-planning-gu/503613/>; LEGISLATIVE ANALYST'S OFFICE, ASSESSING CALIFORNIA'S CLIMATE POLICIES—AN OVERVIEW (Dec. 21, 2018), <https://lao.ca.gov/Publications/Report/3911>.

²⁷ See generally DENISE A. GRAB ET AL., INST. FOR POLICY INTEGRITY, OPPORTUNITIES FOR VALUING CLIMATE IMPACTS IN U.S. STATE ELECTRICITY POLICY (2019), https://policyintegrity.org/files/publications/Valuing_Climate_Impacts.pdf.

including their environmental and public health value.²⁸ Our scholarship and comments helped New York State improve its “Value Stack” framework to compensate distributed energy resources for their energy, capacity, distribution, and environmental value separately.²⁹ In addition, we have led a working group with a diverse set of New York stakeholders to analyze different methods the state can use to compensate distributed energy resources for their environmental and public health benefits.³⁰ Our work showed that these benefits are time- and location-variant, and the compensation for these benefits should also be similarly time- and location-variant.³¹ As a result, the state is currently working on refining its original, flat compensation mechanism.³² Similarly, our

²⁸ See Inst. for Policy Integrity, Comment Letter on Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues (Sept. 26, 2018), https://policyintegrity.org/documents/Policy_Integrity_SGIP_Comments_R1211005.pdf; see also Inst. for Policy Integrity, Comment Letter on Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements (Feb. 11, 2016), https://policyintegrity.org/documents/R1602007_Policy_Integrity_IRP_Comments_06-28-17.pdf; Inst. for Policy Integrity, Comments Letter on Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Distributed Energy Resources (Oct. 2, 2014), https://policyintegrity.org/documents/CPUC_Policy_Integrity_-_Response_to_Utilities_Motion_for_Hearing.pdf.

²⁹ Compare N.Y. DEP’T PUB. SERV., WHITE PAPER ON RATEMAKING AND UTILITY BUSINESS MODELS 76 (2015), <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={48954621-2BE8-40A8-903E-41D2AD268798}> (proposing the use of LMP+D value stack framework), with Order on Net Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters, 2017 N.Y. PUC LEXIS 121, 288–94 (N.Y.P.S.C. Mar. 9, 2017) (addressing Policy Integrity’s suggestion to separate the energy, capacity, distribution, and environmental values).

³⁰ See generally JEFFREY SHRADER ET AL., INST. FOR POLICY INTEGRITY, VALUE OF DISTRIBUTED ENERGY RESOURCES – E/EJ VALUE INFORMAL SUBGROUP – TRACK 1 AND 2 REPORT (2018), https://policyintegrity.org/documents/DER_Value_Stack_E_Value_Report_07.09.18.pdf.

³¹ See JEFFREY SHRADER ET AL., INST. FOR POLICY INTEGRITY, VALUING POLLUTION REDUCTIONS: HOW TO MONETIZE GREENHOUSE GAS AND LOCAL AIR POLLUTANT REDUCTIONS FROM DISTRIBUTED ENERGY RESOURCES i-ii (2018), https://policyintegrity.org/files/publications/Valuing_Pollution_Reductions.pdf; see also INST. FOR POLICY INTEGRITY, HOW STATES CAN VALUE POLLUTION REDUCTIONS FROM DISTRIBUTED ENERGY RESOURCES 2 (2018), https://policyintegrity.org/files/publications/E_Value_Brief_-_v2.pdf.

³² See Order Regarding Value Stack Compensation, 2019 N.Y. PUC LEXIS 116, 23 (N.Y.P.S.C. Apr. 18, 2019) (“Finally, development of the Value Stack will

earlier research on the public health benefits of regulations helped the New York City Department of Environmental Protection adopt a major rule to switch buildings away from burning dirty fuels.³³

2. *Advancing Federal Energy Policies*

Policy Integrity has also been active in proceedings at the federal level. We have advocated directly in front of FERC, as well as through the stakeholder processes of several wholesale market operators, which are regulated by FERC. Our advocacy efforts have focused on improving the design of wholesale markets to allow for efficient participation of all resources, including renewables and distributed energy resources;³⁴ explaining the ways the markets need to evolve to take into account externalities;³⁵ and discussing how FERC-jurisdictional wholesale markets can evolve in the face of state-jurisdictional climate policies.³⁶

Policy Integrity has been actively involved in discussions on how wholesale energy market designs should evolve as we move toward a clean grid. For example, we have been participating in stakeholder discussions for carbon pricing in New York's wholesale market.³⁷ We have been supporting carbon pricing in wholesale markets as a more cost-effective and a technology-neutral way of achieving emission reductions in the power sector. We have presented at stakeholder meetings to support the use of the SCC³⁸

continue following this Order, including review of the Environmental Value calculation methodology and whether that value can be made time-varying to reflect the impact of generation in reducing emissions at different points during the day and during the year.”).

³³ See *Helping NYC Reach a Clean Air Milestone*, INST. FOR POLICY INTEGRITY: PROJECT UPDATES (July 1, 2015), <https://policyintegrity.org/what-we-do/update/helping-nyc-reach-a-clean-air-milestone>.

³⁴ See Sylwia Bialek & Burcin Unel, *Will You Be There for Me the Whole Time? On the Importance of Obligation Periods in Design of Capacity Markets*, 32 ELECTRICITY J. 21 (2019).

³⁵ See, e.g., SYLWIA BIALEK & BURCIN UNEL, INST. FOR POL'Y INTEGRITY, CAPACITY MARKETS AND EXTERNALITIES (2018), <https://policyintegrity.org/publications/detail/capacity-markets-and-externalities>.

³⁶ See, e.g. Comments of the Institute for Policy Integrity at New York University School of Law, FERC No. ER19-467-000 (Feb. 7, 2019).

³⁷ See Inst. for Policy Integrity, Comments on the Notice on Process, Soliciting Proposals and Comments, and Announcing Technical Conference (Nov. 30, 2017), https://policyintegrity.org/documents/Comments_NYISO_Carbon_Pricing_DPS.pdf

³⁸ See, e.g., Inst. for Policy Integrity, Social Cost of Carbon, Presented to IPPTF, Albany, NY (Apr. 23, 2018), <https://www.nyiso.com/documents/20142/>

and produced scholarly work discussing FERC's authority on the issue.³⁹

We have also been contributing to discussions on market design questions. For example, we have submitted comments to FERC on how to think about capacity markets in the face of externalities,⁴⁰ how to design seasonal capacity markets,⁴¹ how to define and value resilience,⁴² and how to design participation rules for energy storage and distributed energy resources participation.⁴³ We have also published reports on some of these issues, which have been cited extensively by other stakeholders in their comments.⁴⁴ And, we continue to directly participate in market reform

1393516/SCC%20PowerPoint%20for%20NYISO%20Meeting%204.23.pdf/53c8288a-3a17-181a-740c-83a04c0fd76e.

