

FERC AND CLIMATE CHANGE

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Synopsis: The evidence that anthropogenic climate change is an existential threat to our way of life is incontrovertible. The Intergovernmental Panel on Climate Change (IPCC) recently concluded that we are on track to experience a rise in global temperatures by as much as 1.5°C as early as 2030, a result that could present "long-lasting and irreversible" consequences, which will only get worse if temperatures continue to rise. And although the worst consequences lie in the future, the Trump Administration's most recent National Climate Assessment points out that we are already experiencing the impacts of climate change.

The American people are far ahead of the politicians, demanding action when it comes to climate change and cleaner sources of energy. Businesses have followed suit. Companies as diverse as Amazon, Anheuser-Busch, and Proctor and Gamble regularly advertise that their products are powered with clean energy. In fact, corporate demand is now one of the largest drivers of renewable energy development in the United States.

To date, the political debate over how to address the threat of climate change has mostly occurred before Congress, the U.S. Environmental Protection Agency (EPA), and the various state legislatures. But, as the threat becomes ever more immediate, that debate has extended to a variety of new venues, including various federal and state agencies that regulate the production and consumption of energy.

This article discusses one of those federal agencies—the Federal Energy Regulatory Commission (FERC or the Commission)—and how its actions can have substantial consequences for climate change. The Commission regulates significant swaths of the U.S. energy industry, including the wholesale sale and transmission of electricity, the transportation of oil and natural gas, and the permitting of several types of energy infrastructure projects. Although the Commission is not a climate regulator, like the EPA, the scope of its statutory responsibilities means that its decisions will inevitably affect the nation's greenhouse gas (GHG) emissions, and, therefore, climate change. As a result, the Commission is likely to become an increasingly important venue in the debate over how this nation will address climate change and those that want to address climate change will find that the Commission is an important agency with which to interact.

This article examines several areas of the Commission's jurisdiction that have particularly important consequences for GHG emissions. In many of these areas, the Commission has implemented its authority in a manner that has already had the effect, if not the intent, of facilitating a cleaner, less GHG-intensive energy

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mix. We argue that the basic principles that the Commission has used to implement this authority continue to support actions that will likely reduce GHG emissions. In other areas, particularly certain types of infrastructure permitting, we argue that the Commission has fallen short of its statutory obligations to consider the impact of its actions on climate change and that more is needed to comply with the Commission's mandates. On the whole, we conclude that the urgent threat of climate change does not necessitate a wholesale reinterpretation of the Commission's jurisdiction or a novel regulatory paradigm. Instead, climate change increases the stakes of many Commission actions, making it all the more important that the Commission carry out its existing obligations.

I. INTRODUCTION

A. The Existential Threat of Climate Change

The evidence that anthropogenic climate change is an existential threat to our way of life is incontrovertible. The Intergovernmental Panel on Climate Change (IPCC) recently concluded that global temperatures are on track to rise by 1.5°C

as early as 2030, a result that could present "irreversible" consequences.[1] The Trump Administration's most recent National Climate Assessment points out that we are already experiencing the impacts of climate change.[2] The devastating 2018 California wildfires are only one horrific example of the type of the disaster that could become commonplace as the climate changes.[3] The Administration's National Climate Assessment indicates that, absent a dramatic reduction in greenhouse gas (GHG) emissions, annual economic losses caused by climate change will reach into the hundreds of billions of dollars by the end of the century.[4] And that figure does not reflect the potentially catastrophic consequences to human health and well-being[5] or the staggering degradation of the environment.[6]

At the same time, the social and political debates that climate change engenders have become more intense. The principal debates over how to address GHG emissions and climate change have mostly occurred before Congress, the U.S. Environmental Protection Agency (EPA), and the various state legislatures. But, as the threat of climate change becomes more immediate, that debate has extended to a variety of new venues, including various federal and state agencies that regulate the production and consumption of energy.

The energy sector, broadly defined, remains the principal source of the United States' contribution to climate change.[7] Electricity generation was, until

1. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, GLOBAL WARMING OF 1.5 °C 6-7 (2018), http://www.ipcc.ch/report/sr15/ [hereinafter IPCC REPORT].

2. U.S. GLOBAL CHANGE RESEARCH PROGRAM, FOURTH NATIONAL CLIMATE ASSESSMENT, SUMMARY FINDINGS (2018), https://nca2018.globalchange.gov/ [hereinafter FOURTH NATIONAL CLIMATE ASSESSMENT].

3. Alejandra Borunda, *See how a warmer world primed California for large fires*, NAT'L GEOGRAPHIC (Nov. 15, 2018), https://www.nationalgeographic.com/environment/2018/11/climate-change-california-wildfire/ ("[C]limate change is driving a clear trend: When wildfires happen in California, they have a better chance of growing large and destructive."); *see also* John T. Abatzogloua & A. Park Williams, *Impact of anthropogenic climate change on wildfire across western US forests*, 113 PROC. NAT'L ACAD. OF SCIENCE 11710 (2016) (estimating that "human-caused climate change contributed to an additional 4.2 million [hectares] of forest fire area during 1984– 2015, nearly doubling the forest fire area expected in its absence.").

4. FOURTH NATIONAL CLIMATE ASSESSMENT, *supra* note 2 ("[A] annual losses in some economic sectors are projected to reach hundreds of billions of dollars by the end of the century—more than the current gross domestic product (GDP) of many U.S. states.").

5. Nick Watts et al., *The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come*, THE LANCET (Nov. 28, 2018), https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32594-7/fulltext ("Trends in climate change impacts, exposures, and vulnerabilities show an unacceptably high level of risk for the current and future health of populations across the world.").

6. *See* U.S. GLOBAL CHANGE RESEARCH PROGRAM, FOURTH NATIONAL CLIMATE ASSESSMENT, ECOSYSTEMS, ECOSYSTEM SERVICES, AND BIODIVERSITY (2018), https://nca2018.globalchange.gov/chapter/7/ (discussing the potential effects of climate change on ecosystems and individual species); Chelsea Harvey, *Climate Change Is Becoming a Top Threat to Biodiversity*, SCIENTIFIC AMERICAN (Mar. 28, 2018), https://www.scientificamerican.com/article/climate-change-is-becoming-a-top-threat-to-biodiversity/ (summarizing research regarding the effects of climate change on species extinction).

7. Emissions from the energy sector overall, primarily the combustion of fossil fuels for transportation and to generate electricity, represent the overwhelming majority of U.S. GHG emissions. ENERGY INFO. ADMIN, WHERE GREENHOUSE GASES COME FROM (July 20, 2018), https://www.eia.gov/energyexplained/index.php?page=environment_where_ghg_come_from.

recently, the single largest source of domestic GHG emissions,[8] and still produces 1,809 million metric tons of carbon dioxide equivalent emissions annually,[9] which represents roughly $75 billion dollars of economic harm as measured by the Social Cost of Carbon.[10] A combination of improved energy efficiency and significant reductions in the cost of renewable and natural-gas generation have caused electricity-sector GHG emissions to decline by 28% since 2005.[11] But much more needs to be done. The IPCC forecasts that, if the world is to avoid an increase in global temperatures in excess of 1.5°C, and the potentially catastrophic consequences that would come with such an increase, GHG emissions must be reduced by at least 45% from 2010 levels over the next 12 years—a feat that will likely require significant reductions in GHG emissions from all sectors of our economy.[12]

B. Climate Change and the Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC or the Commission) regulates significant swaths of the U.S. energy industry, including the wholesale sale and transmission of electricity, the transportation of oil and natural gas, and the permitting of several types of energy infrastructure projects.[13] The Commission regulates largely pursuant to a pair of broad statutory mandates: (1) that the rates and practices[14] subject to its jurisdiction be "just and reasonable and not unduly

8. The transportation sector is now the largest source of GHG emissions in the United States. *See* U.S. ENVTL. PROT. AGENCY, SOURCES OF GREENHOUSE GAS EMISSIONS, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions (last visited Mar. 19, 2018). Nevertheless, the electricity sector is responsible for 28 % of all U.S. GHG emissions and roughly 5% of global GHG emissions. *Id.*; U.S. ENVTL. PROT. AGENCY, GLOBAL GREENHOUSE GAS EMISSIONS DATA, https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data (last visited Mar. 19, 2018).

9. *See* U.S. ENVTL. PROT. AGENCY, U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2016 ES-2 (2018), https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf. Carbon dioxide equivalent reflects the fact that different GHGs have different warming potentials. This figure represents the volume of carbon dioxide emissions equivalent to the total warming potential of all carbon dioxide emissions. *See id.* at table ES-1 (listing the global warming potential of various GHGs).

10. This number reflects the carbon dioxide equivalent GHG emissions multiplied by a $42 dollar-per-ton estimate of the social cost of carbon used by the Obama Administration's Environmental Protection Agency. *See* U.S. ENVTL. PROT. AGENCY, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 16, 20 (2016), https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf. The Trump Administration has selected a lower Social Cost of Carbon figure that does not account for international effects of CO_2 and also employs a much higher discount rate. Richard G. Newell, *Unpacking the Administration's Revised Social Cost of Carbon*, RESOURCES (Oct. 10, 2017), http://www.rff.org/blog/2017/unpacking-administration-s-revised-social-cost-carbon.

11. U.S. ENERGY INFO. ADMIN, CARBON DIOXIDE EMISSIONS FROM THE U.S. POWER SECTOR HAVE DECLINED 28% SINCE 2005 (Oct. 29, 2018), https://www.eia.gov/todayinenergy/detail.php?id=37392.

12. *See* IPCC REPORT, *supra* note 1. Unfortunately, much of the 28% reduction from 2005 levels occurred prior to the 2010 benchmark used in the IPCC's analysis, meaning that much of the needed 45% decline has yet to be realized. *See* THE RHODIUM GROUP, PRELIMINARY US EMISSIONS ESTIMATES FOR 2018 Figure 6 (Jan. 8, 2019), https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/.

13. FERC, WHAT FERC DOES, https://www.ferc.gov/about/ferc-does.asp?csrt=8960867565483579373 (last visited Mar. 1, 2019).

14. The Commission's jurisdiction extends to "any rate, charge, or classification, demanded, observed, charged, or collected by any public utility for any transmission or sale subject to the jurisdiction of the Commission" and "any rule, regulation, practice, or contract affecting such rate, charge, or classification." 16 U.S.C.

discriminatory or preferential" and (2) that its decisions be consistent with the "public interest."[15]

Largely because the Commission's jurisdiction touches on so many aspects of the energy sector, it is receiving increasing attention from across the political spectrum. That attention has ranged from calls to *sua sponte* impose a price on carbon to a proposal to bail out uneconomic coal and nuclear plants.[16] There is every reason to believe that the focus paid to the Commission will only increase as interest groups recognize the potential for the Commission to affect climate change.

There is no question that the Commission's actions have substantial consequences for climate change. Although the Commission is not a climate regulator, like the EPA, the scope of its statutory responsibilities means that its decisions will inevitably affect the nation's GHG emissions. This article discusses several areas of the Commission's jurisdiction that have particularly important consequences for climate change.

The article begins with the Commission's authority over the electricity sector. The Commission has implemented its authority in a manner that has already had the effect, if not the intent, of facilitating a cleaner, less GHG-intensive energy mix. Consistent with its technology- and fuel-neutral approach,[17] the Commission has implemented its responsibilities under the Federal Power Act (FPA) through a series of principles that were conceived and applied without regard to their environmental consequences. Those principles include eliminating barriers to wholesale market competition and a commitment to cooperative federalism. The consequences that those principles have for climate change are largely indirect, but nevertheless important. Eliminating barriers to competition can, among other things, facilitate the deployment of new, relatively clean technologies—such as wind, solar, and energy storage—that are increasingly the lowest-cost option for meeting the nation's electricity needs. Similarly, respecting the FPA's cooperative federalist foundation will ensure that states can exercise their authority over the generation mix, including through the clean energy programs that are prolifer-

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§ 824e(a) (2018); *see also id.* § 824d(a). For brevity, we use "rates" and "practices" to refer to all these items when discussing the Commission's jurisdiction.

15. *See, e.g.*, Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1292 (2016) (explaining the just and reasonable standard under the FPA); Atl. Ref. Co. v. Pub. Serv. Comm'n, 360 U.S. 378, 391 (1959) (explaining that, in the context of NGA section 7 certificate proceeding, the Commission must consider all factors bearing on the public interest as part of its determination).

16. *Compare* Christopher J. Bateman & James T. B. Tripp, *Toward Greener FERC Regulation of the Power Industry*, 38 HARV. ENVTL. L. REV. 275 (2014) ("FERC could mandate that wholesale market sales of electricity reflect and incorporate the cost of carbon."); *cf.* Grid Resiliency Pricing Rule, 162 F.E.R.C. ¶ 61,012 (Jan. 8, 2018) (NOPR filed by the Department of Energy under section 403 of the Department of Energy Organization Act).

17. In this case, neutrality means that the Commission may not regulate in a manner that preferences one fuel or technology type over another. *See, e.g.*, Order No. 755, *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, 137 F.E.R.C. ¶ 61,064 (Oct. 20, 2011) (describing resource neutrality in terms of regulating a particular service, regardless of the resource or technology type that provides that service).

ating among the states. Adherence to these principles will further the core purposes of the FPA, while also facilitating the ongoing transformation of the electricity sector to a cleaner, more customer-centric model—a transformation that we refer to as the transition to the electricity grid of the future.

We then discuss the Commission's responsibility for permitting energy infrastructure—including natural gas pipelines, facilities for importing or exporting liquefied natural gas (LNG), and hydroelectric facilities. Unlike the previous example, climate change must factor directly into the Commission's permitting responsibilities, which generally require the Commission to determine whether the relevant facility is consistent with the public interest. Simply put, it is hard to imagine a consideration more relevant to the "public interest" than the existential threat posed by climate change. Although, in the last year, the Commission's majority has largely refused to consider the climate change consequences of energy infrastructure, the federal courts have recently issued a series of decisions requiring federal agencies, and, in one case, the Commission itself, to meaningfully consider climate change in the permitting process.[18] Considering climate change does not require the rejection of all energy infrastructure projects that cause GHG emissions. It does, however, require the Commission to ensure that the benefits of a project—whatever they may be—more than offset the harms caused by those GHG emissions. Taking that responsibility seriously will ensure that the Commission's actions are, in fact, consistent with the public interest and do not needlessly and wantonly contribute to climate change.

Although the urgent threat of climate change does not require a radical reinterpretation or expansion of the Commission's authority, it does increase the stakes associated with the Commission's exercise of its existing authority. For example, given the importance of integrating renewable resources into the generation mix, it is critical that all resources be able to compete on a level playing field in the wholesale electricity sector and that rules designed for conventional technologies are not barriers to the entry of new ones. Similarly, as a result of the states' current leadership role in addressing climate change, it is all the more important that the Commission accommodate state policies, consistent with the cooperative federalist principles underlying the FPA. And with regard to infrastructure permitting, the increasing salience of climate change within the national dialogue only underscores the importance of meaningfully considering a project's impact on climate change when evaluating whether it is consistent with the public interest. In other words, the Commission does not have to take on new obligations, it just has to double down on obligations it already has.

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18. *See, e.g.*, Sierra Club v. FERC, 867 F.3d 1357, 1373 (D.C. Cir. 2017) [hereinafter *Sabal Trail*]; WildEarth Guardians v. U.S. Bureau of Land Mgmt., 870 F.3d 1222, 1226 (10th Cir. 2017); Citizens for a Healthy Community v. Bureau of Land Mgmt., No. No. 1:17-cv-02519-LTB-GPG, 2019 WL 1382785 at *6-8 (D. Colo. Mar. 29th 2019); Wild Earthguards v. Zinke, No. 16-1724 (RC), 2019 WL 1273181 at *11-22 (D.D.C. Mar. 20, 2019); San Juan Citizens All. v. U.S. Bureau of Land Mgmt., No. 16-CV-376-MCA-JHR, 2018 WL 2994406, at *10 (D.N.M. 2018); High Country Conservation Advocates v. U.S. Forest Serv., 52 F. Supp. 3d 1174, 1195-98 (D. Colo. 2014); *see also* Center for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1216 (9th Cir. 2008).

II. THE TRANSITION TO THE ELECTRICITY GRID OF THE FUTURE

A. The Transition to the Electricity Grid of the Future is Underway

The U.S. electricity sector is decarbonizing.[19] That trend is rooted in technology and economics. The cost of renewable energy technologies, such as wind and solar, has fallen dramatically over the last few decades[20] and those declines are forecasted to continue in the years ahead.[21] As Bloomberg New Energy Finance observed in 2018, "[c]oal and gas are facing a mounting threat to their position in the world's electricity generation mix, as a result of the spectacular reductions in cost not just for wind and solar technologies, but also for batteries."[22] These technologies have, as a result, gone from playing a minimal role in the generation mix to representing the majority of new generation capacity in the United States in three of the last four years.[23] In a number of regions, they have, for certain

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19. *See, e.g.*, Greg Schivley et al., *Assessing the evolution of power sector carbon intensity in the United States*, 13 ENVTL. RESEARCH LETTERS 5 (2018) (concluding that GHG-intensity of the U.S. electricity sector declined 30 percent between 2001 and 2017, with some regions declining by as much as 58%). This dynamic has slowed in recent years and preliminary data indicates that, for the first time in years, electricity-sector GHG emissions increased in 2018. *See* THE RHODIUM GROUP, PRELIMINARY US EMISSIONS ESTIMATES FOR 2018 (Jan. 8, 2019), https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/. The overall trend, however, remains toward electricity-sector decarbonization and, as discussed further below, various states and utilities announced plans to significantly or entirely decarbonize their generation mix in the last year. *See, e.g.*, *infra* notes 32, 114.