³⁹ See Bethany A. Davis Noll & Burcin Unel, *Markets, Externalities, and the Federal Power Act: The Federal Energy Regulatory Commission's Authority to Price Carbon Dioxide Emissions*, 27 N.Y.U. ENVTL. L. J. 1 (2019).

⁴⁰ See Inst. for Policy Integrity, Comment Letter on Potential revisions to the PJM Interconnection, L.L.C. Capacity Market, the Reliability Pricing Model (Nov. 6, 2018), https://policyintegrity.org/documents/Policy_Integrity_Reply_Docket_EL18-178_FOR_FILING.pdf.

⁴¹ See Inst. for Policy Integrity, Comment Letter on Seasonal Capacity Markets and Electricity Demand (July 12, 2018), https://policyintegrity.org/documents/Policy_Integrity_Post-Tech_Conference_Comments.pdf.

⁴² See Inst. for Policy Integrity, Comment Letter on the Federal Energy Regulatory Commission Electric Grid Resilience Order (July 12, 2018), https://policyintegrity.org/documents/Policy_Integrity_FERC_Resilience_Comments_050918.pdf.

⁴³ See Inst. for Policy Integrity, Comment Letter on Proposed Rulemaking for Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, 18 C.F.R. pt. 35 (Jan. 30, 2017), https://policyintegrity.org/documents/FERC_DER_Energy_Storage_Comments.pdf.

⁴⁴ See, e.g., Nat. Res. Def. Council, Alliance for Clean Energy New York and Acadia Center, Comments of the Clean Energy Advocates on NYISO's Proposed Application of Buyer-Side Mitigation Rules to DERs (June 15, 2018), <https://www.nyiso.com/documents/20142/1403297/20180615%20Clean%20Energy%20Advocates%20Comments%20re%20NYISO%20BSM%20Proposal%20for%20DERs.pdf/89ac3877-7822-a348-e8de-23838c529065>; Request for Rehearing or, in the Alternative, Extension of Time of the Office of the People's Counsel for the District of Columbia, Citizens Utility Board, Maryland Office of the People's Counsel, and Kentucky Office of the Attorney General, Office of Rate Intervention, FERC No. EL18-178-000 (July 30, 2018); Protest of Clean Energy Advocates, FERC No. ER18-1314 (May 7, 2018); Order Rejecting Proposed Tariff Revisions, Granting in Part and Denying in Part Complaint, and Instituting Proceeding Under Section 209 of the Federal Power Act, 163 FERC ¶ 61,236 (June 29, 2018) (No. EL18-178-000) (Glick, Commissioner, dissenting).

discussions in multiple wholesale markets, including NYISO, PJM, and MISO.

3. *Thinking About the Future of Energy Regulation*

The most exciting period of energy law and policy is yet to come. Technologies that are already in use, such as solar panels and energy storage, technologies that are currently in their infancy, such as electricity trading using blockchain, as well as technologies that we cannot even foresee today are going to disrupt the energy markets in ways that we cannot currently predict. And, given how fast such disruptions can transform markets, energy scholars and policymakers should already be thinking about, and even moving forward with implementing, technology-neutral regulatory frameworks that can accommodate new resources based on the value they bring to grid, including their external costs and benefits.

At Policy Integrity, we have indeed been authoring academic publications discussing the regulatory challenges and policy solutions to manage the future of the electricity grid. In our forward-looking academic work, we have explained how distributed energy resources should be compensated, how energy storage policies should be designed, as well as how retail electricity pricing should be reformed.⁴⁵ We have explored how capacity markets should be designed when there is increasing seasonal variation in both electricity demand (due to extreme weather events) and electricity supply (due to higher penetration of resources such as wind and solar).⁴⁶ Finally, we have analyzed the role and the authority of FERC to price carbon-dioxide emissions in wholesale energy markets as a way of harmonizing wholesale markets with state clean energy goals.⁴⁷

And, going forward, Policy Integrity will continue to work on issues that are at the forefront of energy policy discussions as advocates, academics, and thought leaders.

⁴⁵ See Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Modernizing Rate Design*, 44 HARV. ENVTL L. REV. (forthcoming Feb. 2020); see also Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Energy Storage and Greenhouse Gas Emissions*, 42 HARV. ENVTL L. REV. 139, 143 (2018); Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Distributed Generation and Net Metering*, 41 HARV. ENVTL L. REV. 43, 45–46 (2017).

⁴⁶ See Bialek & Unel, *supra* note 34, at 22.

⁴⁷ See Davis Noll & Unel, *supra* note 39, at 2, 7–8.

Conclusion

As we continue to move closer to a clean energy future, with advanced technologies being a crucial component of the future grid, the current paradigm of energy regulation will necessarily have to change. New policy designs will be needed to efficiently integrate new technologies. And, both state and federal regulators will have to adapt to this future where the jurisdictional lines are not so bright any more.

At this exciting moment in energy regulation, we convened a panel of state and federal regulators to share their thoughts on the future of energy regulation. Their remarks follow.

REMARKS OF CHERYL A. LAFLEUR**

Thank you very much Burcin and Ricky and everyone here for all the work you do in proceedings at FERC and in this area. We need all the help we can get in the quest for rationality. I know you didn't go over my whole bio, but I just want to pull out one little-known element. I am a mother-in-law of a proud graduate of the New York University School of Law. I haven't been on the NYU law campus since I lived in an NYU law dorm in 1977, long before my son-in-law was born. But I'm very happy to be here today.

First, I will get the legal stuff out of the way. I speak only for myself, not for any other commissioner or the commission. And as Burcin said, I can talk about rulemakings and broad policy issues we are addressing, but I can't talk about specific adjudicated open dockets among parties.

I've been at FERC for eight years. We are a bipartisan commission, an independent agency like the Securities Exchange Commission, the Federal Communication Commission, and others. We're bipartisan by design, with no more than three commissioners from any political party, normally the President's.⁴⁸ I'm in my second term. I was there for six years as part of a Democratic administration. I was there for an unprecedented six-month stretch

** Cheryl A. LaFleur was a Commissioner on the Federal Energy Regulatory Commission from July 2010 through August 2019.

⁴⁸ See Slideshow, Fed. Energy Regulatory Comm'n, An Overview of the Federal Energy Regulatory Commission and Federal Regulation of Public Utilities (June 2018), <https://www.ferc.gov/about/ferc-does/ferc101.pdf>.

of having no quorum.⁴⁹ For a while I was the only commissioner, then we restocked, and now for the last year-plus, I have been a minority Democratic commissioner as part of the Republican administration, although right now we are short-staffed, again. We are two Republican commissioners, including the chairman, and two Democratic commissioners, and awaiting another nomination.

During the entire span of the time I've been at FERC, a great deal of our work in all areas has been driven by profound changes in how our nation generates, transmits, and uses energy. These changes are being driven by the growth of domestic natural gas, the growth of renewables, storage, and demand-side technologies, and the increasing recognition of environmental issues, especially climate change. The drivers are leading to a lot of new resources that are different in their cost patterns, operational patterns, and geography than the ones we used for most of the twentieth century. And that's driving a lot of change and turmoil. Those adaptations are being felt in different ways in different parts of the country, because different parts of the United States have different underlying regulatory structures, but energy technology is changing everywhere. What's happening as we try to wend our way through the technology and policy changes is that these decisions are being made in the context of a very complicated political and constitutional ecosystem, with some work done at the federal level, a lot done in fifty statehouses, some by environmental regulators, and some by economic regulators such as FERC. But there are not neat divisions between these authorities and their responsibilities. All of these worlds overlap.

It would be much simpler, although certainly not preferable in my view, to be in an authoritarian society like China, where somebody says, we shall change to this form of energy, and things change. That's not how the United States works. Change happens in fits and starts and is debated in a lot of places at once. At FERC we are primarily an economic regulator, but our work is strongly shaped by environmental choices that are being made at the federal and state level. We are an environmental regulator in our infrastructure work, when we're issuing permits to gas pipelines and liquified natural gas facilities. We're the lead agency under the National Environmental

⁴⁹ See John Siciliano, *Trump's FERC Chairman Says Lack of Quorum Was Historic*, WASH. EXAMINER (Aug. 10, 2017), <https://www.washingtonexaminer.com/trumps-ferc-chairman-says-lack-of-quorum-was-historic>.

Policy Act (NEPA), so we do the environmental review.⁵⁰ Right now, there has been quite a lot of debate, very heated, on whether and how we take into account climate impacts of gas infrastructure in our permitting decisionmaking, something that NYU and this institute have been very involved in.

FERC is a creature of statute, applying the laws that govern us. Some of them are quite old, like the Federal Power Act and the Natural Gas Act, but have been overlaid with years of precedential interpretation in the courts and at the commission. We apply those laws to the factual record before us. There's often a policy through-line in our work, but we have to start with the law and the record. That's our defining ethos.

A big issue that we've been confronting for the last couple of years is how to reconcile the wholesale interstate regional market structures for electricity in the United States with state initiatives to select specific resources that might not otherwise be selected under existing market rules.

Wholesale markets were set up about twenty years ago in response to the growth of independent power beginning in the 1980s, customer concern over the high cost of some utility-built baseload generation, and the availability of new technology alternatives, especially natural gas generation.⁵¹ The central concept was to establish competitive wholesale markets to select and deploy resources. And in my opinion, having lived through all stages of competitive markets so far, they have worked very well for customers. They have done what they were designed to do, which is to continually find the cheapest resources to keep the lights on at

⁵⁰ See *FERC – NEPA Review (9-FD-i)*, OPENEI (Aug. 19, 2019), <https://openei.org/wiki/RAPID/Roadmap/9-FD-i> (citing 40 C.F.R. § 1508.18 (1978)) (explaining FERC's responsibility to incorporate NEPA review into its decisionmaking); see also *Pre-Filing Environmental Review Process*, FED. ENERGY REGULATORY COMM'N, <https://www.ferc.gov/resources/processes/flow/Ing-1-text.asp> (last visited Sept. 12, 2019) (describing FERC's unique responsibilities under NEPA); *Students Corner: FERC and the Environment*, FED. ENERGY REGULATORY COMM'N, <https://www.ferc.gov/students/environment.asp> (last visited Sept. 12, 2019) (discussing FERC's role of analyzing environmental impacts of proposed projects under NEPA).

⁵¹ See PAUL L. JOSKOW, CTR. FOR ENERGY & ENVTL. POLICY RESEARCH, *MARKETS FOR POWER IN THE UNITED STATES: AN INTERIM ASSESSMENT* 2, 19 (2005), <http://ceep.mit.edu/files/papers/2005-012.pdf> (describing the wholesale energy market initiatives of the late 90s and 2000s). See also DAVID YERGIN, *THE QUEST: ENERGY, SECURITY, AND THE REMAKING OF THE MODERN WORLD* 382–98 (2d ed. 2012).

any particular moment—sustain reliability at least cost. In recent years, the resource changes that I’ve mentioned, particularly the growth of affordable natural gas generation and zero marginal cost wind and solar, have brought energy prices down in the markets sharply,⁵² which in many ways is very good for customers. But they’ve roiled the market because they’ve created winners and losers, as markets do, and led to concerns and efforts on behalf of the resources that are not thriving in the market. I’ll just give a few examples.

At the federal level, the Trump administration has been open about its desire to ensure the success, to subsidize older uneconomic baseload coal units that are challenged in the market and that otherwise retire.⁵³ Other baseload generation like nuclear has been discussed as well, but a lot of the heat in the discussion has been around coal.

Several states, including New York,⁵⁴ New Jersey,⁵⁵ Illinois,⁵⁶ and Connecticut,⁵⁷ have been seeking to subsidize uneconomic nuclear units for various state policy reasons, both environmental and economic, most often through requiring distribution-level

⁵² See Megan Mahajan, *Plunging Prices Mean Building New Renewable Energy Is Cheaper Than Running Existing Coal*, FORBES (Dec. 3, 2018), <https://www.forbes.com/sites/energyinnovation/2018/12/03/plunging-prices-mean-building-new-renewable-energy-is-cheaper-than-running-existing-coal/#7add5eac31f3> (discussing how growth in wind and solar energy has lowered market prices); see also, *Natural Gas Explained: Factors Affecting Natural Gas Prices*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/energyexplained/natural-gas/factors-affecting-natural-gas-prices.php> (last updated July 12, 2019) (explaining that increases in natural gas production lowers natural gas prices).

⁵³ See, e.g., Brad Plumer, *Plan to Rescue Coal and Nuclear Plants is Rejected*, N.Y. TIMES, Jan. 9, 2018, at A16. (discussing the administration’s ultimately failed attempt to subsidize coal power plants).