20. LAZARD, LEVELIZED COST OF ENERGY ANALYSIS 10 (Nov. 2017), https://www.lazard.com/media/450337/lazard-levelized-cost-of-energy-version-110.pdf (showing the declines in the levelized cost of wind and utility scale solar between 2009 and 2017); U.S. ENERGY INFO. ADMIN., LEVELIZED COST AND LEVELIZED AVOIDED COST OF NEW GENERATION RESOURCES IN THE ANNUAL ENERGY OUTLOOK 2018 4-5 (Mar. 2018), https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf (listing the levelized costs of electricity by technology type for resources estimated to enter service in 2022); ENERGY INNOVATION POLICY & TECHNOLOGY, LLC, RENEWABLE ELECTRICITY LEVELIZED COST OF ENERGY ALREADY CHEAPER THAN FOSSIL FUELS, AND PRICES KEEP PLUNGING (Jan. 22, 2018), https://energyinnovation.org/2018/01/22/renewable-energy-levelized-cost-of-energy-already-cheaper-than-fossil-fuels-and-prices-keep-plunging/ (showing projected changes in the levelized cost of electricity by technology type between 2020 and 2050, based on projections by the National Renewable Energy Laboratory).

21. U.S. ENERGY INFO. ADMIN., ELECTRICITY EXPLAINED: ELECTRICITY IN THE UNITED STATES (Apr. 20, 2018), https://www.eia.gov/energyexplained/index.php?page=electricity_in_the_united_states (showing the percentage of the nation's electricity derived from renewable resources between 1950 and 2017 as well as the breakdown among different types of renewable resources); Jeffrey Logan et al., *National Renewable Energy Laboratory, Electricity Generation Baseline Report*, NAT'L RENEWABLE ENERGY LAB. viii (2017), https://www.nrel.gov/docs/fy17osti/67645.pdf (showing net capacity additions by technology type between 1950 and 2015).

22. BLOOMBERGNEF, TUMBLING COSTS FOR WIND, SOLAR, BATTERIES ARE SQUEEZING FOSSIL FUELS (Mar. 28, 2018), https://about.bnef.com/blog/tumbling-costs-wind-solar-batteries-squeezing-fossil-fuels/; *id.* ("[T]he economic case for building new coal and gas capacity is crumbling, as batteries start to encroach on the flexibility and peaking revenues enjoyed by fossil fuel plants.").

23. U.S. ENERGY INFO. ADMIN., NEARLY HALF OF UTILITY-SCALE CAPACITY INSTALLED IN 2017 CAME FROM RENEWABLES (Jan. 10, 2018), https://www.eia.gov/todayinenergy/detail.php?id=34472; *see also* U.S. ENERGY INFO. ADMIN., COMBINED WIND AND SOLAR MADE UP AT LEAST 20% OF ELECTRIC GENERATION IN 10 STATES IN 2017 (Oct. 11, 2018), https://www.eia.gov/todayinenergy/detail.php?id=37233 ("Wind and solar electric generation, including small-scale solar photovoltaics, reached or exceeded 20% of total generation in 10 states in 2017. During some months in 2017, wind accounted for more than 50% of in-state electricity generation in Iowa and Kansas, and solar accounted for more than 20% of in-state electricity generation in California."); Michael Goggin et al., *Customer Focused and Clean: Power Markets for the Future*, WIND SOLAR ALL. 7 (2018),

periods, accounted for the majority, or even the vast majority, of electricity produced within the state.[24] Not only are these resources often the lowest-cost form of new energy, they are also, in an increasing number of cases, less expensive than *existing* fossil-fuel-fired facilities.[25] As a result, increasing the percentage of electricity from resources such as wind and solar can decrease the amount that consumers pay for energy.[26]

The growth of renewable resources is also a function of consumers' desire for clean energy.[27] Customers—including residential, commercial, and even industrial consumers—are increasingly demanding that their energy come from renewable or zero-emissions sources. Numerous studies show that individual consumers place significant value on both the clean and renewable attributes of their

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https://windsolaralliance.org/wp-content/uploads/2018/11/WSA_Market_Reform_report_online.pdf ("Wind and solar generating capacity has increased 500% since 2008."); *see also* U.S. ENERGY INFO. ADMIN., NEW ELECTRIC GENERATING CAPACITY IN 2019 WILL COME FROM RENEWABLES AND NATURAL GAS (Jan. 10, 2019), https://www.eia.gov/todayinenergy/detail.php?id=37952 (estimating that 64% of new capacity in 2019 will come from wind and solar resources). Natural gas generation has made up the vast majority of the remaining new capacity, as discussed below. *See infra* notes 36-40 and accompanying text.

24. At multiple points in March 2018, the Southwest Power Pool, one of the nation's seven regional transmission organizations (RTOs), served over 60% of its total load using wind resources. *See* Tom Kleckner, *Another Wind Penetration Record for SPP*, RTOINSIDER (Apr. 5, 2018), https://www.rtoinsider.com/spp-wind-penetration-record-89917/; U.S. ENERGY INFO. ADMIN., COMBINED WIND AND SOLAR MADE UP AT LEAST 20% OF ELECTRIC GENERATION IN 10 STATES IN 2017 (Oct. 11, 2018), https://www.eia.gov/todayinenergy/detail.php?id=37233 ("During some months in 2017, wind accounted for more than 50% of in-state electricity generation in Iowa and Kansas."). Both the California Independent System Operator (CAISO) and the Electric Reliability Council of Texas (ERCOT), the RTOs covering most of California and Texas, respectively, also generated more than half of their electricity from renewable resources. *See* RTOINSIDER, SPP, ERCOT SET NEW WIND GENERATION MARKS (Dec. 23, 2018), https://www.rtoinsider.com/spp-ercot-december-wind-generation-record-108378/; CALIFORNIA ISO, MONTHLY RENEWABLES REPORT DECEMBER 2018, http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Dec2018.html (last visited Jan. 30, 2019) (showing that at one point in December 2018 CAISO served nearly 75% of load within the region using renewable resources). When these technologies are considered along with a broader definition of renewable energy, including, for example, hydropower, the number of states that have relied primarily on renewable energy increases considerably. *See e.g.*, U.S. ENERGY INFO. ADMIN., NATURAL GAS WEEKLY UPDATE (Sept. 27, 2018), https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2018/09_27/ ("[S]ince November 2016, more than 75% of Maine's electricity generation has come from renewable sources, including hydroelectricity.").

25. *See, e.g.*, Matt Gray, *Colorado's renewables revolution gathers steam*, CARBON TRACKER (Jan. 5, 2018), https://www.carbontracker.org/colorados-renewables-revolution/ (explaining that, in a recent solicitation run by Xcel Energy in Colorado, the median bids for solar and wind were less than the operating cost of most existing coal plants within the state).

26. THE ECONOMIC VALUE OF RENEWABLE ENERGY IN TEXAS: REDUCING ENERGY COSTS FOR CUSTOMERS 2 (2018), https://static1.squarespace.com/static/5bc4a0d8e5f7d17e4e04af16/t/5bc643bef4e1fcb9bfccf4e7/1539720128210/Reducing+Energy+Costs+for+Customers.pdf (explaining that the total cost of electricity in ERCOT was $5.7 billion lower between 2010 and 2017 as a result of wind and solar installations than it would have been otherwise, with roughly $850 million of the savings in 2017); Joachim Seel et al., *Impacts of High Variable Renewable Energy Futures on Wholesale Electricity Prices, and on Electric-Sector Decision Making* vii (2018), http://eta-publications.lbl.gov/sites/default/files/report_pdf_0.pdf (finding that increased levels of wind and solar resources should lead to lower average electricity prices, albeit potentially with more variability).

27. David Roberts, *Utilities Have a Problem: the Public Wants 100% Renewable Energy, and Quick*, VOX (Oct. 11, 2018), https://www.vox.com/energy-and-environment/2018/9/14/17853884/utilities-renewable-energy-100-percent-public-opinion (discussing various measures of public opinion showing high demand for relying mostly, or, in some cases, entirely, on renewable sources of electricity).

electricity.[28] Dozens of corporations—including some of the largest in the country—have announced or already achieved a goal of procuring all of their electricity needs from zero-emissions or renewable resources.[29] For example, in 2018, Apple announced that it had achieved its goal of purchasing renewable energy sufficient to satisfy the electricity demand of all its facilities.[30] All told, corporate renewable energy procurement had a record year in 2018 and is now one of the chief factors driving growth in renewable energy.[31] That trend is not limited to consumers of electricity. In 2018, Xcel Energy, one of the largest utilities in the United States, announced a goal of 80% decarbonization by 2030 and complete decarbonization by 2050, with several others following a similar path.[32]

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28. *Id*. (discussing studies indicating that 70% of consumers "agree that 'in the near future, we should produce 100% of our electricity from renewable energy sources such as solar and wind'"); Patty Durand, *Three Things Consumers Want From Electricity Providers*, UTILITYDIVE (Apr. 10, 2018), https://www.utilitydive.com/news/three-things-consumers-want-from-electricity-providers-1/520821/.

29. *See* BLOOMBERGNEF, CORPORATIONS PURCHASED RECORD AMOUNTS OF CLEAN POWER IN 2017 (Jan. 22, 2018), https://about.bnef.com/blog/corporations-purchased-record-amounts-of-clean-power-in-2017/ ("Corporations have signed contracts to purchase nearly 19GW of clean power since 2008, an amount comparable to the generation capacity of Portugal, with 76% of this activity coming since 2015."); INT'L RENEWABLE ENERGY AGENCY, CORPORATE SOURCING OF RENEWABLES: MARKET AND INDUSTRY TRENDS 10 (2018), https://irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_Corporate_sourcing_2018.pdf ("Active corporate sourcing of renewable electricity reached 465 terawatt-hours (TWh) in 2017, representing approximately 3.5% of total electricity demand in the Commercial & Industrial sector, and 18.5% of total renewable electricity demand in the Commercial & Industrial sector."); *see also* RE100, COMPANIES http://there100.org/companies (last visited Mar. 5, 2018) ("174 RE100 companies have made a commitment to go '100% renewable.'").

30. Press Release, Apple, Apple now globally powered by 100 percent renewable energy (Apr. 9, 2018), https://www.apple.com/newsroom/2018/04/apple-now-globally-powered-by-100-percent-renewable-energy/.

31. *See* BLOOMBERGNEF, CORPORATE CLEAN ENERGY BUYING SURGED TO NEW RECORD IN 2018 (Jan. 28, 2019), https://about.bnef.com/blog/corporate-clean-energy-buying-surged-new-record-2018/.

32. Press Release, Xcel, Xcel Energy aims for zero-carbon electricity by 2050 (Dec. 4, 2018), https://www.xcelenergy.com/company/media_room/news_releases/xcel_energy_aims_for_zero-carbon_electricity_by_2050. Integrated resource plan proceedings involving other major utilities have indicated that it is frequently cheaper to develop alternative sources of electricity, such as wind and solar, than it is to continue operating many legacy coal-fired facilities. *See, e.g.*, Iulia Gheorghiu, *PacifiCorp Shows 60% of its Coal Units are Uneconomic*, UTILITYDIVE (Dec. 5, 2018), https://www.utilitydive.com/news/pacificorp-shows-60-of-its-coal-units-are-uneconomic/543566/ ("PacifiCorp revealed that 13 of its 22 coal units are more expensive than alternative options, such as clean energy."); Coley Girouard, *Top 10 Utility Regulation Trends of 2018*, ADVANCED ENERGY PERSPECTIVES (Dec. 19, 2018), https://blog.aee.net/top-10-utility-regulation-trends-of-2018 ("Northern Indiana Public Service's 2018 [integrated resource plan] found that the utility could save customers $4 billion by replacing its entire coal fleet by 2028 with a portfolio of solar, wind, storage, and demand management resources."); CONSUMERS ENERGY, INTEGRATED RESOURCE PLAN, https://www.consumersenergy.com/community/sustainability/energy-mix/renewables/integrated-resource-plan (last visited Feb. 6, 2019) (explaining that the [integrated resource plan] would "reduc[e] carbon emissions by 80% from 2005 levels by 2040."); Press Release, Avista, Avista builds on commitment to renewable energy with goal of 100 percent clean electricity by 2045 (Apr. 18, 2019), https://myavista.com/-/media/myavista/content-documents/our-environment/cleanelectricitygoalnewsrelease-pdf.pdf?la=en. In addition, earlier this year, Florida Power and Light announced that it would use "the world's largest solar-powered battery" as the key piece in a plan to replace a pair of gas-fired power plants. *See* News Release, Florida Power and Light, FPL announces plan to build the world's largest solar-powered battery and drive accelerated retirement of fossil fuel generation (Mar. 28, 2019), http://newsroom.fpl.com/2019-03-28-FPL-announces-plan-to-build-the-worlds-largest-solar-powered-battery-and-drive-accelerated-retirement-of-fossil-fuel-generation.

At the same time that customers are demanding cleaner energy, they are also playing a more important and sophisticated role in the production and consumption of electricity. Distributed resources and demand management technologies have become cheaper and are now ubiquitous enough to play an important role in balancing the supply and demand for electricity. For example, California already has over 7,000 MW of installed Distributed Energy Resource (DER) capacity and is well on its way to meeting its target of at least 12,000 MW by 2020.[33] Customers in several other states have already deployed significant quantities of DERs.[34] Nationwide, DER capacity is forecasted to nearly double between 2018 and 2024.[35]

In addition, historically low natural gas prices continue to play a significant role in the changing resource mix by putting downward pressure on electricity prices and displacing aging, uneconomic facilities.[36] A study by the U.S. Department of Energy (DOE) in 2017 concluded that cheap natural gas was the primary factor driving the retirement of so-called "baseload" resources, primarily coal and nuclear.[37] But, even as natural gas has recently become the dominant fuel for electricity generation,[38] its role in the electricity mix has begun to change with the needs of the system, with flexible resources becoming relatively more valuable. That trend is likely to continue as an increasing share of the resource mix is made up of low-to-no marginal cost variable energy resources, particularly wind and solar.[39] As a result of these trends, many industry experts predict that natural gas facilities will need to secure an increasing share of their revenue from ancillary services, including, potentially, ancillary services that are not widely procured in today's markets.[40]

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33. *See* FERC STAFF REPORT, DISTRIBUTED ENERGY RESOURCES TECHNICAL CONSIDERATIONS FOR THE BULK POWER SYSTEM 2 (2018), https://www.ferc.gov/legal/staff-reports/2018/der-report.pdf.

34. *Id.* Fig. 1.

35. *Id.* Fig. 2.

36. U.S. DEP'T OF ENERGY, STAFF REPORT TO THE SECRETARY ON ELECTRICITY MARKETS AND RELIABILITY (Aug. 2017), https://www.energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf [hereinafter DOE GRID STUDY]; ECONOMIST INTELLIGENCE UNIT, US COAL PLANT RETIREMENTS TO CONTINUE (Sept. 7, 2018), http://www.eiu.com/industry/article/1277120111/us-coal-plant-retirements-to-continue/2018-09-07. ("A combination of factors has made the electricity market difficult for coal-fired plants to operate in, and these have been well-documented. The fall in natural gas prices, due to the shale gas boom, caused natural gas prices to plummet, making this fuel more competitive with coal plants and initiating a surge in gas-fired power generation (now the largest source of power in the US.")).

37. DOE GRID STUDY, *supra* note 36 ("The biggest contributor to coal and nuclear plant retirements has been the advantaged economics of natural gas-fired generation.").

38. U.S. ENERGY INFO. ADMIN., WHAT IS U.S. ELECTRICITY GENERATION BY ENERGY SOURCE?, https://www.eia.gov/tools/faqs/faq.php?id=427&t=3 (last visited Mar. 3, 2018).

39. For example, multiple market operators have developed "ramping products" that procure resources based on their capacity to rapidly adjust output in response to market conditions. *See California Independent System Operator Corporation*, 156 F.E.R.C. ¶ 61,226 at P 36 (2016) (accepting CAISO's proposal to a create a flexible ramping product that will "enhance CAISO's ability to manage ramping capability to address changes in system conditions by extending CAISO's ability to procure ramping capability in both the upward and downward directions."); *Midcontinent Independent System Operator, Inc*, 149 F.E.R.C. ¶ 61,095 (2014) (accepting MISO's proposal to create a ramping product).

40. *See, e.g.*, Erik Ela et al., *Effective Ancillary Services Market Designs on High Wind Power Penetration Systems*, 4-6 (2012), https://www.nrel.gov/docs/fy12osti/53514.pdf (discussing potential new ancillary services); Aaron Bloom et al., *Eastern Renewable Generation Integration Study*, NAT'L RENEWABLE ENERGY LAB. 154-

The pace of change in the electricity sector may accelerate if other sectors of the economy turn to electrification as a means of decarbonization. Preventing the worst effects of climate change will require significant reductions in GHGs economy-wide, which many believe will be possible only through electrification.[41] As noted, the transportation sector is now the country's largest source of GHG emissions and the consensus opinion—although it is by no means universal—is that electrification provides the best option for decarbonizing transportation. In addition, commercial and residential buildings, which account for roughly a tenth of the nation's GHG emissions, are widely viewed as a candidate for further electrification as a means of reducing their GHG emissions.[42] Wide-spread electrification has potentially enormous consequences for electricity demand and patterns of consumption, which would inevitably affect the wholesale electricity sector subject to the Commission's jurisdiction.[43]

Although economic and technological forces are driving the transformation of the electricity sector, public policy has played, and will continue to play, an important role. States have historically supported cleaner technologies through a range of policies, including renewable portfolio standards,[44] net metering programs,[45] and efforts to put a price on carbon pollution.[46] In recent years, several

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56 (2016), https://www.nrel.gov/docs/fy16osti/64472.pdf (concluding that the grid in the Eastern Interconnection is technically capable of integrating high levels of variable energy resources, but that doing so will require regulatory mechanisms that incentivize significant resource flexibility); Michael Goggin et al., *supra* note 23, at 12 (stating that frequency-related ancillary services will become more valuable as the percentage of electricity from wind and solar increases); *see also* FERC, FUTURE ANCILLARY SERVICES IN ERCOT (2013), https://www.ferc.gov/CalendarFiles/20140421084800-ERCOT-ConceptPaper.pdf (discussing how ancillary service needs may evolve in the ERCOT market).