⁵⁴ DANIEL SHEA & KRISTY HARTMAN, NAT’L CONFERENCE OF STATE LEGISLATORS, STATE OPTIONS TO KEEP NUCLEAR IN THE ENERGY MIX 35 (2017), http://www.ncsl.org/Portals/1/Documents/energy/StateOptions_NuclearPower_f05_WEB.pdf (noting New York’s attempts to subsidize nuclear units).

⁵⁵ See Scott DiSavino, *New Jersey Governor Signs Nuclear Power Subsidy Bill Into Law*, REUTERS (May 23, 2018), <https://www.reuters.com/article/us-new-jersey-pseg-exelon-nuclear/new-jersey-governor-signs-nuclear-power-subsidy-bill-into-law-idUSKCN11O2RL> (describing New Jersey’s proposal to subsidize nuclear units, in order to promote clean energy initiatives and create jobs).

⁵⁶ See SHEA & HARTMAN, *supra* note 54, at 34 (discussing Illinois’ legislative attempts to subsidize nuclear plants).

⁵⁷ See *id.* at 12, 33 (discussing Connecticut’s attempts to subsidize nuclear energy).

electric customers to pay resource specific credits to those units. Many other states, including some of the same ones, such as Massachusetts,⁵⁸ New York,⁵⁹ and New Jersey,⁶⁰ are running very large procurements for offshore wind to meet various clean energy goals, while seeking market rules to enable those resources to be accepted in the forward capacity markets, so they won't have to buy duplicate resources.⁶¹

Since 2016, with the abdication of federal actions on climate, such state actions have only accelerated. I expect that trend to continue, at least for the next few years assuming no federal climate action during this administration. More climate action at the state level is causing more tension between regional market structures and the states. Companies that invested in resources in reliance on the wholesale market structures without state support, particularly gas generators that built into the market largely to replace coal over the last decade, have initiated judicial and administrative litigation efforts to try to defeat or change the impact of the state policies to choose other resources. A couple of weeks ago, the Seventh Circuit Court of Appeals ruled that state programs to pay nuclear units zero emissions credits are not preempted by FERC's authority over wholesale markets.⁶² And yesterday the Second Circuit agreed, in a longer opinion, that those programs are not preempted.⁶³ In part, they said they were not preempted because FERC already has the authority under the Federal Power Act to require market changes if

⁵⁸ See Nichola Groom, *Massachusetts, Rhode Island Award Major Offshore Wind Contracts*, REUTERS (May 23, 2018), <https://www.reuters.com/article/us-usa-wind-offshore/massachusetts-rhode-island-award-major-offshore-wind-contracts-idUSKCN11O33L>.

⁵⁹ See *2018 Solicitation Results*, N.Y. STATE ENERGY RESEARCH & DEV. ADMIN., <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-Solicitations/Generators-and-Developers/2018-Solicitation> (last visited Nov. 16, 2019).

⁶⁰ See Press Release, State of N.J., Governor Murphy Signs Executive Order to Promote Offshore Wind Energy (Jan. 31, 2018), https://nj.gov/governor/news/news/562018/approved/20180131a_eo.shtml.

⁶¹ See, e.g., ISO New England, *Comments on Competitive Auctions and Sponsored Policy Resources Proposed Filing* (Jan. 29, 2018), <http://nescoe.com/resource-center/caspr-comments-jan2018>; Gavin Bade, *Electricity Markets: States Reassert Authority Over Power Generation*, UTIL. DRIVE (Oct. 16, 2018), <https://www.utilitydive.com/news/electricity-markets-states-reassert-authority-over-power-generation/539658/>.

⁶² See *Elec. Power Supply Ass'n v. Star*, 904 F.3d 518, 524 (7th Cir. 2018).

⁶³ See *Coal. for Competitive Elec. v. Zibelman*, 906 F.3d 41, 46 (2d Cir. 2018).

needed to protect the integrity of the market price.⁶⁴ That is what the United States, on behalf of FERC, had argued in the amicus brief at the Seventh Circuit: that FERC had the market authority to adapt markets as necessary, so there was no preemption.⁶⁵ It calls to mind the saying “Beware of what you want, you may get it.”

So, now these cases are squarely at FERC. My personal goal has been to adapt the markets to meet state objectives while still obtaining market benefits for customers. I think if we’re going to change the model of how we select resources, we should do so in a very deliberate and thoughtful way with everyone involved. I’m concerned about unplanned reregulation if we chip away at markets everywhere. I would far rather have a thoughtful market design solution at a regional level. And that’s what I’ve been pushing.

So far the different regional markets are headed toward different plans. In New York, where we stand, they are discussing the economists’ Plan A: direct carbon pricing in the energy market. They haven’t done it yet, but they appear to be on a path to do it.⁶⁶ And this is in addition to the regional greenhouse gas pricing, which does not fully reflect the effective price the state is placing on carbon reduction.⁶⁷ The carbon price would be in some way derived from the SCC. This structure would represent the most market-compatible way to set a clean energy or carbon target and then use economic markets to meet it, to make sure you meet the target in the most efficient way. You could still run the market because the value you seek is already monetized in whatever carbon price you use. New York is working toward that, and at some point will presumably be filing a new market structure for FERC to consider.

Up in New England, where I’m from, they’ve been dealing primarily with the issue of forward procurement of big swaths of

⁶⁴ See *id.* at 46, 55–57.

⁶⁵ See Brief for United States as Amici Curiae Supporting Respondents, *Elec. Power Supply Ass’n*, 904 F.3d 518 (Nos. 17-2433 & 17-2445).

⁶⁶ See Gregory Scruggs, *After Defeat in West, U.S. Carbon Tax Pushes East*, REUTERS (Nov. 8, 2018), <https://www.reuters.com/article/us-usa-election-carbontax-analysis/after-defeat-in-west-u-s-carbon-tax-push-looks-east-idUSKCN1ND1PT> (including New York among states whose legislatures are considering carbon pricing).

⁶⁷ See *Regional Greenhouse Gas Initiative Auction Prices Are the Lowest Since 2014*, U.S. ENERGY INFO. ADMIN (May 31, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=31432> (discussing New York’s involvement in a regional gas pricing program, as well as New York’s general decrease in gas pricing).

clean energy that might not be selected economically in the market, particularly offshore wind and imported hydroelectricity. The market operator there, the Independent System Operator of New England, came up with a plan to run a second market auction. After you choose resources in the forward auction, you then do another procurement in which new state-selected resources can replace some of those already chosen.⁶⁸ It's an attempt to use market structures to choose the most economical of the clean resources without affecting the pricing of the resources that aren't subsidized in the market.⁶⁹ It was approved by FERC in March on a split vote.⁷⁰ I voted for it. Currently it is subject to pending rehearing petitions, so that is all I can say about that.

Most controversial of all is PJM, whose name reflects that it used to encompass Pennsylvania, Jersey, and Maryland, but it now serves thirteen states across the Mid-Atlantic and Midwest as well as the District of Columbia. In PJM, a lot of the controversy has been around the payments to subsidize nuclear units for their carbon-free properties. After spending more than a year trying to come up with a consensus market redesign proposal that would accommodate those efforts, PJM was unable to do so. So, PJM filed two proposals at FERC and said, here are two ideas, we will develop further the one you select. FERC rejected both of them and came up with its own idea, which was basically an approach to take subsidized resources out of the market entirely. Both of the Republicans who are still on the commission voted for it. Both of the Democrats who are still on the commission voted against it.⁷¹ And it is now pending compliance and rehearing and will likely be a hot topic at FERC this winter.

As far as federal efforts, last fall FERC made a rare appearance in the world press when Energy Secretary Perry proposed a rulemaking to FERC, invoking a rarely used provision of the Federal

⁶⁸ See ISO New England Inc., 162 FERC ¶ 61,205, ¶¶ 1, 7 (2018) (discussing the dual-auction mechanism advanced by the proposal).

⁶⁹ See *id.* ¶ 6 (discussing the proposal's goal of minimizing the effect to the prices of non-subsidized resources).

⁷⁰ See *id.* (LaFleur, concurring) (acknowledging that the decision was a split vote).

⁷¹ See Robert Walton, *FERC Rejects PJM Capacity Market Reform Proposals, Seeks Quick Resolution*, UTIL. DIVE (June 30, 2018), <https://www.utilitydive.com/news/ferc-rejects-pjm-capacity-market-reform-proposals-seeks-quick-resolution/526903> (noting that both Democrats on the board, Cheryl LaFleur and Richard Glick, voted against the decision).

Power Act, to order additional compensation of generation units operating in the competitive markets if they had ninety days of fuel on site.⁷² And after a lot of speculation in the energy world about what would happen, in January 2018 FERC unanimously rejected that proposal.⁷³ Instead, we started our own docket to see if there is anything further we should be doing to ensure that the grid sustains resilience as resources change.⁷⁴ We have received a huge number of comments from everyone on all ends of the spectrum and that docket is pending before us.

In the meantime, the Trump administration has talked about using emergency provisions of either the Federal Power Act or the Defense Production Act to pay coal units directly.⁷⁵ There have been rumors that this is imminent, although whether to believe rumors is a tough question. I am assuming that eventually the next shoe will drop, and it will come to FERC to undoubtedly deal with complaints about what impacts any proposal has on the market. But, we shall see what happens.

All of this will continue. The resource changes aren't going anywhere. Climate policy is still expected to be made at the state level for the next couple of years, so we will be using our complicated constitutional federal system to work through these

⁷² See Grid Resiliency Pricing Rule, 82 Fed. Reg. 46940 (proposed Sep. 28, 2017) (to be codified at 18 C.F.R. pt. 35); see also *Secretary Perry Urges FERC to Take Swift Action to Address Threats to Grid Resiliency*, U.S. DEP'T OF ENERGY (Sept. 29, 2017), <https://www.energy.gov/articles/secretary-perry-urges-ferc-take-swift-action-address-threats-grid-resiliency>.

⁷³ See Grid Reliability and Resilience Pricing, 162 FERC ¶ 61,012, ¶ 1 (2018) (acknowledging that Secretary Perry's proposal was rejected in January); Gavin Bade, *FERC Rejects DOE NOPR, Kicking Resilience Issue to Grid Operators*, UTIL. DIVE (Jan. 8, 2018), <https://www.utilitydive.com/news/ferc-rejects-doe-nopr-kicking-resilience-issue-to-grid-operators/514334/> (noting that the decision was unanimous).

⁷⁴ See Press Release, Fed. Energy Regulatory Comm'n, FERC Initiates New Proceeding on Grid Resilience, Terminates DOE NOPR Proceeding (Jan. 8, 2018), <https://www.ferc.gov/media/news-releases/2018/2018-1/01-08-18.asp#.XSyYs-tKjcs> (stating FERC's plan to examine the importance on resources that may have resilience attributes needed in the market).

⁷⁵ See Steven Mufson, *Trump orders Energy Secretary Perry to Halt Shutdown of Coal and Nuclear Plants*, WASH. POST (June 1, 2018), https://www.washingtonpost.com/business/economy/trump-officials-preparing-to-use-cold-war-emergency-powers-to-protect-coal-and-nuclear-plants/2018/06/01/230f0778-65a9-11e8-a69c-b944de66d9e7_story.html?utm_term=.b772a1f90a15 (highlighting that the President plans to use the emergency provisions of the Federal Powers Act and Defense Production Act to pay coal units directly).

changes. It's going to be a lot of fun for everyone in the energy world. I am glad that all of you are interested in energy and the environment, because I know we will need the best and the brightest of the next generation to join us as we tackle these issues in the future.

Thank you very much.

Questions & Answers[†]

On a question regarding the future of energy policymaking:

Well you posited two change drivers: concerns about climate and new technologies. We'll take those as given, at a hopefully accelerating rate. I would say we're seeing two conflicting forces that are in tension: regionalization and localization. One is, to some extent, new technologies and the concern about climate are forcing more regionalization because clean energy technology is not equally available all over the United States. There are locations where it's much better to put up large-scale central station wind and solar resources and build transmission infrastructure to deliver them to population centers. For example, in the western United States we are seeing considerable market sharing of resources across very diverse states and widely dispersed population centers. And that trend is pushing toward more regionalization in order to utilize more clean energy.⁷⁶ We may see more of that in the east when we start seeing more development of offshore wind as well. I think that building intraregional transmission may require an expanded federal role in transmission siting compared to what we have now. If we're really going to decarbonize, you may almost need a program like Abraham Lincoln and the railroads, and Dwight Eisenhower and the highways, to build more of a transmission grid to do that.

That's one big change driver. But the other is, simultaneously we're seeing the deployment of more and more distributed resources that collectively can operate like a power plant. These are the technologies at distribution level, even customer level. Behind-the-meter technologies are now collectively operating much

[†] Responses from the Q&A session are below, along with relevant questions and panelist comments.

⁷⁶ See, e.g., *Exploring Regional Solutions for a Green Grid*, CAL. INDEP. SYS. OPERATOR, <http://www.caiso.com/informed/Pages/RegionalSolutions.aspx> (last visited Sept. 9, 2019) (discussing the ISO studies showing that California's clean energy goals can be promoted by regionalization of the western U.S. energy market).

like a power plant used to. I think that clearly the distributed technologies have a big state role, but they probably also have a federal role where they're aggregated and shared across a region.