41. David Roberts, *The Key to Tackling Climate Change: Electrify Everything*, VOX (Oct. 27, 2017), https://www.vox.com/2016/9/19/12938086/electrify-everything; *see* Jürgen Weiss et al., *Electrification Emerging Opportunities for Utility Growth*, BRATTLE (2017), http://files.brattle.com/files/7376_electrification_white-paper_final_single_pages.pdf; Sherri Billimoria et al., *The Economics of Electrifying Buildings*, ROCKY MOUNTAIN INST. (2018), https://rmi.org/insight/the-economics-of-electrifying-buildings/.

42. *See* U.S. ENVTL. PROT. AGENCY, SOURCES OF GREENHOUSE GAS EMISSIONS, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions (last visited Mar. 10, 2019); Jeff Deason et al., *Electrification of buildings and industry in the United States: Drivers, barriers, prospects, and policy approaches* (2018), http://eta-publications.lbl.gov/sites/default/files/electrification_of_buildings_and_industry_final_0.pdf (discussing building electrification and potential policy drivers).

43. Weiss et al., *supra* note 41, at 6 (estimating that "full electrification of land-based transport (light-duty, commercial, and freight vehicles) in 2050 would increase total electricity demand by 2,100 TWh, or 56% of 2015 electricity sales.").

44. A renewable portfolio standard mandates that a certain percentage of electricity within a particular jurisdiction be produced from one of an enumerated set of renewable resources. Most states currently have a renewable portfolio standard in place. *See* DSIRE, RENEWABLE PORTFOLIO STANDARD POLICIES (Oct. 2018), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2018/10/Renewable-Portfolio-Standards-2018.pdf.

45. A net metering program permits the owner of a distributed energy resource, usually a photovoltaic solar system, to net electricity exported to the grid during times of peak production against her total electricity imported from the grid. Most states currently have net metering rules. *See* DSIRE, NET METERING (Nov. 2018), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/11/DSIRE_Net_Metering_November 2017.pdf.

46. Although no state taxes GHGs directly, several states participate in cap-and-trade programs, which put a price on GHGs implicitly by issuing a limited number of permits to emit GHGs. Nine states participate in the Regional Greenhouse Gas Initiative (RGGI), *see* RGGI, THE REG'L GREENHOUSE GAS INITIATIVE (last visited

states have ratcheted up their efforts to combat climate change, seeking to significantly or entirely decarbonize the electricity sector in a matter of decades. While complete decarbonization remains a relatively long-term goal for even these states, these efforts include aggressive short-term goals for carbon reduction that will accelerate the economic trends described above. In addition, although the federal government has, for the time being, abdicated an international leadership role on climate, actions of previous administrations, both Democrat and Republican, have contributed to these changes, helping to reduce the costs of new technologies while also addressing certain of the environmental externalities associated with electricity generation.[47]

These trends portend profound changes for how the electricity sector is planned, maintained, operated, and paid for. For example, the fastest growing energy production technologies—wind and solar[48]—are locationally constrained. Utility-scale wind and solar are often most cost-effective in areas far removed from consumers, meaning that the electricity must be transmitted long distances, in some cases over hundreds of miles.[49] Grid planning will have to evolve to accommodate the forecasted growth in these resources. In addition, a significant increase in variable energy resources will affect how ancillary services are defined, offered, and procured.[50] Electric storage resources have the potential to store large quantities of electricity from variable energy resources,[51] which may address some of these issues by eliminating the need for electricity production to at all times

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Nov. 10, 2018), https://www.rggi.org/rggi-inc/contact, and California has its own cap-and-trade program, *see* CALIFORNIA AIR RESOURCES BD., CAP-AND-TRADE PROGRAM (Oct. 23, 2018), https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

47. The most well-known federal policies are tax credits for renewable resources that were supported on a bipartisan basis under both Republican and Democratic Presidents. *See* CONG. RESEARCH SERV., THE RENEWABLE ELECTRICITY PRODUCTION TAX CREDIT: IN BRIEF, 4 (2017), https://www.everycrsreport.com/files/20170726_R43453_01e1a4cc07ea890d0f7ff9ef759e2deb7ceacd57.pdf (listing statutes enacting or extending production tax credits for renewable energy). Other prominent examples include DOE's SunShot Initiative to lower the cost of installed solar energy 75% between 2011 and 2020, *see* OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, THE SUNSHOT INITIATIVE, https://www.energy.gov/eere/solar/sunshot-initiative (last viewed Nov. 10, 2018), and which met its target three years early, *see* GREENTECHMEDIA, DOE OFFICIALLY MARKS SUNSHOT'S $1 PER WATT GOAL FOR UTILITY-SCALE SOLAR (Sept. 12, 2017), https://www.greentechmedia.com/articles/read/doe-officially-hits-sunshot-1-per-watt-goal-for-utility-scale-solar#gs.j9szLNk, and DOE's Title XVII loan guarantee program, *see* DEP'T OF ENERGY, TITLE XVII, https://www.energy.gov/lpo/title-xvii (last visited November 10, 2018).

48. U.S. ENERGY INFO. ADMIN., EIA FORECASTS RENEWABLES WILL BE FASTEST GROWING SOURCE OF ELECTRICITY GENERATION (2019), https://www.eia.gov/todayinenergy/detail.php?id=38053#.

49. *See, e.g.*, Anthony Lopez et al., *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis*, NAT'L RENEWABLE ENERGY LAB. Figs. 2, 3 (2012) (comparing "rural" utility-scale solar potential versus "urban" utility-scale solar potential).

50. Michael Milligan, *Sources of Grid Reliability Services*, 31 Electricity J. 1, 2 (2018); *see also id.* at 7 (discussing the importance of ensuring that market rules do not limit the ability of all types of resources to provide these services).

51. Although batteries receive much of the attention devoted to energy storage, other technologies, such as pumped storage at hydroelectric facilities, already play an important role in storing electricity for subsequent use in balancing the system. *See* U.S. DEP'T OF ENERGY, PUMPED STORAGE AND POTENTIAL HYDROPOWER FROM CONDUITS ii, 3-4, 7 (2015), https://www.energy.gov/sites/prod/files/2015/06/f22/pumped-storage-potential-hydropower-from-conduits-final.pdf (discussing the current state of pumped storage and the potential of pumped storage to help integrate significant quantities of variable energy resources).

equal end-use consumption.[52] For the time being, however, the variability of renewable resources is addressed through operational protocols, such as reducing the output of conventional resources and relying more heavily on flexible resources—the same protocols grid operators use to address load variability[53]—which is putting a premium on resources that can quickly change their output.[54] The cumulative effect of these and other changes may well require modifications to the traditional model of electricity regulation.

The transition to the electricity grid of the future presents an enormous opportunity to create an electricity sector that is more efficient, cost-effective, and, ultimately, more sustainable. As noted, renewable resources are increasingly putting downward pressure on energy prices—providing real savings for consumers.[55] In addition, renewable resources—sometimes paired with batteries—are more often becoming the low-cost option in utility integrated resource planning proceedings—again, reducing the power costs borne by consumers.[56] Not only

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52. In addition, Hydroelectric resources may also play an increasingly important role in managing resource variability given that they are fully dispatchable, zero-emissions resources that can be consistent with state clean energy goals. As discussed below, *infra* note 114, many states have enacted or are exploring 100% renewable or clean energy standards that often include hydroelectric resources. For example, New Mexico's Energy Transition Act defines "zero-emissions resource" to include hydroelectric facilities and also defines "renewable energy resource" to include certain forms of hydroelectric facilities. *See* Energy Transition Act, N.M. S.B. 489 §§ 28(h) & (K).

53. Jaquelin Cochran et al., *Grid Integration and the Carrying Capacity of the U.S. Grid to Incorporate Variable Renewable Energy*, NAT'L RENEWABLE ENERGY LAB 5-8 (2015), https://www.nrel.gov/docs/fy15osti/62607.pdf (discussing protocols for integrating increasing levels of variable energy resources); Mackay Miller & Sadie Cox, *Overview of Variable Renewable Energy Regulatory Issues*, NAT'L RENEWABLE ENERGY LAB 20-21 (2014), https://www.nrel.gov/docs/fy14osti/61350.pdf (explaining operational best practices at increasing levels of electricity from variable energy resources).

54. *See supra* note 39. In addition, several other reforms enacted by RTOs and independent system operators (ISOs) or the Commission were intended to incentivize the development and procurement of fast-responding resources. *See, e.g.*, Ari Peskoe & Kate Konschnik, *Climate Implications of FERC Proceedings*, HARVARD LAW SCHOOL ENVIRONMENTAL LAW PROGRAM POLICY INITIATIVE 14 (2017), http://eelp.law.harvard.edu/wp-content/uploads/Climate-and-FERC-Proceedings.pdf ("By ensuring that flexibility is appropriately compensated by the markets, FERC [in Order No. 831] directly improved the economic viability of particular resources, such as energy storage, demand response, and fast-ramping natural gas turbines.").

55. *See*, e.g., James Bushnell and Kevin Novan, *Setting with the Sun: The Impacts of Renewable Energy on Wholesale Power Markets*, UC DAVIS ENERGY ECONOMICS PROGRAM 23 (May 2018), http://deep.ucdavis.edu/uploads/5/6/8/7/56877229/deep_wp020.pdf (finding that investments in renewable electricity "appear[] to be responsible for the majority of price declines over the last half-decade in California."); DOE GRID STUDY, *supra* note 36, at 13-14 (finding that variable energy resources had contributed to lower wholesale electricity prices); Joachim Seel et al., *Impacts of High Variable Renewable Energy Futures on Wholesale Electricity Prices, and on Electric-Sector Decision Making*, LAWRENCE BERKELEY NAT'L LAB. 21-23 (2018), https://www.energycentral.com/system/files/ece/nodes/255349/lbnl_impacts_of_high_vre_futures_final_embargoed.pdf (discussing the potential for increased reliance on variable energy resources to put downward pressure on electricity prices in ISOs and RTOs).

56. *See, e.g.*, Matt Gray, *Colorado's renewables revolution gathers Renewables Revolution Gathers Steam*, CARBON TRACKER (Jan. 5, 2018), https://www.carbontracker.org/colorados-renewables-revolution/ (explaining that, in a recent solicitation run by Xcel Energy, the median bids for solar and wind were less than the operating cost of most existing coal plants within the state); Gavin Bade & Peter Maloney, *Updated: Tucson Electric signs solar + Signs Solar + Storage PPA for Less Than 4.5¢/kWh*, UTILITYDIVE (May 23, 2017), https://www.utilitydive.com/news/updated-tucson-electric-signs-solar-storage-ppa-for-less-than-45kwh/443293/ (explaining that the pricing of a solar plus storage facility would appear comparable to that of a gas peaker plant).

are these new technologies capable of reducing cost, in many instances they may also provide superior services to conventional technologies. For example, inverters are capable of providing some services, such as frequency regulation, more quickly and precisely than most existing resources.[57] Although the precise course of the transition is still uncertain, it seems likely that the bulk power system will eventually transition into one that relies largely on low-cost, renewable electricity that is integrated into the grid using a diverse array of resources.

B. The Commission's Role in the Transition to the Electricity Grid of the Future

The Commission cannot ignore these fundamental changes to the electricity sector. Instead, these changing dynamics will require the Commission to monitor and, in some cases, revise its regulations to ensure that they are facilitating competition and not becoming obstacles to new technologies or entrenching existing methods of generating and transmitting electricity. Ensuring a level playing field through competition should indirectly facilitate a reduction in GHG emissions by ensuring that existing market rules do not become barriers to new technologies, which are generally cleaner than many conventional forms of electricity generation.

Section 205 of the FPA requires that all rates and charges for the wholesale sale and transmission of electricity as well as "all rules and regulations affecting or pertaining to such rates or charges" be just and reasonable and not unduly discriminatory or preferential.[58] Section 206 gives the Commission the authority to revise any existing rate or charge or any practice affecting an existing rate or charge upon a showing that (1) the existing rate, charge, or practice is unjust and unreasonable or unduly discriminatory or preferential and (2) the Commission's preferred replacement rate is just and reasonable and not unduly discriminatory or preferential.[59] The FPA also reserves certain issues for exclusive state jurisdiction, including retail sales of electricity and the facilities used for generating electricity.[60]

Sections 205 and 206 the FPA vest the Commission with significant discretion to determine what is just and reasonable and not unduly discriminatory or preferential.[61] As discussed below, the Commission has used this discretion to

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57. *See, e.g.*, Goggin et al., *supra* note 23, at 24 ("Wind and solar plants, with wholly electronic controls, are able to provide regulation services with greater speed and accuracy than conventional power plants. CAISO has found that frequency regulation from solar PV is around 90% accurate at meeting specific regulation demands quickly, which is almost twice as accurate as conventional generators and some energy storage technologies.").

58. 16 U.S.C. § 824d; *see* Arkansas Louisiana Gas Co. v. Hall, 453 U.S. 571, 577, n.7 (1981); (explaining that because of the parallel structure of the FPA and the Natural Gas Act, the Supreme Court has an "established practice of citing interchangeably decisions interpreting the pertinent sections of the two statutes."). Section 205 requires public utilities to file all rates and charges with the Commission and collect only those rates and charges that are on file.

59. 16 U.S.C. § 824e.

60. *Id.* § 824(b).

61. *See* Petal Gas Storage, L.L.C. v. FERC, 496 F.3d 695, 698 (D.C. Cir. 2007) (noting that its review of Commission orders "entitl[es] the Commission to substantial deference, particularly in the ratemaking context."); BP W. Coast Prod., LLC v. FERC, 374 F.3d 1263, 1282 (D.C. Cir. 2004) ("The court reviews the Commission's ratemaking decision to determine whether it was arbitrary and capricious according special deference to the Commission's expertise.") (internal citations omitted); *accord* Emera Maine v. FERC, 854 F.3d 9, 21

establish a series of principles that guide its implementation of the FPA. Chief among these principles are (1) ensuring a level playing field for similarly situated actors, (2) enhancing competition, and (3) promoting cooperative federalism. Whether these are the right principles and the success with which the Commission has implemented those principles can be debated. Nevertheless, these are the principles that the Commission has relied upon in recent years to explain how it implements its statutory mandate.

Regulations consistent with these principles will facilitate the transition to the electricity grid of the future, with important consequences for climate change. For example, eliminating barriers to competition and unduly discriminatory market rules has been a cornerstone of the Commission's implementation of the FPA. Many of the principal barriers to increased competition happen to be arrayed against new technologies that are relatively clean themselves or that have the potential to play important roles in the transition to the grid of the future. And while the Commission has justified its removal of these barriers entirely based on the core, pro-competitive purposes of the FPA, ensuring that these technologies are able to compete on a level playing field could go a long way toward reducing GHG emissions, thereby helping to avoid the worst effects of climate change.

Similarly, the Commission's commitment to cooperative federalism should facilitate state efforts to decarbonize the electricity sector. As noted, the states are currently taking the lead in the fight against climate change, primarily through efforts to reduce GHG emissions from the electricity sector. States as economically and geographically diverse as California, New York, New Mexico, and Colorado have enacted legislation or adopted regulations aimed at significantly or entirely decarbonizing their electricity generation mix.[62] As discussed below, the FPA preserves significant state authority, including the authority to regulate generation facilities, and the Commission has historically been solicitous of states' exercise of this authority, even where doing so may constrain the scope of Commission initiatives.[63] Such solicitude is especially warranted where the states are exercising their police powers over the general health and welfare—in this case by addressing environmental externalities, a core component of those police powers.[64]

The balance of this section discusses some of the most significant examples of these principles in action. Critically, although a faithful application of these

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(2017) ("The FPA's just-and-reasonable requirement 'is obviously incapable of precise judicial definition.'" (quoting *Morgan Stanley*, 554 U.S. at 532)).

62. *See, e.g.*, *infra* note 114.

63. *See infra* notes 115-118, 146-168. Some of the Commission's most prominent orders, including Order No. 888 and Order No. 745, have contained measures designed to preserve state policymaking discretion, even where the Commission arguably had jurisdiction and a policy rationale for acting more aggressively.

64. *See, e.g.*, Huron Portland Cement Co. v. City of Detroit, Mich., 362 U.S. 440, 442 (1960) ("Legislation designed to free from pollution the very air that people breathe clearly falls within the exercise of even the most traditional concept of what is compendiously known as the police power."). After Congress enacted the FPA, it passed the Clean Air Act and subsequent amendments, vesting authority to regulate various forms of air pollution, including carbon pollution, with the EPA. *See, e.g.*, Clean Air Act Extension of 1970, 84 Stat. 1676, Pub. L. No. 91-604; Clean Air Act Amendments of 1977, 91 Stat. 685, Pub. L. No. 95-95. Although those statutes provide other organs of the federal government with the responsibility to regulate generation facilities, under the FPA, that responsibility lies entirely with the states.

principles can have meaningful effect on GHG emissions, doing so is entirely consistent with the Commission's fuel- and technology-neutral approach. The rules and regulations discussed below do not preference one resource class or type over another. Instead, they facilitate competition among all resources on a relatively level playing field and permit the states to play the role that Congress reserved for them under the FPA.

Of course, competition may create winners and losers in the electricity sector. Although Congress and the state legislatures have a history of helping companies—and workers—who find themselves in declining industries, that is not the Commission's role. Instead, the Commission promotes fair and robust competition, not the welfare of particular competitors.[65] The Commission's responsibility to protect the public interest and ensure that rates and practices remain just and reasonable in the face of pressure from entities who may suffer economic losses in the changed energy sector is a perfect illustration of why Congress made the Commission an independent agency.

1. Removing Barriers to Competition and New Technologies

Arguably the Commission's most important overarching policy initiative over the last few decades has been breaking down barriers to competition. The introduction of significant wholesale competition following the Energy Policy Act of 1992[66] and Order No. 888[67] produced substantial savings for consumers while also helping to foster a more diverse and dynamic electric generation sector. But, as the Commission has recognized in a series of orders, those reforms did not create a fully open and competitive wholesale electricity sector. In many cases, rules and practices designed for an industry based on vertically integrated utilities and conventional generation technologies became barriers to competition, even where competition had nominally taken hold.[68] One consequence of these barriers is that the bulk power system frequently either did not recognize or failed to accommodate new resources or technologies that were as capable of providing electricity, capacity, and ancillary services as conventional generators. This section discusses

65. *Cf.* Otter Tail Power Co. v. United States, 410 U.S. 366, 374 (1973) (explaining that in enacting the FPA Congress had "an overriding policy of maintaining competition to the maximum extent possible.").

66. Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776.

67. Order No. 888, *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities*, 62 Fed. Reg. 12,274-01 (Mar. 14, 1997)*;* Order No. 888-A, *Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, 61 Fed. Reg. 2,1540 (May 10, 1996), F.E.R.C. STATS. & REGS. ¶ 31,036 (1996), *order on reh'g*, 62 Fed. Reg. 12274 (Mar. 14, 1997), F.E.R.C. STATS. & REGS. ¶ 31,048 (1997), *order on reh'g*, Order No. 888-B, 81 F.E.R.C. ¶ 61,248 (1997), *order on reh'g*, Order No. 888-C, 82 F.E.R.C. ¶ 61,046 (1998), *aff'd in relevant part sub nom.*; Transmission Access Policy Study Grp. v. FERC, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom.*; New York v. FERC, 535 U.S. 1 (2002).

68. *See, e.g.*, Order No. 841, *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, 162 F.E.R.C. ¶ 61,127 at P 2 (2018) ("barriers to the participation of new technologies . . . in the RTO/ISO markets can emerge when the rules governing participation in those markets are designed for traditional resources and in effect limit the services that emerging technologies can provide"); Goggin et al., *supra* note 23, at 9, app. D (cataloging ways in which electricity markets were designed with fossil, nuclear, and hydroelectric resources in mind).

a series of the Commission's landmark orders attempting to eliminate certain of those barriers to competition.[69]

a. Removing Barriers to Full Market Participation

Over the last 30 years, the Commission has issued a series of orders eliminating barriers that prevented resources from participating fully in wholesale electricity markets. In each case, the Commission focused entirely on the longstanding principles underlying its implementation of the FPA, particularly enhancing competition and eliminating undue discrimination. By facilitating competitive markets and breaking down discriminatory barriers, the Commission has laid the foundation for a more dynamic electricity sector in which new competitors and new technologies are able to participate on a relatively level playing field.

Perhaps the most prominent recent example of the Commission's efforts to break down barriers facing new resources involves demand response. Demand response programs pay consumers to reduce their electricity use in response to the price of electricity.[70] In Order No. 719, the Commission sought to ensure that demand response resources were able to participate in wholesale electricity markets.[71] The Commission explained that, because demand response resources could supply many of the services and benefits provided by conventional generators—and often at a lower cost—wholesale markets that precluded demand response from participating were unjust and unreasonable and unduly discriminatory or preferential.[72] Order No. 719 required RTOs and ISOs to make a number of reforms, including revising their market rules to accept offers from demand response resources largely as they would offers from conventional generators, in theory putting both types of resources on a level playing field for balancing supply and demand.[73]

The Commission issued a second rule addressing demand response resources a few years later. Order No. 745 required RTOs and ISOs to compensate demand

69. Although the orders discussed in the following section are some of the most salient steps that the Commission has taken to remove barriers to competition, many of its other orders and initiatives have furthered the same goal, albeit arguably less directly. One example is the Commission's policy of supporting the creation and growth of organized markets in the form of RTOs and ISOs. One of the many beneficial effects of these large regional markets is their potential to more effectively integrate variable energy resources by, among other things, reducing curtailment, eliminating rate pancaking, and identifying regional transmission needs. By integrating variable energy resources more effectively, organized markets can facilitate greater competition for a range of services, with corresponding benefits to ratepayers.

70. FERC v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 767 (2016), *as revised* Jan. 28, 2016) [hereinafter *EPSA*]. FERC has structured its demand response rules so that demand response programs are triggered when it is cheaper to balance wholesale market supply and demand by reducing electricity consumption rather than increasing electricity production. *Id.* at 774-75.

71. Order No. 719, *Wholesale Competition in Regions with Organized Electric Markets*, 125 F.E.R.C. ¶ 61,071, F.E.R.C. STATS. & REGS. ¶ 31,281 at PP 16-19 (2008) [hereinafter Order No. 719] ("Demand response can provide competitive pressure to reduce wholesale power prices; increases awareness of energy usage; provides for more efficient operation of markets; mitigates market power; enhances reliability; and in combination with certain new technologies, can support the use of renewable energy resources, distributed generation, and advanced metering.")

72. *Id.* at P 16.

73. *Id.* at PP 3, 16 (explaining that FERC's aim is to "eliminate barriers to the participation of demand response in the organized power markets by ensuring comparable treatment of resources.").

response resources at the same level as conventional resources, requiring that "demand response providers . . . receive as much for conserving electricity as generators do for producing it."[74] The Commission explained that this pricing formula would break down barriers to competition by ensuring that demand response and conventional resources received commensurate compensation for the services they provided.[75] That change, the Commission explained, would help demand response resources to participate meaningfully in the wholesale market—with the market, not the Commission, determining the appropriate level of demand response resources.[76]

Order No. 745 led to one of the most significant Supreme Court cases in the history of the FPA: *FERC v. EPSA*.[77] In that case, the Supreme Court upheld both the Commission's jurisdiction to regulate wholesale demand response as well as the pricing mechanism it chose in Order No. 745.[78] The Court agreed that the Commission had jurisdiction to issue Order No. 745 because the compensation scheme for demand response "directly affects" the wholesale rate.[79] In support of that conclusion, the Court pointed to the facts that demand response is used to balance wholesale market supply with wholesale market demand and that it puts "downward pressure" on all suppliers' bids.[80] The Court also recognized that the participation of demand response in wholesale markets helped alleviate service problems on the grid by easing "pressure" during periods of peak demand.[81] In short, the Court held that demand response's potential to improve the wholesale market brought the efforts to remove barriers to wholesale demand response within the Commission's jurisdiction under the FPA.

Together, the demand response orders stand for the proposition that barriers to competition that preclude or hinder particular resource types from supplying the services that they are technically capable of providing may be unjust and unreasonable and/or unduly discriminatory or preferential. Although that principle derives directly from the Commission's longstanding pro-competitive interpretation of the FPA, it also has important consequences for electricity-sector GHG emissions. Many wholesale market rules were designed for a grid that was overwhelmingly composed of fully dispatchable, synchronous generators, such as thermal, nuclear, and hydro plants that rely on spinning turbines to generate electricity.[82] Market rules designed with these resources in mind can pose unintended barriers

74. *EPSA*, 136 S. Ct. at 771.

75. Order No. 719, 125 F.E.R.C. ¶ 61,071 at P 16.

76. Order No. 745, *Demand Response Competition in Organized Wholesale Energy Markets*, 134 F.E.R.C. ¶ 61,187 at P 59 (2011) [hereinafter Order No. 745]. In a similar vein, the Commission has found that failing to adequately value the services provided by particular resources is itself a form of undue discrimination. *See* Order No. 755, *supra* note 17, at PP 1-2 (finding that the methods for compensating frequency response, a type of ancillary service, in RTOs and ISOs are unduly discriminatory insofar as they "fail to acknowledge the inherently greater amount of frequency regulation service being provided by faster-ramping resources.").

77. *EPSA*, 136 S. Ct. at 760.

78. *Id*. at 784.

79. *Id*. at 774-75.

80. *Id*. at 774-75 ("Compensation for demand response thus directly affects wholesale prices. Indeed, it is hard to think of a practice that does so more.").

81. *EPSA*, 136 S. Ct. at 774.

82. *See* DOE GRID STUDY, *supra* note 36.

to variable energy resources, including demand response, but also wind and solar, that do not rely on spinning turbines to generate electricity. For example, many of the standardized products and services purchased in wholesale markets were designed for the needs and capabilities of an electricity grid based primarily on generators that use "spinning mass" to generate electricity.[83] Similarly, wholesale markets have at times precluded the full participation of new technologies—such as demand response, but also storage and distributed energy resources, discussed further below. Accordingly, although enhancing competition is an imperative rooted in the most conventional understanding of the FPA, it can facilitate the participation of new technologies that happen to be relatively clean themselves or that will play an integral role in the electricity grid of the future, thereby leading to a cleaner, more sustainable resource mix.

A more recent example of this principle in action is Order No. 841, which addressed the participation of energy storage resources in wholesale markets.[84] The potential for energy storage resources to radically transform how grid operators balance supply and demand is hard to overstate.[85] Although energy storage resources, particularly batteries, have made enormous strides in recent years, both in terms of cost and technical capabilities, they have continued to encounter barriers to participation in the market as a result of business and operational models that differ from conventional resources.[86] The Commission explained that those barriers include, for example, bidding parameters that preclude electric storage resources from participating to their full potential and rules that impede their ability to charge effectively using electricity purchased in the wholesale market. In addition, Order No. 841 recognized that some of the most important attributes of energy storage resources—including the ability to provide services as both a producer and consumer and to respond almost instantaneously to market signals—are

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83. Goggin et al., *supra* note 23, at 9 ("Most of the power system planning, operations and market methods now in use were developed around the operational capabilities of large, utility-owned conventional fossil, nuclear, and hydro power plants."); *id.* ("Operating reserves were defined by characteristics of thermal generation supply ("spinning" vs "non-spinning"), rather than by system needs. "Inertia" from the rotating masses of synchronous generators was considered a product, when it is actually only one tool to stabilize frequency following a system disturbance.").

84. Order No. 841, 162 F.E.R.C. ¶ 61,127. Although Order No. 841 is arguably the most prominent step that the Commission has taken to remove barriers to electric storage resources, as the Commission explained in the NOPR that led to Order No. 841, the Commission took several smaller steps to remove discrete barriers to competition for such resources prior to issuing Order No. 841. *See Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Notice of Proposed Rulemaking*, F.E.R.C. STATS. & REGS. ¶ 32,718 at n.15 (2016).

85. *See, e.g.*, Paul Denholm & Robert Margolis, *The Potential for Energy Storage to Provide Peaking Capacity in California under Increased Penetration of Solar Photovoltaics*, NAT'L RENEWABLE ENERGY LAB (2018), https://www.nrel.gov/docs/fy18osti/70905.pdf; David Hart et al., *Energy Storage for the Grid*, MIT ENERGY INITIATIVE 2-3 (2018), http://energy.mit.edu/wp-content/uploads/2018/04/MITEI-WP-2018-04.pdf (explaining the potential effect of widespread energy storage on the operation of the electricity grid).

86. Garrett Fitzgerald et al., *The Economics of Battery Energy Storage How Multi-Use, Customer-Sited Batteries Deliver the Most Services and Value to Customers and the Grid*, Rocky Mountain Inst. 36-37 (2015), https://rmi.org/wp-content/uploads/2017/03/RMI-TheEconomicsOfBatteryEnergyStorage-FullReport-FINAL.pdf (summarizing barriers facing electric storage resources and batteries in particular); Dhruv Bhatnagar, *Market And Policy Barriers To Energy Storage Deployment*, SANDIA NAT'L LAB 26-29 (2013), https://www.sandia.gov/ess-ssl/publications/SAND2013-7606.pdf (discussing the market-related barriers to the growth of electric storage resources).

not recognized in all markets.[87] Accordingly, as in its demand response orders, the Commission recognized that market rules designed for other contexts were now hindering the development of modern storage resources and, by extension, harming consumers by limiting the potential for competition.[88]

To remedy this situation, the Commission required RTOs and ISOs to develop market "participation models" that "recogniz[e] the physical and operational characteristics of electric storage resources."[89] The Commission recognized explicitly that a participation model that accommodates energy storage resources' characteristics was necessary to overcome "market rules designed for conventional generation resources which create barriers to entry for emerging technologies."[90] It explained that this participation model will produce rates that are just and reasonable because the participation model will remove barriers to market competition for all the services that energy storage resources are capable of providing.[91] Here again, although the Commission based its action entirely on its core responsibilities under the FPA—including much the same rationale adopted in Order No. 719—the rulemaking has the potential to play a significant role in the transition to the electricity grid of the future given the potential of energy storage technologies to effectively integrate large quantities of variable energy resources.[92] In addition, Order No. 841's concept of a participation model that permits resources to provide all the services that they are technically capable of supplying may eventually provide a model for ensuring that other technologies are fully capable of competing in wholesale markets.

When the Commission issued the notice of proposed rulemaking (NOPR) that became Order No. 841, it also included a proposal to require RTOs and ISOs to eliminate barriers to distributed energy resources' ability to bid their aggregated output into RTO and ISO markets.[93] Just as it did for energy storage resources in Order No. 841, the Commission suggested that distributed resources were capable of providing energy, capacity, and ancillary services, but were prevented from doing so effectively by RTO and ISO rules designed with conventional generators in mind.[94] Even more than demand response and energy storage resources, DERs may face significant barriers to participating effectively in the wholesale market—

87. Order No. 841, 162 F.E.R.C. ¶ 61,127 at PP 7-8, 10-12.

88. *Id.* at PP 11-12.

89. *Id.* at 51 ("We find that requiring each RTO/ISO to create a participation model that recognizes the unique characteristics of electric storage resources will help eliminate barriers to their participation in the RTO/ISO markets, which will enhance competition and, in turn, help to ensure that these markets produce just and reasonable rates.").

90. *Id.* at P 10.

91. *Id.* at P 53.

92. Order No. 841 is rightly regarded as the Commission's most significant order addressing the barriers facing energy storage resources. But it is far from the only one. Order No. 841, 162 F.E.R.C. ¶ 61,127 at n.18 (collecting Commission orders that have addressed energy storage issues).

93. *Id.* at P 5. The Commission defined distributed energy resources as a resource interconnected through the distribution grid, including, for example, small batteries, rooftop solar systems, and even electric vehicles. *Id.* at n.2.

94. *Id.* at PP 13-15.

e.g., because DERs interconnect to the distribution system and are frequently located behind customer meters.[95] But DERs may also have greater potential to fundamentally transform how electricity is produced and consumed, given the sheer number and variety of DERs that could eventually participate in wholesale markets through aggregation. Although the Commission subsequently convened a technical conference to develop additional information before taking final action on the NOPR,[96] and the NOPR remains pending at the time of writing this article, the proceeding highlights how the Commission's responsibilities to eliminate barriers to competition and undue discrimination have the potential to accelerate the transition to the electricity grid of the future.

b. Removing Barriers Created by Antiquated Service Models

The previous section focused on how the Commission has eliminated barriers to the development of competition by reforming wholesale market rules that hinder the participation of new technologies. Equally important, however, are the Commission's efforts to ensure that public utilities provide the services needed to accommodate the changing electricity sector. Order No. 888's open access requirement is perhaps the best example.[97] Order No. 888 functionally "unbundled" the wholesale generation and transmission of electricity by requiring all utilities to establish a tariff with separate rates for generation, transmission, and ancillary services and to apply that tariff equally to themselves and third parties.[98] Order No. 888 thus created an "open access" regime in which third parties could utilize the transmission networks of incumbent utilities—a dynamic that established the foundation for the modern, competitive bulk power system.[99]

Nevertheless, open access did not entirely eliminate the potential for undue discrimination or preference, especially where transmission owners retained significant discretion in administering their obligations under their OATT.[100] In the

95. FERC, AD18-10-000, DISTRIBUTED ENERGY RESOURCES TECHNICAL CONSIDERATIONS FOR THE BULK POWER SYSTEM 7-8 (2018), https://www.ferc.gov/CalendarFiles/20180215112833-der-report.pdf.

96. Notice of Technical Conference, *Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators*, 83 Fed. Reg. 7,703 (2018).

97. Order No. 888, *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, 61 Fed. Reg. 21,540 (1996) (codified at 18 C.F.R. pts. 35, 385) ("Open access" generally refers to the requirement that Commission-jurisdictional transmission-owning entities must provide access to their network using rates, terms, and conditions that do not discriminate among transmission customers); *see also* Order No. 888-A, 78 F.E.R.C. ¶ 61,220, at 30,176 ("[T]he Commission believes that our authorities under the FPA not only permit us to adapt to changing economic realities in the electric industry, but also require us to do so to eliminate undue discrimination and protect electricity customers.")

98. *New York*, 535 U.S. at 11.

99. As discussed further below, Order No. 888 also established an "open access" requirement for "unbundled" retail transactions in interstate commerce. *See infra* notes 147-148 and accompanying text.

100. Order No. 890, *Preventing Undue Discrimination in Transmission Service*, F.E.R.C. STATS. & REGS. ¶ 31,241, 72 Fed. Reg. 12,266 at P 26 (2007) (codified at 18 C.F.R. pts. 35, 37) (citing Order No. 2003 at PP 11-12), *order on reh'g,* Order No. 890–A, F.E.R.C. STATS. & REGS. ¶ 31,261 (2007), *order on reh'g,* Order No. 890–B, 123 F.E.R.C. ¶ 61,299 (2008), *order on reh'g,* Order No. 890–C, 126 F.E.R.C. ¶ 61,228, *order on clarification,* Order No. 890–D, 129 F.E.R.C. ¶ 61,126 (2009).

two decades following Order No. 888, the Commission has issued a series of orders to ensure that non-incumbent wholesale market participants are able to access the transmission grid on equal terms as transmission owners. For example, in Order No. 2003 and subsequent rulemakings, the Commission required transmission owners to establish and refine *pro forma* interconnection procedures, facilitating new generators' access to the bulk power system.[101]

The Commission continues to recognize that the nation's "changing resource mix driven by market forces and state and federal policies" and "the emergence of new technologies" have significant implications for the way resources access the transmission grid.[102] The Commission has addressed these implications in a variety of ways. For example, Order No. 845 provides that resources with excess interconnection capacity may use that excess capacity to directly supply energy from other sources or transfer it to another resource—a reform that is likely to facilitate the use of electric storage resources in conjunction with variable energy resources.[103] This change will facilitate the deployment of variable technologies by allowing them to use their interconnection service to provide more dispatchable and predictable energy, capacity, and ancillary services. Reforms along these lines have helped ensure that new technologies are able to access the transmission services needed to participate fully in Commission jurisdictional markets. The provision of non-discriminatory transmission access has, in turn, helped to facilitate the emergence of new, relatively clean resources that have contributed to the declining GHG-intensity of the electricity sector. Provided that the Commission continues to police the potential for undue discrimination in transmission service, there is every reason to believe that this dynamic will continue—and even accelerate—as the cost of renewable resources continues to decline.