We just are going to have to live in this period where those things are in tension, because I see both of them continuing. If deep decarbonization down the road is the goal, we're going to need both forms of renewable energy, distributed generation and the large central station resources.

On a question regarding carbon pricing:

I think there are two macro problems standing in the way of climate carbon pricing. The first is that there is not national consensus that climate change is a problem, so there is no national climate strategy. There is the opposite of consensus, there is actually heated debate on this.

I just got back from Alaska and I saw the effects of climate change with my own eyes. I believe if we as a nation said, this is a big deal, we won World War II, we put a man on the moon, we can do this, then we certainly could do it. But unfortunately we're not there yet in terms of agreeing on collective action. If you want to know why there's not successful federal action, there's not a consensus among the parties that there is a problem we have to address. And that itself is a problem. I had a congressman say to me, when I referred to the fact that Congress hasn't acted on climate change, he said, we did act on climate change. Not passing the Waxman-Markey law was our action. That's what we think. It made me upset, but it was historically accurate.

Problem number two, as I said before, is that we have a complicated ecosystem in which to implement a solution—assuming we were collectively trying to do so. For example, consider PJM with its thirteen states, some are politically like Kentucky and West Virginia and others are like New Jersey and Maryland. That's perhaps why New York right now with a single state market seems to be a little closer to a market-based solution. But that is certainly a subsidiary problem to the lack of a national climate strategy.

On a question regarding ideal policy change, advice to states, and biggest challenge to rationality:

The first question is, if I had a magic wand: definitely federal level climate policy. It could be cap and trade or a carbon tax, but something federal that would be overarching program that other

efforts could fit into, so we didn't have to build it up from the bottom.

My advice to states is to work together, because regionalization has had a lot of benefits for customers. If we go back to our corners, it's not, in the long run, good for customers or the nation.

And to answer your question of what is the biggest challenge to rationality: in my opinion, politics and the election cycle.

REMARKS OF ANDREW G. PLACE***

It's a pleasure to be here. I have seven issues. Any one of them could be a day long symposium. Some big things, some minutia, some just venting my spleen, if I can quote Herman Melville. Pennsylvania, in comparison to New York, and many of our neighboring states—Pennsylvania is a tough political environment. I won't sugarcoat it; I may as well get that out upfront.

Pennsylvania by the numbers, I think, speaks to the complexity of our issues. We are a restructured state. We have a competitive retail market for electricity and natural gas. We're the largest net electricity exporter in the United States.⁷⁷ To put that in context, we export about thirty percent of our electricity generation, so exports to our neighbors, whether it's to our south, Maryland and New Jersey, or to our north, New England and New York.⁷⁸ That matters to our industry. We're also the third largest electricity producer period behind Texas and Florida. We rank second for energy production—everything from coal to natural gas, etc. We're also second for natural gas production behind Texas.⁷⁹ That is a four hundred pound gorilla. We're also second in the nation for nuclear production.⁸⁰ So again, a big deal for us. Another thing to hit our complexity, we're third in the country for coal production, which also brings us down to the bottom line.⁸¹ We're third in the country

*** Commissioner, Pennsylvania Public Utility.

⁷⁷ See *California Imports the Most Electricity From Other States; Pennsylvania Exports the Most*, U.S. ENERGY INFO. ADMIN. (Apr. 4, 2019), <https://www.eia.gov/todayinenergy/detail.php?id=38912>.

⁷⁸ See PA. PUB. UTIL. COMM'N, *ELECTRIC POWER OUTLOOK FOR PENNSYLVANIA 2017–2022*, at 61 (2018).

⁷⁹ See *State Profile and Energy Estimates: Pennsylvania Profile Overview*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/?sid=PA> (last visited Nov. 16, 2019).

⁸⁰ See *id.*

⁸¹ See *id.*

for CO₂ emissions, and that's just stack emissions.⁸² However, particularly in the context of natural gas methane emissions, as a potent greenhouse gas, we cannot neglect upstream emissions.

Giving you the breakdown on the state's generation: we're pretty well balanced. Almost thirty percent from natural gas, twenty-five percent from coal, and forty percent generation from nuclear.⁸³ We do have a renewable carve-out.⁸⁴ We're also, speaking of PJM, about twenty percent of all generation in the regional grid, even though it's thirteen states and the District of Columbia.⁸⁵ Again, it matters. We have a modest, and maybe that's a kind way of saying it, alternative energy portfolio standard. Tier one: eight percent by 2021. Tier two, which is a whole host of things including waste coal: ten percent by 2021.⁸⁶ But that's consumption, that's not generation.

So first and foremost—these issues I did not rank and sort in any order, there's no rationale for why I thought of these things the way I did—I'm thinking about natural gas, and I'm also thinking about my background. In some ways, I'm an accidental commissioner. I was working in upstream oil and gas. I was the corporate director for energy and environmental policy at arguably the largest independent in the Appalachian basin. My task was to think about what risks are, cradle to grave. Everything from wellheads to ground water risk, to volatile organic compound (VOC) emissions from condensate tanks, to the displacement of coal, to the 2030, 2040, 2050 horizon for greenhouse gas emissions

⁸² As of 2016, Pennsylvania was fourth in the nation in CO₂ emissions. *See State Profile and Energy Estimates: Pennsylvania Rankings: Total Carbon Dioxide Emissions 2016*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/rankings/?sid=PA#/series/226> (last visited Nov. 16, 2019).

⁸³ *See Pennsylvania State Energy Profile*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/print.php?sid=PA> (last visited Sept. 12, 2019).

⁸⁴ *See Alternative Energy*, PA. PUB. UTIL. COMM'N, http://www.puc.pa.gov/consumer_info/electricity/alternative_energy.aspx (last visited Sept. 20, 2019).

⁸⁵ *See Pennsylvania Electricity Profile 2017*, U.S. ENERGY INFO. ADMIN. (last updated Jan. 8, 2019), <https://www.eia.gov/electricity/state/pennsylvania/index.php>. Based on the energy generation statistics for all PJM states collected by the Energy Information Administration, Pennsylvania produces sixteen percent of all total energy produced by PJM states. However, some states are only partially in the PJM grip, and so Pennsylvania's actual share of all PJM production is slightly larger. *See id.*

⁸⁶ PA. PUB. UTIL. COMM'N, ALTERNATIVE ENERGY AND ECONOMIC DEVELOPMENT IN PENNSYLVANIA (2017), https://www.puc.state.pa.us/general/consumer_ed/pdf/AEPS_Fact_Sheet.pdf.

from what we were producing, and how does that affect the market demand for gas and other energy sources? I got a cold call from a 717-area code in Harrisburg and was asked if I would come and serve on the Commission. I could have barely found Harrisburg on the map. But, as a friend of mine in graduate school said, I may not be particularly smart, but I'm smart enough to know I shouldn't say no. But that said, you know, when you think about it, as I stated in the Pennsylvania by the numbers, it's just an extraordinarily important time, a relevant and intellectually fascinating moment to be in Pennsylvania and in this space, with all the issues we have to bring forth and consider. It's not binary. It's not tertiary. It's almost a boundless space, thinking about all the facets and the Public Utility Commission (PUC) is a phenomenally fascinating place in which to engage in this space. I'll speak to them in all the seven issues I have before us today.

We do not currently have siting authority for pipelines.⁸⁷ That's a concern of mine. There is legislation to have some sort of siting authority, whether that exists within the PUC or some other created entity.⁸⁸ I think it makes rational sense to do so—we have it for high voltage transmission lines.⁸⁹ That goes back to the dawn of regulatory time. There were aesthetic reasons, perhaps even safety reasons that siting was thought to be important to have regulatory oversight. When we think about high voltage lines, to me, I cannot avoid that there's a direct parallel to what we're doing in natural gas and natural gas liquids. What siting authority would bring is an adversarial process. So, all parties can come in and provide public comment. You can think about all the impacts instead of what we do currently. If an entity has a certificate to build a pipe, we just look at: Does it make economic rational sense? Is there a demand for the product they're going to move? And that's the end of the story. That's not going to be sufficient when you're dealing with and thinking about townships, the impacts on communities, concerns

⁸⁷ See Reid Fraizer, *In Pennsylvania, No Oversight of Where Some Pipelines Can Be Built*, NPR: STATE IMPACT PA. (Sept. 25, 2018), <https://stateimpact.npr.org/pennsylvania/2018/09/25/in-pennsylvania-no-oversight-of-where-some-pipelines-can-be-built/>.

⁸⁸ See, e.g., S.B. 928, 2017 Gen. Assemb. (Pa. 2017). <https://www.legis.state.pa.us/cfdocs/billInfo/billInfo.cfm?sYear=2017&sInd=0&body=S&type=B&bn=0928>.

⁸⁹ See 52 PA. CODE § 57.71 (1973), <https://www.pacode.com/secure/data/052/chapter57/chap57toc.html>.

about safety. An adversarial process can bring before us multiple alternatives and we can balance all those end dimensions, the environmental impact, the health and safety impacts, the impacts on a township's 2030, 2040 build out plan. So, all of that, the adversarial process, can bring a lot of rationality to it that we don't currently have.

A sort of tertiary issue as well: we recently had an explosion in western Pennsylvania. That's an active case before us, and it's still uncertain what caused that, but if I can be blunt, I don't think the Commission has enough safety oversight. We have safety authority, but it begins when you energize the pipe.⁹⁰ And it makes much more rational sense to be in there when the pipe is being designed and built. What are the geophysics, and what's the geological characteristics of where you're putting that pipe through, should you consider an alternative? All of that is behind the curtain to us and we're coming in at the eleventh hour when much of this work has already been done. We also don't have, arguably, the staff to do the amount of oversight that I argue is required.

Again, in the natural gas space, methane loss matters. We have a very forward-leaning Distribution System Improvement Charge, which allows immediate cost recovery for utilities,⁹¹ which has brought down the length of time it takes for utilities to get all that legacy leaky pipe out of the ground from virtually infinite or 100-year time horizons down to under twenty years, and ten and fifteen years. That really matters for public safety, but also for leakage. I mean, those are leaky pipes. They're expensive to get out of the ground. For some, it can be a million dollars a mile. But getting that out matters from a climate perspective. We also have a forward-leaning program to ensure that we reduce leakage from our distribution pipes in the aggregate. Again, a source of significant methane emissions. Starting in 2013, Pennsylvania distribution companies not only had to have metrics for what their leakage rate was, but also bring it down from a maximum of five percent, on a glide path to three percent next year.⁹²

That has been extraordinarily helpful for us, not only knowing where those leaks are, but to have a risk-based analysis on how

⁹⁰ See *Pipeline Safety*, PA. PUB. UTIL. COMM'N, http://www.puc.state.pa.us/consumer_info/transportation/pipeline_safety_.aspx (last visited Sept. 20, 2019).

⁹¹ See 66 PA. CONS. STAT. § 1353 (2012).

⁹² See 52 PA. CODE § 59.111(c)(1)–(2) (2019).

you're getting that pipe out, when you're getting that back out, what's the most at-risk pipe. That has brought significant improvements on the leakage rate.⁹³ The next effort on that, currently ongoing, is to take that same approach and apply it to gathering lines, which are also a significant leakage source.

I would be patently neglectful if I didn't talk about low-income customers. Pennsylvania is twenty-third in the nation for poverty, so we have a significant issue.⁹⁴ We have 1.6 million residents living below the federal poverty line.⁹⁵ I think it's something like 1.3 million households, are living below one-and-a-half times the federal poverty line.⁹⁶ So this matters. And all these conversations about cost always have this knock-on impact—what is it going to do to vulnerable customers? I authored a motion last year launching an energy burden analysis to say what is affordable.⁹⁷ For example, if you're between zero and fifty percent of the federal poverty line, what percentage of your income can you contribute to your monthly energy bills and keep your head above water? That analysis has been completed and serves as the foundational piece to rebuild the low-income support expectations that were last addressed in 1992.⁹⁸ Historically, that was a policy statement and was neglected more than it was followed. My expectation is to codify affordability as rule.

We're also, as New Jersey is, looking at community solar and using that to help offset low income energy burdens—do a tranche of a community solar portfolio standard as a commitment for low-income customers. Similarly, Pennsylvania has an energy

⁹³ See Press Release, Pa. Dep't of Env'tl. Prot., 2015 Air Emissions Inventory for Unconventional Natural Gas Operations Released (Aug. 31, 2017), <https://www.ahs.dep.pa.gov/NewsRoomPublic/articleviewer.aspx?id=21283&typeid=1>.

⁹⁴ See *Pennsylvania 2018*, TALK POVERTY, <https://talkpoverty.org/state-year-report/pennsylvania-2018-report/> (last visited Dec. 23, 2019).

⁹⁵ See *id.*

⁹⁶ The Pennsylvania Utility Commission's staff calculated this number internally using data from the U.S. Census Bureau.