Another example of the Commission's efforts to ensure necessary transmission services is Order No. 764, which aimed to create a level playing field for variable resources—primarily wind and solar—by eliminating rules that were designed for conventional resources and that discriminated against variable energy resources.[104] For example, the Commission required transmission owners to reduce the time increment in which they offered transmission service from an hour to fifteen minutes, so that variable energy resources could purchase transmission

101. Order No. 2003-A, *Standardization of Generator Interconnection Agreements and Procedures*, 106 F.E.R.C. ¶ 61,220 at P 744 (2004) (codified at 18 C.F.R. pt. 35), *order on reh'g*, Order No. 2003-B, F.E.R.C. STATS. & REGS. ¶ 31,171 (2004), *order on reh'g*, Order No. 2003-C, F.E.R.C. STATS. & REGS. ¶ 31,190 (2005), *aff'd sub nom.* NARUC v. F.E.R.C., 475 F.3d 1277 (D.C. Cir. 2007).

102. Order No. 845, *Reform of Generator Interconnection Procedures and Agreements*, 163 F.E.R.C. ¶ 61,043 at P 7 (2018) (to be codified at 18 C.F.R. pt. 37), *order on reh'g*, Order No. 845-A, 166 F.E.R.C. ¶ 61,137 (2019).

103. Order No. 845, 163 F.E.R.C. ¶ 61,043 at PP 460-463. In addition, the rule provides that a generator that may require additional interconnection upgrades may provisionally interconnect and inject energy to the extent that the grid can accommodate it while upgrades are under construction. *Id.* at PP 440-443.

104. Order No. 764, *Integration of Variable Energy Resources*, 139 F.E.R.C. ¶ 61,246, 77 Fed. Reg. 41,482 (2012) (codified at 18 C.F.R. pt. 35). An important distinction between the demand response orders and Order No. 764 is that the demand response orders applied only to RTOs and ISOs while Order No. 764, because it addressed transmission service, applied to all jurisdictional transmission owners. *Id.* at P 2 (explaining that the Commission is revising the *pro forma* OATT).

services that better aligned with their generation output.[105] Order No. 764 extended the Commission's longstanding recognition that differences in the operational models of variable energy resources may require accommodation under the FPA.[106] Order No. 764 was arguably the Commission's clearest step to date in ensuring that variable energy resources can compete on an equal footing with conventional generators without suffering undue discrimination as a result of "operational procedures that have the *de facto* effect of imposing an undue burden on [variable energy resources]."[107] Nevertheless, as with the other orders discussed above, the Commission based its action on a straightforward understanding of its FPA obligations, in this case by eliminating unduly discriminatory rules and barriers to the entry of new resources.[108]

An important point to recognize in the foregoing discussion is that breaking down barriers to competition and fostering new services does not mean giving new technologies a preference over conventional ones or excusing new resources from obligations that apply to similarly situated conventional resources. As new technologies have become increasingly sophisticated, the Commission has required these resources to take on additional responsibilities in maintaining the operations and reliability of the grid. For example, in 2016 the Commission generally required that all generation resources, including variable energy resources, provide reactive power to the grid as part of a new interconnection agreement.[109] Similarly, in 2018, the Commission required all new generating resources, again including variable energy resources, to install the equipment needed to provide primary frequency response.[110] As these examples illustrate, ensuring new technologies can compete on a level playing field will often entail a corresponding obligation to contribute to the reliability of the grid.

The Commission must continue to ensure that new technologies do not face barriers to competition, including rules designed for an outdated electricity sector.

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105. Order No. 764, *supra* note 104.

106. Notice of Proposed Rulemaking, *Integration of Variable Energy Resources*, F.E.R.C. STATS. & REGS. ¶ 32,664, 75 Fed. Reg. 75,336, 75,337, 75,340 (2010) (citing Order No. 890, *supra* note 100, at P 5). The Commission further recognized that variable energy resources, such as wind power, have a limited ability to control their output, and that this limitation supports tailoring certain requirements to the special circumstances presented by this type of resource. *Id.* at P 663 (requiring that generator imbalance provisions account for the special circumstances presented by variable energy resources).

107. Order No. 764, *supra* note 104, at PP 11-20 (the Commission explained that many of the market rules within RTOs and ISOs "were developed at a time when virtually all generation on the system could be scheduled with relative precision" and that the record indicated that those rules unduly discriminated against resources whose output could vary within hourly increments). *Id.* at PP 20-21 (the Commission concluded that the ongoing transformation of the generation mix created a greater need to remove the discriminatory barriers to variable energy resources).

108. *Id.* at PP 36-37.

109. Order No. 827, *Reactive Power Requirements for Non-Synchronous Generation*, 155 F.E.R.C. ¶ 61,277 (2016) (codified at 18 C.F.R. pt. 35) (revising the Commission's *pro forma* large and small generator interconnection agreements to require non-synchronous generators, e.g. wind and solar resources, to provide reactive power).

110. Order No. 842, *Essential Reliability Services and the Evolving Bulk Power System—Primary Frequency Response*, 162 F.E.R.C. ¶ 61,128 (2018) (to be codified at 18 C.F.R. pt. 35) (requiring all new generators, both synchronous and non-synchronous, to install equipment to provide primary frequency response as a condition of interconnection).

At the time of writing this article, the compliance processes for Order No. 841 and Order No. 845 are ongoing. Although these orders laid out important principles, their ultimate success will turn on technical details of those compliance filings, which must not become barriers in their own right. The Commission similarly has yet to act on the NOPR regarding DERs.[111] Accordingly, ensuring that DERs—arguably the largest category of emerging new technologies—do not face unjust and unreasonable or unduly discriminatory or preferential barriers must remain a priority if the Commission is to fulfill its FPA obligations.

In addition, while the rulemakings discussed above addressed, or may address, some of the most fundamental barriers to entry facing certain new technologies, other barriers will likely emerge as new technologies expand their capabilities and reach unprecedented scale as part of the transition to the electricity grid of the future. For example, project developers are increasingly pairing renewable resources with battery storage technologies, reflecting both the improving economics of these combinations and their ability to provide expanded services to the grid.[112] These resources will not always fit neatly into the current generator constructs offered in many existing wholesale markets. Consistent with its responsibilities under the FPA and the precedents discussed above, the Commission must ensure that RTO/ISO rules do not become unnecessary barriers to the development of these hybrid resources, especially as their economics and technical capabilities make them an increasingly relevant part of the generation mix. Whether such barriers will arise—and, if so, how to address them—is outside the scope of this article. Our point is that the Commission must remain vigilant and continue applying its longstanding pro-competitive principles to ensure that any such barriers that do arise are promptly removed.

2. Respecting the FPA's Cooperative Federalism Foundation

The states are currently the frontline in the nation's fight against climate change. Partly in response to the lack of ongoing significant federal effort[113] to

111. Notice Inviting Post-Technical Conference Comments, *Distributed Energy Resources-Technical Considerations for the Bulk Power System*, 83 Fed. Reg. 19745 (2018).

112. *See, e.g.*, Peter Maloney, *Competitive solar-plus-storage moves closer to reality*, UTILITYDIVE (May 14, 2018), https://www.utilitydive.com/news/competitive-solar-plus-storage-moves-closer-to-reality/523519/ (discussing the growth of relatively large-scale combinations of solar and batter storage); N.Y. STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, LARGE SCALE RENEWABLES FACT SHEET (2017), https://www.nyserda.ny.gov/-/media/Files/Programs/Clean-Energy-Standard/2017-RES-RFP-Results-Factsheet.pdf (discussing the Bluestone Wind 122 MW wind-plus-storage facility being developed in New York); *see also, e.g.*, Paul Denholm *et al*., *Evaluating the Technical and Economic Performance of PV Plus Storage Power Plants*, NAT'L RENEWABLE ENERGY LAB. v-vii (2018), https://www.nrel.gov/docs/fy17osti/68737.pdf (summarizing the benefit-cost tradeoffs of pairing solar with battery storage).

113. In August 2018, EPA proposed to replace the Obama Administration's Clean Power Plan with the Affordable Clean Energy (ACE) rule. Although the rule has not been finalized, and it will surely be heavily litigated. EPA's own analysis suggests that it will lead to a significant increase in GHG emissions as well as other consequences, such as premature deaths. Charles Kuo & Kevin Jones, *Going Backwards: Rollback of Carbon Pollution Regulations*, VERMONT J. ENVTL. L. (2018), http://vjel.vermontlaw.edu/topten/going-backwards-rollback-carbon-pollution-regulations/; Amelia T. Keyes, *The Affordable Clean Energy Rule and the Im-*

address carbon pollution, states are increasingly seeking to decarbonize electricity production, largely by promoting clean sources of electricity as a substitute for GHG-emitting resources.[114] These efforts have the potential to make a meaningful dent in the nation's GHG emissions and also pave the way for further actions by other states—and maybe, eventually, the federal government—by helping to reduce the costs of cleaner sources of electricity.

The FPA gives the states ample authority to pursue these policies.[115] Although the Commission has jurisdiction over the wholesale sale and transmission of electricity in interstate commerce, section 201(b) reserves to the states exclusive jurisdiction to regulate "facilities used for the generation of electric energy."[116] Congress has revised the FPA a number of times, but it has never revisited this preservation of the states' authority or sought to extend federal regulation to the maximum extent that it might under the Commerce Clause of the U.S. Constitution.[117] This state authority includes the regulation of environmental externalities associated with generation, whether directly, *e.g.*, through a carbon tax or cap-and-trade regime, or indirectly, by adopting policies that promote cleaner alternative

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pact of Emissions Rebound on Carbon Dioxide and Criteria Air Pollutant Emissions 8 (2019) (accepted manuscript) (on file with IOPscience for Environ. Res. Letters) (discussing the limited effect ACE would have on emissions of both GHGs and traditional pollutants).

114. The number of examples is growing rapidly. California is the most prominent example, enacting a law in 2018 that requires the state to get 60% of its electricity from renewable resources by 2030 and 100% of its electricity from carbon-free sources by 2045. Cal. S.B. 100. New Mexico and the District of Columbia recently enacted legislation requiring 100% of their electricity to come from clean and renewable sources, respectively. Energy Transition Act, N.M. S.B. 489; Clean Energy DC Omnibus Amendment Act of 2018, D.C. B22-0904 (2018). Earlier this year, Washington State passed a 100% clean energy standard that, at the time of writing, was awaiting a signature from the Governor, who has indicated his support for the legislation. Catherine Morehouse, *Washington 100% clean energy bill gets one step closer to Inslee's desk*, UTILITYDIVE (Apr. 12, 2019), https://www.utilitydive.com/news/washington-100-clean-energy-law-only-a-signature-from-inslee-away/552627/. In addition, the governors of several states, including New York, announced goals of procuring 100% of their state's electricity needs from renewable or zero carbon resources by mid-century. Catherine Morehouse, *New York Gov. Cuomo Pledges 100% Carbon-Free Electricity by 2040*, UTILITYDIVE (Dec. 18, 2018), https://www.utilitydive.com/news/new-york-gov-cuomo-pledges-100-carbon-free-electricity-by-2040/544587/; STATE OF NEW JERSEY, GOVERNOR MURPHY SIGNS MEASURES TO ADVANCE NEW JERSEY'S CLEAN ENERGY ECONOMY (May 23, 2018), https://www.nj.gov/governor/news/news/562018/approved/20180523a_cleanEnergy.shtml. And several other states are currently considering legislation to establish 100 percent clean energy or renewable energy standards. *See, e.g.*, Future Energy Jobs Act, Illinois S.B. 2814 (2019); Minnesota H.F. 700 (2019). In addition, although it is not subject to Commission jurisdiction, Hawaii has had a 100% renewable energy target in effect since 2015. *See* Relating to Renewable Energy Standards, Hawaii H.B. 623 (2015), https://www.capitol.hawaii.gov/session2015/bills/HB623_CD1_.pdf. Finally, the majority of states have renewable portfolio standards or other programs in place to procure an increasing share of their electricity from carbon-free sources. FERC STAFF REPORT, *supra* note 33.

115. In discussing the states, we include self-regulated utilities that operate as quasi-governmental entities.

116. 16 U.S.C. § 824(b); Hughes v. Talen Energy Mktg., 136 S. Ct. 1288, 1292 (2016) ("[t]he States' reserved authority includes control over in-state facilities used for the generation of electric energy." (internal quotation marks omitted)); Pacific Gas & Elec. Co. v. State Energy Resources Conservation and Dev. Comm'n, 461 U.S. 190, 205 (1983) ("[the n]eed for new power facilities, their economic feasibility, and rates and services, are areas that have been characteristically governed by the States."); Panhandle E. Pipe Line Co. v. Pub. Serv. Comm'n of Ind., 332 U.S. 507, 517-518 (1947) (recognizing that the parallel NGA "was drawn with meticulous regard for the continued exercise of state power.").

117. *See, e.g.*, *Wickard v. Filburn*, 317 U.S. 111, 127-29 (1942) (holding that the federal government has authority under the Commerce Clause to regulate the production of wheat based on its effect on interstate commerce, even if the wheat in question is not actually sold in interstate commerce).

forms of generation, *e.g.*, renewable portfolio standards.[118] At the same time, the states' authority to regulate generation facilities is not limited to their environmental externalities nor are states required to use that authority to promote relatively clean resources. The FPA does not distinguish between a state program to promote new solar facilities and a state program aimed at preserving an existing coal-fired power plant.[119] Nevertheless, perhaps recognizing the economic fundamentals and consumer preferences described above, states have generally exercised their authority to promote a cleaner resource mix, especially in recent years.

Any dual federalist statute will produce tensions at the jurisdictional boundary between federal and state authority.[120] In recent years, however, these tensions have increased. The driving forces behind these rising tensions include (1) the development and expansion of organized wholesale markets, especially those involving mandatory capacity markets, (2) rapid technological advancements—such as demand response, DER, and energy storage, none of which fits neatly into the categories of resources existing when Congress enacted the FPA in 1935—and (3)

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118. *See, e.g.*, Coal. for Competitive Elec. v. Zibelman, 906 F.3d 41, 55 (2d Cir. 2018) (holding that "zero emissions credits," which the court deemed functionally identical to the renewable energy credits that are the foundation for most renewable portfolio standards, are not preempted under either field- or conflict-preemption theories), *cert. denied sub nom.*, *Elec. Power Supply Ass'n v. Rhodes*, --- S. Ct. ---, 2019 WL 133642 (Apr. 15, 2019); Allco Fin. Ltd. v. Klee, 861 F.3d 82, 101 (2d Cir. 2017), *cert. denied*, 138 S. Ct. 926, (2018) (holding that a state policy that requires load-serving entities to enter contracts with certain clean resources is not preempted under the FPA); Connecticut Dep't of Pub. Util. Control v. FERC, 569 F.3d 477, 481 (D.C. Cir. 2009) ("[s]tate and municipal authorities retain the right to forbid new entrants from providing new capacity, to require retirement of existing generators, to limit new construction to more expensive, environmentally-friendly units, or to take any other action in their role as regulators of generation facilities without direct interference from the Commission."); Brief for the U.S. and the FERC as Amici Curiae at 22-27, Village *of Old Mill Creek v. Star*, 2017 WL 3008289 (N.D. Ill. 2017) (Nos. 17-2433 and 17-2445) [hereinafter Seventh Circuit ZEC Brief], *aff'd sub nom.*, Elec. Power Supply Ass'n v. Star, 904 F.3d 518 (7th Cir. 2018), *reh'g denied* (Oct. 9, 2018), *cert. denied*, --- S. Ct. ---, 2019 WL 133642 (Apr. 15, 2019) (discussing proceedings in which the Commission has concluded that state policies to promote clean energy do not address matters within its jurisdiction); *Hughes*, 136 S. Ct. at 1299 (clarifying that the Court's holding that a state law was preempted does not necessarily extend to "various other measures States might employ to encourage development of new or clean generation, including tax incentives, land grants, direct subsidies, construction of state-owned generation facilities, or re-regulation of the energy sector."). This litigation has arisen largely in "restructured" states, where the retail utilities have sold off most or all of their generation facilities. In the "traditional," vertically integrated states, public utility commissions exercise even broader authority through supervision of utilities' integrated resource plans. Brief of Amici Curiae Electricity Law Scholars in Support of Defendants-Appellees at 10-18, *Star*, 904 F.3d 518 (Nos. 17-2433 and 17-2445).

119. The specific manner in which the state acts to promote different resource types may lead to different results if those programs come before the Commission, but that is not because the FPA limits states to promoting certain types of generation facilities. *Elec. Power Supply Ass'n v. AEP Generation Resources, Inc.*, 155 F.E.R.C. ¶ 61,102 (2016) (revoking the Commission's previous waiver of its affiliate power sales restrictions for AEP following the Ohio Public Utilities Commission's approval of a non-bypassable charge for supporting certain of AEP's coal-fired facilities).