⁹⁷ See Pa. Util. Comm'n, Opinion and Order on Energy Affordability for Low Income Customers, Docket No. M-2017-2587711 (2017), http://www.puc.pa.gov/about_puc/consolidated_case_view.aspx?Docket=M-2017-2587711.

⁹⁸ See PA. UTIL. COMM'N, HOME ENERGY AFFORDABILITY FOR LOW-INCOME CUSTOMERS IN PENNSYLVANIA 5–6 (2019), <http://www.puc.pa.gov/pdocs/1602386.pdf>.

efficiency standard.⁹⁹ There is hope in the next administration to make that more robust for low income customers who are, of course, not only least able to manage energy bills, but also least able to afford all the things that those of us in the middle class, etc., can do to mitigate those costs.

A minor issue, but one that matters and speaks to the issue of cost: we are not as a Commission careful enough in our empiricism and our transparency on return-on-equity calculations. We do quarterly return-on-equity measures, but they become precedential for general rate case settlements. Pennsylvania is demonstrably high. I'm always a minority of one on the Commission on this issue, so I don't have any expectation in my time, my tenure. But we're a regulatory-friendly environment, yet we're paying above market rates on ROEs,¹⁰⁰ and that, speaking back to my previous issue on low-income customers, feeds back to the challenges we have. Even though as I noted, we are producing a lot of energy, utility bills are higher than many of our neighbors.¹⁰¹ This is one of the driving reasons.

Transmission projects have also been on our list. Historically, we do Letters of Notification, and none of those were ever rejected. We're seeing far too many transmission projects being built that may not be necessary and that end up being rate-based and, again, included in the cost of energy. We clearly are making strides to be more careful and judicious and empirical and rational in what gets built. As Alfred Kahn said—he was a professor of mine at Cornell, back in the day, and I really regret that I was a freshman econ major and just thought, hey, just take this class, and now I realize I should've paid more attention—if the regulator permitted, a utility would rate base a pyramid. So not to take a shot at our utilities, but we do it. But that's a shortcoming of our oversight role.

Finally, the big issue. The question about accommodating state policies and climate. It's been mentioned by the panelists before me, thinking about how we manage this barrage, this incoming tide of

⁹⁹ See *Act 129 Information*, PA. PUB. UTIL. COMM'N, http://www.puc.state.pa.us/filing_resources/issues_laws_regulations/act_129_information.aspx (last visited Sept. 20, 2019).

¹⁰⁰ See Coley Girouard, *How Do Electric Utilities Make Money?*, ADVANCED ENERGY PERSPECTIVES (Apr. 23, 2015, 10:55 AM), <https://blog.aee.net/how-do-electric-utilities-make-money>.

¹⁰¹ See ENERGY INFO. ADMIN., 2017 AVERAGE MONTHLY BILL-RESIDENTIAL (2018), https://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf.

state policies in energy and capacity markets and all the rubrics, all the complexities, the Fixed Resource Requirement, and so on. It matters. I'll argue tooth-and-nail in Pennsylvania for a market price on carbon, for all the reasons we know, the elegance of it, the drive for innovation.

I'm no fan of Zero-emission Credits¹⁰²—they're blunt instruments. And thinking again about the impacts, and what our obligations are to manage and moderate the price of energy, and the economic development necessity to do so, it's tough for me to think that any alternative other than a market solution is particularly rational. Although they may be politically expedient and necessary.

We have an election coming up. Might Pennsylvania participate in the Regional Greenhouse Gas Initiative (RGGI)? Pennsylvania's entry would double the generation capacity of RGGI.¹⁰³ It'd be a big deal. There's strong modeling arguing that Pennsylvania's participation would inflate the allowance price up from say four or five dollars to seven or eight dollars.¹⁰⁴ On the other hand, if we had a carbon market, and even if that price was \$12.50 or \$13 per ton of carbon emitted—that would likely be sufficient to preserve the state's nuclear fleet, which a six or eight dollar RGGI price would likely not.¹⁰⁵ To me that's a challenge, a conundrum, because there is substantive value in retaining Pennsylvania's nuclear fleet. Not all of it, as perhaps Three Mile Island is always going to be challenged. But from a cost of mitigating climate emissions perspective, keeping that nuclear generation matters. It's operating today and would, quite possibly, take an inordinate length of time to replace. I just caution that, it's not a reason to choose a RGGI versus a price on carbon approach. But price is in my mind—what price would retain Pennsylvania's nuclear generation?

¹⁰² See NUCLEAR ENERGY INST., ZERO-EMISSION CREDITS 3 (2018) (“Zero-emission credits are payments that electricity generators receive to compensate them for the value attribute of not emitting greenhouse gases in the production of electricity.”).

¹⁰³ See U.S. ENERGY INFO. ADMIN., *supra* note 85 (calculating using the 2017 numbers produced by the U.S. Energy Information Administration for Pennsylvania and the current RGGI states, Pennsylvania's entry into the RGGI would increase the group's total energy production by approximately seventy percent).

¹⁰⁴ See Nat. Res. Def. Council, Presentation, Modeling Pennsylvania's Power Future: Carbon & Clean Energy Policy Scenarios (Sept. 20, 2018).

¹⁰⁵ See *id.*

And speaking of Pennsylvania, flipping back to my earlier point about Pennsylvania being a challenging place to be, I'm going to be frank: the costs of climate aren't particularly borne by Pennsylvanians. Yes, we have not insignificant exposure to the impacts of more intense storms, polar vortices, etc. We also have more miles of stream than any other of the lower forty-eight states, with associated increased flooding risks.¹⁰⁶ So there are clear impacts, but we are not the ones most hurt by climate change. But that is not a reason not to act; that's a fundamentally lousy reason not to act. I live on a farm at the foothills of the Appalachians. I raise sheep and cattle, and I am a steward of my stream. I have a fifty-five-acre riparian buffer with 5,500 trees I planted on it. I was thinking yesterday—it was pouring down rain and the water leaving my farm was crystalline. My neighbor is receiving water that is in exceptional condition when it leaves my farm. I don't do that because it's a regulatory necessity. It doesn't begin with someone giving me an edict to do something. It begins with my moral obligation, my ethical obligation to be a steward of that resource. And that goes no differently for Pennsylvania, even though, like I started this conversation, we've got a whole host of challenges that make this a very difficult environment in which to do something.

¹⁰⁶ See Rob Shane, *86,000 Miles of Streams: Protecting Pennsylvania's Trout*, COAL. FOR DEL. RIVER WATERSHED (Nov. 27, 2017), <http://www.delriverwatershed.org/news/2017/11/27/protecting-pennsylvanias-trout>.