120. For that reason, the Supreme Court has a long line of preemption cases under the FPA and the similarly structured NGA. Schneidewind v. ANR Pipeline Co., 485 U.S. 293, 310 (1988) (field preempted); Mississippi Power & Light Co. v. Miss. ex rel. Moore, 487 U.S. 354 (1988) (conflict preempted); Northern Nat. Gas Co. v. State Corp. Comm'n of Kan., 372 U.S. 84, 83 (1963) (not preempted); Northwest Cent. Pipeline Corp. v. State Corp. Comm'n of Kan., 489 U.S. 493, 522 (1989) (neither field nor conflict preempted); Oneok, Inc. v. Learjet, Inc., 135 S. Ct. 1591, 1601 (2015) (not field preempted); *Hughes*, 136 S. Ct. at 1288 (2016) (field preempted); Nantahala Power & Light Co. v. Thornburg, 476 U.S. 953, 966 (1986) (conflict preempted).

the proliferation of state efforts to address climate change.[121] As noted, the Supreme Court has established the legal standard for evaluating whether the Commission has overstepped its side of the jurisdictional line. In *EPSA*, the Court held that the Commission has authority to regulate practices directly affecting the wholesale market, provided that the regulation does not contravene any of the explicit prohibitions in the FPA.[122]

The Supreme Court has not established a similarly conclusive standard for evaluating when a state oversteps its side of the jurisdictional line. Although the Court has twice in recent years addressed the question of whether a state law affecting the energy sector is preempted,[123] those decisions have not produced a standard as clear as that established in *EPSA*. In the most recent of those cases, *Hughes v. Talen*, the Court held that a Maryland law aimed at promoting new natural-gas fired generation was preempted under the FPA.[124] That law established a "contract for differences," which, as relevant here, required a generator to bid its entire capacity into the PJM capacity market, but guaranteed that the generator would receive a predetermined rate for that capacity, regardless of the actual clearing price in the capacity market.[125] The Court's holding was limited: It "reject[ed] Maryland's program only because it disregards an interstate wholesale rate required by FERC."[126] But the Court was also explicit that its preemption holding did not extend to a variety of other ways that states could promote particular generation facilities.[127]

In the three years since the Court decided *Hughes*, litigation over the meaning of *Hughes* has proliferated as states have increasingly used their authority to promote zero-emissions generation facilities.[128] In the majority of these cases, the courts have upheld the states' authority to address environmental externalities, including carbon pollution, by regulating electricity-sector participants.[129] Perhaps

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121. The jurisdictional tensions created by the emergence of new technologies and the courts' efforts to address those tensions have been explored by an impressive array of scholars. *See, e.g.*, Jim Rossi, *The Brave New Path of Energy Federalism*, 95 Tex. L. Rev. 399 (2016); Joel B. Eisen, *Duel Electricity Federalism Is Dead, but How Dead, and What Replaces It*, 8 GEO. WASH. J. ENERGY & ENVTL. L. 3 (2017); Joel B. Eisen, *FERC's Expansive Authority to Transform the Electric Grid*, 49 U.C.D. L. REV. 1783 (2016); Robert R. Nordhaus, *The Hazy "Bright Line": Defining Federal and State Regulation of Today's Electric Grid*, 36 ENERGY L.J. 203 (2015); Jeffrey Dennis et al., *Federal/State Jurisdictional Split: Implications for Emerging Electricity Technologies* (2016), https://www.energy.gov/sites/prod/files/2017/01/f34/Federal%20State%20Jurisdictional%20Split--Implications%20for%20Emerging%20Electricity%20Technologies.pdf.

122. *EPSA*, 136 S. Ct. at 773.

123. *Hughes*, 136 S. Ct. at 1290; *Oneok*, 135 S. Ct. at 1599.

124. *Hughes*, 136 S. Ct. at 1288.

125. *Id.* at 1294-95.

126. *Id.* at 1299.

127. *Id.* ("We therefore need not and do not address the permissibility of various other measures States might employ to encourage development of new or clean generation, including tax incentives, land grants, direct subsidies, construction of state-owned generation facilities, or re-regulation of the energy sector.").

128. For an excellent collection of recent cases involving constitutional challenges to states' authority to regulate the electricity sector, see STATE CASES, http://www.statepowerproject.org/states/ (last visited November 10, 2018).

129. *See, e.g.*, *Zibelman*, 906 F.3d at 57; *Star*, 904 F.3d at 521, *reh'g denied* (Oct. 9, 2018); *Allco*, 861 F.3d 82, 101 (2d Cir. 2017), *cert. denied*, 138 S. Ct. 926 (2018); *but see* North Dakota v. Heydinger, 825 F.3d 912, 927 (8th Cir. 2016) (separate opinions of two out of the three judges indicating that the state law is preempted by the FPA).

the best example is a pair of recent preemption lawsuits involving efforts by New York and Illinois to value the zero-emissions aspects of nuclear power.[130] In both instances, the courts applied *Hughes* to conclude that these state efforts were not preempted under the FPA.[131] In the first case to be decided by a court of appeals, the U.S. Court of Appeals for the Seventh Circuit upheld the Illinois law, adopting an interpretation advanced in an amicus brief filed by the Commission.[132] The amicus brief urged the court to find that the Illinois program was not preempted and that states retain authority under the FPA to promote their preferred generation resources, provided that they do not cross certain jurisdictional red lines.[133]

The Seventh Circuit agreed. It explained that, after *Hughes v. Talen*, a state may compensate a resource for its environmental attributes, even if doing so affects the wholesale market-clearing price, provided, however, that the state does not condition that compensation on the resource clearing the wholesale market.[134] A few weeks later, the U.S. Court of Appeals for the Second Circuit reached the same conclusion involving a similar law in New York.[135] The Court observed that "even though the [Zero Emissions Credit] program exerts downward pressure on wholesale electricity rates, that incidental effect is insufficient to state a claim for field preemption under the FPA."[136] In addition, the Court recognized that the Commission has long "sanctioned state programs that increase capacity or affect wholesale market prices, so long as the states regulate matters within their jurisdiction."[137] In April 2019, the Supreme Court denied petitions for a writ of *certiorari* in both cases, ending the preemption challenges to the New York and Illinois programs.[138]

Both the Second and Seventh Circuit decisions recognize that an inevitable consequence of the FPA's division of jurisdiction over the electricity sector is that the states' exercise of their authority over generation facilities will affect matters

130. *Zibelman*, 906 F.3d at 41; *Star*, 904 F.3d at 518.

131. Although the preemption causes of action garnered the most attention, both decisions also rejected claims that the state law violated the Dormant Commerce Clause.

132. Following oral argument, the Seventh Circuit invited the United States to submit an amicus brief, which the Department of Justice did jointly with the Commission. The brief explained that the Illinois law was not preempted under the various Supreme Court precedents and that, in fact, the Court has recognized that states retain significant authority to promote clean energy resources provided that they do not target the wholesale market under FERC's jurisdiction. Seventh Circuit ZEC Brief, *supra* note 118, at 16-19. In addition, the brief went on to provide "context" by elucidating a series of Commission precedents recognizing states' expansive authority to "support clean power in a variety of ways." *Id*, at 22-27.

133. *See generally*, Seventh Circuit ZEC Brief, *supra* note 118.

134. *Star*, 904 F.3d at 524 ("[B]ecause states retain authority over power generation, a state policy that affects price only by increasing the quantity of power available for sale is not preempted by federal law.").

135. *Zibelman*, 906 F.3d at 57.

136. *Id.* at 54. The Court also rejected the conflict preemption theory, explaining that the New York program did not directly distort prices in the wholesale market, but rather affected those prices only "by increasing revenues for qualifying nuclear plants, which in turn increases the supply of electricity, which in turn lowers auction clearing prices." *Id.* at 57. The Court held that this "(at best) an incidental effect" was insufficient to state a claim for conflict preemption. *Id.*

137. *Id.* at 56.

138. Order List, 587 U.S. (Apr. 15, 2019), https://www.supremecourt.gov/orders/courtorders/041519zor_h3dj.pdf.

subject to federal jurisdiction and vice-versa.[139] Indeed, any state regulation that increases or decreases the number or type of generation facilities will, through the law of supply and demand, inevitably affect wholesale rates.[140] But the existence of those cross-jurisdictional effects is not necessarily a "problem" for the purposes of the FPA.[141] Rather, they are a direct result of the congressional design of the statute, which, as noted, reserved for the states the authority to regulate generation facilities even as it gave the Commission jurisdiction to regulate sales from those facilities. A conclusion that deprives states of their ability to regulate generation facilities based on the inevitable, but indirect, effects that exercising that authority would have on wholesale rates will turn the FPA's jurisdictional scheme on its head, effectively curtailing the authority that Congress reserved to the states under the FPA.

Both ZEC cases avoid that result. They represent important recognitions of states' authority to regulate the environmental externalities associated with electricity generation. That, in turn, has important consequences for the fight against climate change insofar as it insulates state efforts to decarbonize their electricity sectors from preemption lawsuits. It was also important that the Commission supported this position in its amicus brief. The Commission's recognition that those state programs neither intrude on its exclusive jurisdiction nor interfere with its statutory responsibilities is likely to go a long way toward protecting state authority, including the authority needed to reduce GHG emissions, from preemption challenges.

But federal preemption is not the only obstacle to states' exercise of their authority to regulate the environmental consequences of electricity generation. Even where state programs are not preempted, the Commission's implementation of the FPA can become a significant obstacle to a state's exercise of its authority. As noted, because the state and federal spheres of jurisdiction over the electricity sector are not "hermetically sealed,"[142] a state's efforts to regulate within its sphere of jurisdiction will inevitably affect matters of federal concern and vice-versa. That practical reality, however, is not a license for either sovereign to take action that interferes with the authority of the other and, by extension, with the congressional design of the FPA's cooperative jurisdictional scheme.[143]

Today, several states are attempting to combat climate change by decarbonizing their electricity sector,[144] largely by replacing resources that emit GHGs with

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139. *EPSA*, 136 S. Ct. at 776 (explaining that, under the FPA, the federal and state spheres of jurisdiction "are not hermetically sealed from each other"); *see also Oneok*, 135 S. Ct. at 1601 (explaining that the natural gas sector does not adhere to a "Platonic ideal" of the "clear division between areas of state and federal authority" that undergirds both the FPA and the Natural Gas Act). Both cases were also consistent with the perspective that the Commission adopted in its amicus addressing the preemption question. *See also* Order No. 764, *supra* note 104.

140. *Zibelman*, 906 F.3d at 57.

141. *Id.* at 55-57 (explaining that states may take actions that have the effect of reducing wholesale market prices without necessarily intruding on the Commission's jurisdiction over wholesale rates); *Star*, 904 F.3d at 524 (similar); *Allco*, 861 F.3d at 101 (similar).

142. *EPSA*, 136 S. Ct. at 776.

143. *See generally* Dennis et al., *supra* note 121 (arguing that "FERC has previously chosen to exercise its jurisdiction in ways that explicitly recognize and accommodate state policy goals.").

144. *See* Order No. 841, 162 F.E.R.C. ¶ 61,127 at PP 11-12.

ones that do not. Because those state actions will shape the number and type of resources available to participate in the wholesale market, they will inevitably have consequences for the wholesale sales of electricity subject to Commission jurisdiction. In recent years, a number of entities that would rather not compete directly with state-sponsored clean resources (ignoring that many of them have also benefitted from government subsidies),[145] have urged the Commission to use those consequences as a basis for Commission action to frustrate or limit the effect of certain state policies aimed at reducing GHG emissions.

The Commission must resist the invitation to interfere with those state policies. Although today's electricity sector is astronomically more complex than in 1935, when Congress enacted the FPA, it is still eminently possible to adhere to Congress's basic division of authority, at least provided that the Commission does not use its authority over wholesale rates and practices to target the subjects that Congress left for the states to decide. But to do so, the Commission must respect Congress's decision to leave the states in charge of regulating the generation mix, which, among other things, means that the Commission must ensure that wholesale market rules are not deployed to frustrate state policies.

But that is nothing new. The Commission has long exercised its authority under the FPA in a manner that respects the authority reserved to the states, even in instances when the Commission could arguably have gone further under the law. One of the clearest examples of this commitment is in Order No. 888.[146] As discussed above, Order No. 888 is best known for instituting open access and requiring the functional unbundling of wholesale generation and transmission services. But equally important was the Commission's decision to assert jurisdiction over the transmission component of unbundled retail transactions, but *not* the transmission component of bundled retail transactions.[147] In choosing to limit its regulation to unbundled retail sales, the Commission explained that regulating bundled retail transactions would present "numerous difficult jurisdictional questions" that were not necessary to resolve its inquiry into undue discrimination in the wholesale market.[148] Facing the argument that the Commission should have regulated the bundled retail transactions, the Commission refrained from doing so

145. *See* Nancy Pfund and Ben Healey, *What Would Jefferson Do? The Historical Role of Federal Subsidies in Shaping America's Energy Future*, DBL INVESTORS (Sept. 2011), http://www.dblpartners.vc/wp-content/uploads/2012/09/What-Would-Jefferson-Do-2.4.pdf; INTO THE WIND: THE AWEA BLOG, NEW ANALYSIS: WIND ENERGY LESS THAN 3 PERCENT OF ALL FEDERAL INCENTIVES (July 19, 2016), https://www.aweablog.org/14419-2/ (citing, among other things, Molly F. Sherlock and Jeffrey M. Stupak, *Energy Tax Incentives: Measuring Value Across Different Types of Energy Resources*, CONG. RESEARCH SERV. (Mar. 19, 2015), https://fas.org/sgp/crs/misc/R41953.pdf; THE JOINT COMMITTEE ON TAXATION, PUBLICATIONS ON TAX EXPENDITURES, https://www.jct.gov/publications.html?func=select&id=5 (last visited June 29, 2018)) (extending the DBL analysis through 2016).

146. Order No. 888, *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, 61 Fed. Reg. 21,540 (May 10, 1996), F.E.R.C. STATS. & REGS. ¶ 31,036 (1996), *order on reh'g*, Order No. 888-A, 62 FR 12274 (Mar. 14, 1997), F.E.R.C. STATS. & REGS. ¶ 31,048 (1997), *order on reh'g*, Order No. 888-B, 81 F.E.R.C. ¶ 61,248 (1997), *order on reh'g*, Order No. 888-C, 82 FERC ¶ 61,046 (1998), *aff'd in relevant part sub nom. Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom. New York*, 535 U.S. 1.

147. *New York*, 535 U.S. at 11-12.

148. *Id.* at 26-27.

out of a concern that it would impermissibly intrude on the states' regulation of retail sales.[149] Thus, even where there is a potentially strong argument that the Commission had the authority to act,[150] the Commission refrained from exercising that authority in a manner that would have arguably been inconsistent with the congressional intent behind section 201(b) of the FPA.

A more recent example of the Commission's accommodation of state policy priorities is the Commission's interpretation of its authority regarding state net metering laws. Net metering is a retail billing mechanism that treats excess output from a solar rooftop system as a credit against a homeowner's consumption of electricity during periods when the solar system is producing less electricity than the household consumes.[151] Under net metering programs, the excess output is generally valued at the retail rate for electricity because every excess unit of production reduces the total consumption during the relevant billing period. The Commission has repeatedly disclaimed jurisdiction to regulate net metering as a wholesale sale of electricity on the theory that there is no sale of electricity subject to Commission jurisdiction because the excess electricity merely reduces the homeowner's total billed consumption from the grid, at least under certain conditions.[152] Although that decision has come under criticism,[153] it represents a pragmatic approach by the Commission to implementing its authority in a manner that respects state authority over retail sales and the congressional design of the FPA.[154] Net metering is a retail billing practice that is distinct from the type of wholesale transaction that Congress intended for exclusive Commission jurisdiction in the FPA.[155] In refraining from any effort to exercise exclusive jurisdiction over net metering programs, the Commission has adopted an approach that respects and accommodates states' role in the FPA's dual federalist regime, even in the face of arguments that the Commission can and should exercise greater authority.

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149. *Id.* at 28.

150. Order No. 888 was eventually appealed to the Supreme Court, where three justices concluded that the Commission had the authority to regulate bundled retail sales while the other six refrained from deciding the question. *Id.* at 25; *id.* at 34-35 (Thomas, J., dissenting in part).

151. Order No. 2003-A, F.E.R.C. STATS. & REGS. ¶ 31,160 at P 744.

152. *Sun Edison LLC*, 129 F.E.R.C. ¶ 61,146 at PP 17-19 (2009); *MidAmerican*, 94 F.E.R.C. ¶ 61,340, at 62,262-63 (2001). If, however, the excess electricity produced during a billing period exceeds the household's total consumption during that same period, the amount of electricity produced over and above the amount consumed is treated as a wholesale sale and subject to Commission jurisdiction. *Sun Edison LLC*, 129 F.E.R.C. ¶ 61,146 at P 18.

153. *See, e.g.*, David Raskin, *Getting Distributed Generation Right: A Response to "Does Disruptive Competition Mean a Death Spiral for Electric Utilities?*", 35 ENERGY L.J. 263, 270 (2014); David Raskin, *The Regulatory Challenge of Distributed Generation*, 3 HARV. BUS. L. REV. ONLINE (2013), http://www.hblr.org/2013/12/the-regulatory-challenge-of-distributed-generation/.

154. *See, e.g.*, Jim Rossi, *Federalism and the Net Metering Alternative*, 29 Electricity J. 13 (2015); Matthew R. Christiansen, *Functionalism and the Electricity Industry of the Future*, 68 STAN. L. REV. ONLINE 100, 107-108 (2016).

155. *See* Rossi, *supra* note 121, at 14 (arguing that, in enacting the Energy Policy Act of 2005, Pub. L. No. 109-58, § 1251, Congress conceived of net metering as a retail billing practice that would be regulated by the states).

The Commission's demand response orders—Order No. 719[156] and Order No. 745[157]—also contain similar examples of deference to state policy priorities. As the previous section explained, both of those orders sought to break down barriers to demand response resources' participation in the wholesale markets. In both orders, however, the Commission recognized that several states had nascent demand response programs at the retail level that could be adversely affected if resources migrated overwhelmingly to the wholesale market.[158] The Commission therefore granted states the ability to "opt out" of wholesale demand response markets by preventing resources within their borders from participating as demand response resources in ISO/RTO markets.[159] Although it is debatable whether that opt-out was ultimately good for demand response, it was an effort by the Commission to respect state authority when regulating this specific issue that lay "at the confluence of State and Federal jurisdiction."[160]

All this does not mean that the Commission must refrain from any action that might affect the authority reserved to the states under the FPA. Taken to its logical extreme, that could abdicate the Commission's responsibility to ensure that rates are just and reasonable and not unduly discriminatory or preferential. But the above examples—among many others—reflect the Commission's recognition that the principles of comity and federalism that form the foundation of the FPA require respect for state actions taken pursuant to their reserved authority. For the states to exercise the authority that Congress intended in the context of modern electricity markets, the Commission must regulate in a manner that accommodates states' regulation of generation facilities, even where the Commission could arguably take on a greater role. Similarly, the Commission must not use its authority to establish market conditions that effectively hamper or preclude states' exercise of their authority. In short, the complexity and cross-jurisdictional effects created by modern electricity markets must not be used to undermine the critical role that Congress preserved for the states when it enacted the FPA.

As noted, state efforts to address climate change and other environmental externalities of electricity generation are especially compelling cases for comity and accommodation by the Commission. Not only does the FPA expressly reserve authority to regulate generation facilities to the states, but regulations addressing environmental externalities are paradigmatic examples of a state's exercise of its general police powers over health and welfare.[161] Given that traditional environmental considerations are not within the zone of interests that the Commission

156. Order No. 719, F.E.R.C. STATS. & REGS. ¶ 31,281.

157. Order No. 745, F.E.R.C. STATS. & REGS. ¶ 31,322.

158. Order No. 719, F.E.R.C. STATS. & REGS. ¶ 31,281 at P 155.

159. *EPSA*, 136 S. Ct. at 772.

160. Order 745, F.E.R.C. STATS. & REGS. ¶ 31,322 at P 114. The Court noted that this opt-out provided the "finishing blow" to EPSA's argument that the Commission exceeded its authority. *EPSA*, 136 S. Ct. at 779.

161. *See, e.g.*, *Huron Portland Cement Co.*, 362 U.S. at 442 ("Legislation designed to free from pollution the very air that people breathe clearly falls within the exercise of even the most traditional concept of what is compendiously known as the police power."); *see also, e.g.*, Portland Pipe Line Corp. v. City of S. Portland, 288 F. Supp. 3d 321, 430 (D. Me. 2017) (rejecting the argument that federal legislation had displaced state and local police powers because "state and local powers are only to be displaced by clear congressional intent, and here there is explicit intent to allow them.").

considers when acting pursuant to its ratemaking authority,[162] the Commission must defer to governmental entities with authority and the desire to address climate pollution, which, under the FPA, is the states.[163] Deference in this instance means both permitting states to take the actions that they are entitled to and *also* not using the Commission's authority to undermine those actions. After all, the question of how to reform electricity production to address environmental externalities is precisely the type of broad, multifaceted social policy question that the Commission is relatively ill-equipped to answer.[164] Insofar as the Commission considers state programs in wholesale markets, it should be only as a way of giving effect to states' exercise of their reserved authority and not in any way as an obstacle to those efforts.[165]

Deference to state public policies does not necessarily mean that the Commission must remain entirely on the sidelines. Wholesale electricity markets may represent a natural locus for shaping the generation mix and individuals and entities have long looked to the wholesale market as the potential venue for a carbon price or other state or federal effort to put a price on GHG emissions.[166] Indeed, the Commission has already accepted certain proposals to incorporate the costs of GHGs into wholesale market rules.[167] The New York ISO is currently considering putting a price on carbon as a means of aligning the wholesale electricity market with New York's decarbonization goals.[168] Given the possibility that a proposal along these lines may come before the Commission in the not-too-distant future, we will not discuss it in detail. Suffice it to say that using the wholesale electricity market as a venue for accommodating state public policies has potential to efficiently achieve significant emissions reductions. Provided that any such approach works in concert with the state public policies—and does not displace them—it certainly merits further examination by all interested stakeholders.

According adequate deference to state public policies under the FPA has potentially significant consequences for climate change. As noted, the states are at

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162. Grand Council of Crees (of Quebec) v. FERC, 198 F.3d 950, 956 (D.C. Cir. 2000).

163. Other federal statutes, namely the Clean Air Act, give other organs of the federal government the authority to regulate aspects of generation facilities, such as carbon pollution. *See* Massachusetts v. EPA, 549 U.S. 497, 528 (2007). But, under the FPA, that responsibility falls to the states as part of their authority over generation facilities.

164. *See, e.g.*, Shelley Welton, *Electricity Markets and the Social Project of Decarbonization*, 118 COLUM. L. REV. 1067, 1097-99 (2018) (discussing the extent to which efforts to decarbonize the electricity grid represent a "social project" as opposed to merely least-cost procurement of electricity with certain characteristics).

165. *Cf.* Ari Peskoe, *Easing Jurisdictional Tensions by Integrating Public Policy in Wholesale Markets*, 38 ENERGY L. J. 1, 38-40 (2017) (discussing Commission precedent permitting RTOs and ISOs to design capacity market rules to accommodate or reflect state policies).

166. *See, e.g.*, Craig Glazer et al., *The Future of Centrally-Organized Wholesale Electricity Markets*, FUTURE ELEC. UTIL. REGULATION 46 (2017), *https://emp.lbl.gov/sites/all/files/lbnl-1007226.pdf* (arguing that "FERC could approve a direct carbon adder to energy market dispatch if states or the federal government chose that policy approach."); Pre-Technical Conference Comments of Exelon Corporation, FERC Docket No. AD17-11-000, at 1 (2017); *see also* Jim Rossi, *Carbon Taxation by Regulation*, 102 MINN. L. REV 277, 277-78 (2017) (collecting arguments in favor of carbon taxes).

167. *See, e.g.*, CAISO, 141 F.E.R.C. ¶ 61,237 at P 29 (2014) (accepting CAISO's proposal to incorporate the price of GHG emissions allowance in its bid and dispatch model).

168. *See* NYISO, IPPTF CARBON PRICING PROPOSAL 3-5 (2018), https://www.nyiso.com/documents/20142/2244202/IPPTF-Carbon-Pricing-Proposal.pdf/60889852-2eaf-6157-796f-0b73333847e8.

the forefront of the nation's response to climate change. Permitting them to exercise their lawful authority without Commission obstacles or interference will facilitate meaningful reductions in GHG emissions and potentially lay a foundation for other states to expand on those effects.

III. DEVELOPING THE TRANSMISSION INFRASTRUCTURE NEEDED TO INTEGRATE THE RESOURCE MIX OF THE FUTURE

The previous sections have focused largely on the Commission's authority to regulate wholesale sales of electricity as well as practices affecting those sales. An equally important aspect of the Commission's responsibility under the FPA is the transmission of electricity. As with wholesale sales of electricity, sections 205 and 206 of the FPA require the Commission to ensure that rates for the transmission of electricity as well as practices affecting those rates be just and reasonable and not unduly discriminatory or preferential.[169] In addition, section 219 of the FPA, which Congress enacted in 2005, requires the Commission to incentivize investment in facilities that "promote reliable and economically efficient transmission and generation of electricity."[170] Along with this general mandate, section 219 also requires the Commission to adopt specific incentives, such as for utilities that join RTOs and ISOs and for technologies that improve the capacity and efficiency of existing transmission facilities.[171]

The Commission has interpreted section 219 to indicate congressional support for the development and expansion of the transmission grid.[172] Expanding the grid and enhancing its operational efficiency will also have important consequences for climate change. Unlike conventional generators, renewable resources are often most cost-effective when located in particular geographic areas.[173] These areas are frequently located long distances from load centers, meaning that large, high-voltage transmission facilitates are often required to efficiently move the electricity from the point of generation to the point of consumption.[174] In addition, areas with high potential for renewable resources are often developed incrementally,[175] meaning that any transmission capacity that is developed to access re-

169. 16 U.S.C. §§ 824d & e.

170. *Id.* § 824s(b).

171. *Id.* § 824s(c).

172. *See, e.g.*, Order No. 679, *Promoting Transmission Investment through Pricing Reform*, F.E.R.C. STATS. & REGS. ¶ 31,222 at P 42 (2006) ("[W]e interpret section 219 to promote capital investment in a wide range of infrastructure investments that can have either reliability or congestion benefits rather than investments that have both reliability and congestion benefits.").

173. *See supra* note 49.

174. *See e.g.*, Anthony Lopez et al., *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis*, NAT'L RENEWABLE ENERGY LAB. Figs. 2 & 3 (2012) (comparing "rural" utility-scale solar potential versus "urban" utility-scale solar potential); *see* Johannes Pfeifenberger et al., *Investment Trends and Fundamentals in US Transmission and Electricity Infrastructure*, THE BRATTLE GROUP 8 (July 17, 2015), https://brattle-files.blob.core.windows.net/files/5916_investment_trends_and_fundamentals_in_us_transmission_and_electricity_infrastructure.pdf (estimating that $25-40 billion worth of transmission investments will be required by 2025 to accommodate increasing renewable portfolio standards).

175. *See, e.g.*, *California Independent System Operator Corporation*, 119 F.E.R.C. ¶ 61,061 at PP 64-66 (2007).

motely located renewable resources may not for long satisfy the demand for transmission in the region. The Commission has recognized that challenges associated with the remote locations in which renewable resources can operate most efficiently represent a barrier that may require accommodation, especially insofar as these resources are needed to satisfy public policies.[176]

As demand for clean energy continues to increase, so too will the need for the capacity to transmit that energy reliably and in an economically efficient manner[177] from remote locations to large population centers. This dynamic is becoming increasingly clear in certain regions of the country, where the vast majority of the interconnection queue consists of wind and solar generation facilities.[178] Transmission infrastructure will be critical to unbottling these low-cost resources and ensuring that they have adequate access to markets. The balance of this section discusses some of the Commission's major efforts to support the development of new transmission facilities and how these efforts remain a Commission priority.

The transmission incentives required by section 219 can play an important role in developing the transmission infrastructure needed to support the changing generation mix.[179] In Order No. 679, which implemented the requirements of section 219, the Commission recognized that the substantial challenges associated with building the transmission infrastructure needed to access remotely located renewable resources—e.g., requiring the participation of multiple utilities, crossing multiple state boundaries—could be sufficient to merit an additional return on investment for the utilities developing these transmission facilities.[180] Although the Commission's standards for assessing whether section 219 incentives are appropriate have evolved in the years since Order No. 679,[181] the basic premise—that the Commission must ensure that returns on equity are sufficient to attract new investment in needed transmission facilities—is a principle that will likely prove critical to developing the transmission grid of the future. The Commission's success in using these incentive frameworks to develop long-distance, high-voltage transmission facilities is debatable. Partly for that reason, the Commission is currently engaged in a proceeding to reexamine its incentive program.[182] At the time of writing this article, that proceeding is in its early stages, but it nevertheless has the potential to enhance and revitalize the Commission's approach for supporting the development of transmission facilities needed to accommodate the generation mix of the future.

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176. *Id*. at PP 66-68.

177. The reliability and economic efficiency of transmission and generation facilities were the two overarching goals that Congress identified for FPA section 219. *See* 16 U.S.C. § 824s(a).

178. Laura Rauch, *Grid Modernization: Evaluating system needs in light of an evolving resource mix*, MISO slide 6 (Mar. 1, 2018), https://wpui.wiscweb.wisc.edu/wp-content/uploads/sites/746/2018/12/Rauch-for-2018-grid-mod.pdf.

179. *See* Order No. 679, F.E.R.C. STATS. & REGS. ¶ 31,222 at P 36.

180. *Id.* at PP 25-26, *order on reh'g*, Order No. 679-A, F.E.R.C. STATS. & REGS. ¶ 31,236 (2006), *order on reh'g*, 119 F.E.R.C. ¶ 61,062 (2007).

181. *See, e.g.*, *Promoting Transmission Investment Through Pricing Reform*, 141 F.E.R.C. ¶ 61,129 (2012) (policy statement providing guidance on the Commission's implementation of the section 219).

182. Inquiry Regarding the Commission's Electric Transmission Incentives Policy, 166 FERC ¶ 61,208 (2019).

The Commission's responsibility to encourage investment in transmission is not, however, limited to long-distance, high-voltage facilities. Section 219 also requires the Commission to use incentives to promote technologies that increase the capacity and efficiency of existing transmission facilities.[183] Although a transmission line may be the paradigmatic transmission asset, there is a host of technologies that can expand the capacity and improve the operations of transmission lines, without implicating the siting and other challenges that typically accompany the construction of new transmission facilities.[184] Technologies and other measures such as advanced power flow controls, which can divert electricity away from overloaded power lines and onto ones with more available capacity, and dynamic line ratings, which can adjust the listed capacity for a line to reflect current conditions rather than static assumptions, have the potential to significantly reduce transmission congestion and increase the grid's potential to use existing generation resources more efficiently and integrate additional generation resources.[185] These technologies will not serve as substitutes for long-distance infrastructure, but they hold tremendous potential as a cost-effective means of relieving local bottlenecks and creating transmission capacity in areas where the existing grid is already congested.[186]

Similarly, some advanced technologies may be able to provide the same effect as a new transmission asset. The Commission has found that ability may be a basis for treating that technology as transmission. For example, in *Western Grid*, the Commission granted a petition to treat a series of batteries as transmission assets—making them potentially eligible for cost-based rates—after finding that they would have the effect of transmission assets and would be operated consistent with that treatment (e.g., turning over only certain aspects of operational control to the relevant ISO).[187] Several years later, the Commission issued a policy statement on treating storage as transmission that enumerated the issues and questions it would consider in evaluating whether storage should qualify for treatment as a transmission asset.[188]

What role storage will ultimately play in the transmission mix is, for the time being, very much an open question.[189] What is important for the purposes of this

183. 16 U.S.C. § 824s(b)(3).

184. *See*, e.g., Rob Gramlich, *Bringing the Grid to Life: White Paper on the Benefits to Customers of Transmission Management Technologies*, WATT (2018), https://watttransmission.files.wordpress.com/2018/03/watt-living-grid-white-paper.pdf (discussing dynamic line ratings, advanced powerful controls, and software of optimizing the topology of the grid).

185. *Id.*

186. *See, e.g.*, Verga, N. Pinney, & J. Marmillo, *Incorporating Dynamic Line Ratings to Alleviate Transmission Congestion, Increase Wind Resource Utilization, and Improve Power Market Efficiency*, CIGRE (2016), https://watttransmission.files.wordpress.com/2017/11/cigre-gotf-2016-genscape-finalsubmission1.pdf (discussing a study by MISO's external market monitor estimate that using ambient temperature-based line rates could result in $125-167 million dollars a year in benefits).

187. *Western Grid Development, LLC*, 130 F.E.R.C. ¶ 61,056 at PP 43-45 (2010).

188. *Utilization of Electric Storage Resources for Multiple Services When Receiving Cost-Based Rate Recovery*, 158 F.E.R.C. ¶ 61,051 (2017).

189. *Id.*; *Western Grid* is, so far, the only storage facility that the Commission has determined to be eligible for treatment a transmission.

article, is that the Commission has demonstrated a willingness to examine unconventional options for satisfying the transmission needs of the bulk power system. Given the siting and other challenges that traditional transmission facilities frequently face, it is important that the Commission continue to consider how non-traditional solutions to provide transmission service—including non-transmission alternatives[190]—may help to satisfy the demand for electric transmission and, as a consequence, the ability to integrate new, cleaner generation technologies.

Finally, Order No. 1000 was arguably the Commission's most consequential attempt to address the country's need for a robust transmission system. Order No. 1000 addressed a myriad of different issues related to transmission. The most important of those reforms was the requirement that all transmission-owning utilities join a transmission planning region that proactively identifies the need for transmission on a region-wide basis.[191] Particularly important for the purposes of this article, the Commission also required these transmission planning regions to identify and plan for transmission needs driven by the public policy requirements, including the priorities of the states in which the individual utilities are located.[192] In so doing, the Commission recognized that state public policies play an important role in shaping the nation's transmission needs and that satisfying the demand created by these policies will likely require new transmission facilities. Although the success of the public policy planning requirement is debatable, the requirement to plan for public policies is an important recognition of the fact that the transmission needs of the country will evolve with changes to the generation mix and that, to remain just and reasonable and not unduly discriminatory or preferential, the process for planning and developing these facilities must account for those policies.

Order No. 1000 also took a series of initial steps to support the development of interregional transmission facilities—those that are physically located in two or more transmission planning regions.[193] The Commission required neighboring transmission planning regions within either the Eastern or Western Interconnection to "coordinate" in order to evaluate whether an interregional facility could more efficiently or cost-effectively address the transmission needs identified in the regions' regional transmission plans.[194] Interregional transmission facilities are likely to be especially important for the integration of variable energy resources because they can transmit electricity between different markets and also facilitate the diversification of a region's resource mix, helping to address some of the challenges of variability. Unfortunately, Order No. 1000's interregional coordination processes have yet to produce an interregional transmission facility. Nevertheless, the potential benefits of interregional transmission facilities should compel the

190. Order No. 1000 required transmission planning regions to give non-transmission solutions "comparable consideration" to traditional transmission solutions in the regional transmission planning process. Order No. 1000, F.E.R.C. STATS. & REGS. ¶ 31,323 at PP 118, 154-155; *see generally* Shelley Welton, *Non-Transmission Alternatives*, 39 HARV. ENVTL. L. REV. 457 (2015) (discussing Order No. 1000 and the potential for non-transmission alternatives in the regional transmission planning process).

191. Order No. 1000 at PP 70-71, 78-84.

192. *Id.* at PP 203, 205.

193. *Id.* at P 63.

194. *Id.* at PP 393-96.

Commission to continue exploring reforms that would facilitate the development of these facilities.

IV. FOSTERING COMPETITION UNDER THE PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978

Although the majority of the Commission's electricity-sector jurisdiction is laid out in the FPA, a small, but important set of responsibilities are contained in the Public Utility Regulatory Policies Act of 1978 (PURPA).[195] Especially important for the purposes of this article, PURPA provides one of the few instances in which Congress directed the Commission to provide a preference in support of particular types or methods of generation. Congress enacted PURPA in response to the oil embargoes of the 1970s and against a backdrop of major cost overruns at large coal and nuclear plants. The goal of Title II of PURPA was to promote the use of cogeneration and small power production facilities—a category that includes renewable resources, such as wind and solar—in order to "reduce the demand for traditional fossil fuels" in the electricity sector.[196] Section 210 requires incumbent utilities to purchase the output of qualifying cogeneration and small power providers (known collectively as "qualifying facilities" or "QFs") at a just and reasonable and not discriminatory rate not to exceed the incumbent utility's cost.[197] In so doing, PURPA created a nascent competitive market in which QFs could "compete" on price with incumbent utilities, with a guarantee that they could sell electricity to those utilities and make a profit whenever they can generate electricity at a lower cost.

Over its 40-year history, PURPA has been a major catalyst in the development of cleaner forms of generation. Indeed, much of the early growth of renewable resources took place pursuant to PURPA. In the last decade, PURPA's role has evolved after the Commission, in response to the Energy Policy Act of 2005,[198] adopted a presumption that QFs with a net capacity above 20 MW and that are located in certain RTO regions are no longer entitled to a mandatory purchase obligation from incumbent utilities, since those QFs have access to a sufficiently robust market for their output.[199]

PURPA remains an especially vital tool for ensuring that relatively clean resources have adequate market access outside of the RTOs and ISOs. Although EPAct 2005 circumscribed the mandatory purchase obligation in well-developed markets, such as RTOs and ISOs, it left in place the structure of the 1978 Act outside of those regions.[200] As a result, PURPA remains an important driver of

195. PURPA, Pub.L. 95–617, 92 Stat. 3117 (1978).

196. Am. Paper Inst. v. Am. Elec. Power Serv. Corp., 461 U.S. 402, 404 (1983).

197. 16 U.S.C. § 824a-3(b); *Final Rule Regarding the Implementation of Section 210 of the Public Utility Regulatory Policies Act of 1978*, Order No. 69, F.E.R.C. STATS. & REGS. ¶ 30,128 *order on reh'g*, Order No. 69-A, F.E.R.C. STATS. & REGS. ¶ 30,160 (1980).

198. Pub. L. No. 109-58, 119 Stat. 594 (2005).

199. Order No. 688, *New PURPA Section 210(m) Regulations Applicable to Small Power Production and Cogeneration Facilities*, F.E.R.C. STATS. & REGS. ¶ 31,233 at P 90 (2006).

200. U.S. Energy Info. Admin., PURPA-Qualifying Capacity Increases, But It's Still A Small Portion Of Added Renewables (Aug. 16, 2018), https://www.eia.gov/todayinenergy/detail.php?id=36912.

renewable capacity installations, particularly outside of RTO/ISO markets.[201] Indeed, there has been a significant increase in PURPA facilities in certain areas outside of RTOs and ISOs as the costs of renewable resources, especially photovoltaic solar, have declined.[202] Although PURPA's success has helped to change the landscape for renewable resources, Congress's mandate to encourage the development of these resources, among others, remains on the books and as important as ever, especially in light of climate change.

At the same time, the fact that Congress left in place PURPA's basic structure does not mean that the Commission cannot account for new technologies and economic trends in its implementation of the statute. To the contrary, it is the Commission's responsibility to ensure its regulations and orders implementing PURPA account for new technological developments in the roughly 40 years since the law was first enacted. Reducing our reliance on fossil fuels and encouraging competition is as important today as it was in 1978 when Congress made that goal a Commission priority when administering PURPA and the Commission must continue to adhere to the basic congressional intent underlying the statute.[203]

V. CONSIDERING CLIMATE CHANGE IN INFRASTRUCTURE PERMITTING

A separate aspect of the Commission's jurisdiction involves permitting responsibilities for energy infrastructure, including interstate natural gas pipelines and hydroelectric facilities. The Commission's authority over the siting of natural gas pipelines in particular has become an increasingly high-profile issue in relation to climate change and has been the subject of significant litigation in recent years.[204] Hydroelectric facilities have received less attention in comparison. Nevertheless, the Commission's permitting responsibilities with respect to both types

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201. *Id.* ("The Energy Policy Act of 2005 removed the requirement for utilities to purchase electricity from qualified facilities with nondiscriminatory access to competitive electricity markets. This change lessened the effect of PURPA in states participating in regional transmission organizations (RTOs) but kept the program relevant in regulated markets such as the Southeast and Northwest that do not have RTOs."); *id.* (listing the states with the largest PURPA-qualifying capacity additions).

202. U.S. ENERGY INFO. ADMIN, NORTH CAROLINA HAS MORE PURPA-QUALIFYING SOLAR FACILITIES THAN ANY OTHER STATE (Aug. 23, 2016), https://www.eia.gov/todayinenergy/detail.php?id=27632; PURPA-Qualifying Capacity Increases, *supra* note 200.

203. The Commission is currently conducting a generic proceeding to investigate potential reforms to its implementation of PURPA and that will provide a venue for reexamining these issues. *See* FERC Docket No. AD16-16-000 (July 12, 2018).

204. At the time of writing, there are at least eight active proceedings in the federal courts addressing pipeline certificate orders. Under section 3 of the FPA, the Commission also licenses the facilities used to import or export liquified natural gas (LNG). *See* 15 U.S.C. § 717b (2018). As with interstate natural gas pipelines, the Commission must determine whether the proposed export facilities are consistent with the public interest, although the burden of proof is flipped in the case of LNG facilities—meaning that they are presumed to be consistent with the public interest unless the record shows otherwise. *See* Earth Reports v. FERC, 828 F.3d 949, 953 (D.C. Cir. 2016) (citing W. Va. Pub. Servs. Comm'n v. Dep't of Energy, 681 F.2d 847, 856 (D.C. Cir. 1982) ("NGA section 3, unlike section 7, sets out a general presumption favoring such authorization.")). In addition, section 3, unlike section 7, carves out a central role for the Department of Energy, limiting the scope of the Commission's review. *See Earth Reports*, 828 F.3d at 953-54. Nevertheless, because many of the considerations relevant to LNG facilities overlap with those for interstate natural gas pipelines, and have been more fully examined in the pipeline context, we will limit this article's discussion of these issues to the pipeline cases.

of facilities have consequences for climate change—consequences that the Commission cannot ignore. This section discusses the major climate change-related issues involving the Commission for both types of projects and what steps the Commission must take to ensure that it is acting consistent with the public interest.

A. Climate Change in the Interstate Natural Gas Pipeline Certificate Process

Under section 7 of the NGA, a new interstate pipeline may be constructed and operated only if it receives a certificate of public convenience and necessity from the Commission.[205] The Commission issues certificates of public convenience and necessity upon a finding that the proposed pipeline is needed and consistent with the public interest.[206] Although the Commission must "consider all factors bearing on the "public interest,"[207] the ultimate standard for a section 7 inquiry is whether the proposed pipeline is required by the "public convenience and necessity," a standard that may differ in important respects from the "public interest" standard that the Commission applies in certain contexts under the FPA and NGA.[208]

Unlike the Commission's FPA responsibilities discussed above, environmental interests factor directly into the Commission's decision-making under section 7 of the NGA. Indeed, the Commission has the authority to deny a section 7 certificate application on the basis of its "harm[] to the environment."[209] As a result, because the environmental impacts of a potential pipeline must factor into the Commission's section 7 determination, the Commission must analyze those effects under both the NGA and the National Environmental Policy Act (NEPA).[210]

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205. 15 U.S.C. § 717f(c).

206. *Id.*; *see, e.g.*, *Sabal Trail*, 867 F.3d at 1364 ("Before any such pipeline can be built, FERC must grant the developer a 'certificate of public convenience and necessity,' also called a Section 7 certificate, upon a finding that the project will serve the public interest." (internal citations omitted)).

207. Atl. Ref. Co. v. Pub. Serv. Comm'n, 360 U.S. 378, 391 (1959).

208. *See* NRG Power Mktg. v. Maine Pub. Utils. Comm'n, 558 U.S. 165, 174 (2010) (discussing the "public interest" standard applicable in certain circumstances under sections 205 and 206 of the FPA and sections 4 and 5 of the NGA); *see also* William K. Jones, *Origins of the Certificate of Public Convenience and Necessity: Developments in the States 1870–1920*, 79 COLUMBIA L. REV. 426 (1979) (discussing the history of the public convenience and necessity standard in the states in the years before the NGA was enacted).

209. *Sabal Trail*, 867 F.3d at 1373. That conclusion was essential to the court's holding as it was how the court distinguished the Supreme Court's decision in *Public Citizen* and a series of D.C. Circuit decisions applying that decision. *Public Citizen* held that NEPA does not require an agency of the federal government to consider information on which it has no discretion to act. Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 769-70 (2004); *Id.* at 769 ("[I]t would not . . . satisfy NEPA's 'rule of reason' to require an agency to prepare a full EIS due to the environmental impact of an action it could not refuse to perform."); *see also Freeport*, 827 F.3d at 47 (explaining that the Commission is not required to consider the downstream environmental consequences of LNG exports because if its limited role in the licensing process, which does not include a determination of the public convenience and necessity (citing *Pub. Citizen*, 541 U.S. at 771)). *Sabal Trail* held that the Commission is required to consider the downstream emissions resulting from the pipeline's construction *because* environmental factors, including those emissions, could be a basis for rejecting the section 7 certificate. *See Sabal Trail*, 867 F.3d at 1373 ("Because FERC could deny a pipeline certificate on the ground that the pipeline would be too harmful to the environment, the agency is a 'legally relevant cause' of the direct and indirect environmental effects of pipelines it approves" (quoting *Freeport*, 827 F.3d at 47)).

210. *Atl. Ref. Co.*, 360 U.S. at 391 (holding that NGA section 7 requires the Commission to consider "all factors bearing on the public interest"); *Sabal Trail*, 867 F.3d at 1373-74 ("Because FERC could deny a pipeline certificate on the ground that the pipeline would be too harmful to the environment, the agency is a 'legally

That evaluation must include not just the direct effects of a proposed pipeline, such as emissions of GHGs and other pollutants associated with its construction and operation, but also the indirect effects that are reasonably foreseeable consequences of granting a section 7 certificate.[211] In the *Sabal Trail* case, the D.C. Circuit held that, at least in certain circumstances, the emissions resulting from the downstream combustion of gas transported through an interstate pipeline are a reasonably foreseeable result of building that pipeline, which requires that the Commission must analyze and consider those emissions as part of its public interest determination.[212] The Court reached that conclusion when dealing with a pipeline built for the exclusive purpose of serving a series of natural gas-fired power plants.[213] Nevertheless, because 97% of natural gas is combusted,[214] the emissions resulting from the combustion of natural gas will generally be a reasonably foreseeable result of a section 7 certificate, even if the specific end-use consumer of the gas is not identified in the section 7 proceeding.[215]

Although an indirect effect of a new natural gas pipeline is the almost-total combustion of the gas transported in the pipeline, the incremental shipping capacity may have secondary effects on emissions. For example, natural gas pipelines may, in some instances, help to reduce emissions by displacing oil- or coal-fired facilities that produce more GHG emissions per unit of electricity generated than a new natural gas-fired plant.[216] The possible size and scope of any such "netting" effect, in which new natural gas causes a net reduction in GHGs, is something that the Commission ought to consider when evaluating the climate change impacts of a new natural gas pipeline.[217] At the same time, the Commission must also consider the secondary effects that push in the opposite direction. For example, an increase in interstate pipeline capacity may also, by decreasing the price of delivered gas, increase the demand for that gas and, in turn increase its production—which can lead to a significant increase in upstream emissions, through flaring of natural gas, fugitive methane emissions, etc. In short, new natural gas pipeline

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relevant cause' of the direct and indirect environmental effects of pipelines it approves."); *accord Pub. Citizen*, 541 U.S. at 773.

211. *Pub. Citizen*, 541 U.S. at 764; *Sabal Trail*, 867 F.3d at 1371.

212. *Sabal Trail*, 867 F.3d at 1373-74.

213. *Id.* at 1371-72.

214. Jayni Hein et al., *Pipeline Approvals and Greenhouse Gas Emissions*, INSTITUTE FOR POLICY INTEGRITY 25 (Apr. 2019) (explaining that, in 2017, 97.2% of all natural gas was combusted and urging the Commission to utilize this figure in its decision-making); U.S. ENERGY. INFO. ADMIN, ABOUT 7% OF FOSSIL FUELS ARE CONSUMED FOR NON-COMBUSTION USE IN THE UNITED STATES (Apr. 6, 2018), https://www.eia.gov/todayinenergy/detail.php?id=35672 (explaining that petroleum accounts for the vast majority of non-combusted fossil fuels and that only "[r]elatively small amounts of natural gas are consumed for non-combustion use.").

215. At the time of writing, the federal courts have yet to authoritatively address this issue. Nevertheless, one court has noted, albeit in a non-precedential order, that evaluating the "full burn" permitted by a pipeline (i.e., assuming the pipeline's maximum annual capacity is combusted) can account for the reasonably foreseeable emissions of the pipeline by considering the upper bound on potential emissions. *See* Judgment, *Appalachian Voices v. FERC*, No. 17-1271, at 3 (D.C. Cir. 2019).

216. *Sabal Trail*, 867 F.3d at 1374-75 (discussing the netting effect, but noting that the possibility of netting, without some quantification, does not excuse the Commission's obligation to measure the GHG emissions that are a reasonably foreseeable consequences of a new pipeline).

217. *Id.*

capacity can have a number of effects on GHG emissions, either mitigating or contributing to the ultimate harm from climate change—all of which must factor into the Commission's evaluation of whether a section 7 certificate is consistent with the public interest.

Sabal Trail explained that NGA section 7 makes the environmental consequences of a proposed pipeline—including GHG emissions—one of the factors that the Commission must consider when evaluating whether that pipeline is in the public interest.[218] Although the courts have yet to rule definitively on how the Commission must consider GHGs and the associated climate consequences in its public interest determination, any consideration of GHG emissions that does not make some effort to meaningfully consider the environmental and social harm caused by those emissions' contribution to climate change would be little more than going through the motions. Unlike "conventional" pollutants, such as SOx, NOx, Ozone, and various forms of particulate matter, there is no comprehensive federal regulation of GHG emissions—although, as noted, a diverse range of states are taking steps to limit GHG emissions from the electricity sector.[219] Given that the harm caused by climate change cannot currently be expressed in terms of the likelihood of violating a governmental mandate, it is all the more important that the Commission make some other effort to meaningfully consider the impact caused by GHG emissions that result from a new interstate natural gas pipeline. What the Commission absolutely cannot do is fail to seriously wrestle with a project's actual impact on climate change just because, in a Commissioner's opinion, climate change is a more nebulous or difficult challenge than that posed by conventional pollutants. Although a majority of Commissioners has, to date, rejected the use of the Social Cost of Carbon[220] as a means for calculating and disclosing this harm, the Social Cost of Carbon remains a direct and accessible means of identifying and quantifying the harm caused by GHG emissions.

The Commission has recently issued a number of certificate orders in which a majority of Commissioners voted not to engage in a thorough review of the climate change impacts of a proposed pipeline. Although the arguments justifying these decisions have varied, they fall principally into one of two categories: either (1) the Commission lacks the tools or expertise to meaningfully consider a proposed pipeline's impact on climate change or (2) climate change represents such a sweeping, intractable problem that it cannot or should not be addressed in a section 7 proceeding.[221] Both lines of reasoning are flawed.

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218. *Id.* at 1373.

219. *See supra* note 114 and accompanying text. This statement is not meant to suggest that some form of comprehensive government scheme is necessary to evaluate the significance of the environmental consequences of a proposed pipeline or factor those considerations into the Commission's section 7 determination. Indeed, the Commission itself considered the environmental consequences of proposed pipelines well *before* Congress enacted the Clean Air Act Amendments of 1977, which established the regulatory regimes that address the pollutants listed in the text. *See e.g.*, *Re Transwestern Pipeline Co.*, 36 FPC 176, 185-86 (1966); Comments of the Harvard Electricity Law Initiative at 10-12, PL18-1-000 (2018).

220. *See* U.S. ENVT'L. PROT. AGENCY, THE SOCIAL COST OF CARBON: ESTIMATING THE BENEFITS OF REDUCING GREENHOUSE GAS EMISSIONS (Jan. 19, 2017), https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html (discussing the Social Cost of Carbon).

221. *See, e.g.*, *Florida Southeast Connection, LLC*, 164 F.E.R.C. ¶ 61,099 at PP 11-37 (2018).

Regarding the first argument, we recognize that the size and scope of a problem like climate change may make evaluating the significance of the harm caused by a single pipeline more difficult than for conventional pollutants. But neither the NGA nor NEPA permit the Commission to abdicate its statutory responsibilities simply because they are difficult. Instead, the Commission must meaningfully engage the issue and develop a framework for fully considering climate change in the section 7 process. Tools such as the Social Cost of Carbon can provide the foundation for contextualizing the harm caused by a project's contribution to climate change, although, at some point, evaluating the public interest will almost certainly require some exercise of judgment by the individual commissioners. Indeed, it may even be the case that a pipeline has a net positive environmental effect if, for example, it facilitates the displacement of a significant number of higher-emitting coal-fired power plants. But we will not know the answer to that question with any confidence unless the Commission begins to seriously examine the climate change impacts of a proposed pipelines. At the time of writing, the Commission has before it a proceeding to examine its pipeline certificate policy holistically.[222] That proceeding should provide the ideal place for an inquiry along these lines to begin.

Similarly, neither the seeming intractability of the threat posed by climate change nor the fact that Congress did not designate the Commission as the progenitor of "federal climate policy"[223] excuses the Commission from seriously considering climate change under either the NGA or NEPA. Agencies throughout the federal government regularly consider climate change in their decision-making process, especially under NEPA, even though those agencies cannot establish a federal climate policy, including other agencies administrating statutes pertaining to fossil-fuel related infrastructure.[224] Although it is true section 7 contemplates the construction of natural gas pipelines, as noted, it permits the Commission to issue section 7 certificates only to those pipelines that have been shown to be required by the public convenience and necessity and consistent with the public interest.[225] The extent of the threat posed by climate change is no reason to act as if that threat does not exist or pretend that it is not relevant to the public interest. Instead, that threat is a compelling reason for the Commission to take seriously its obligation to protect the public interest and conduct a meaningful case-by-case evaluation that considers a pipeline's potential contribution to climate change and balances it along with the project's other costs and benefits.

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222. *Notice of Inquiry*, 163 F.E.R.C. ¶ 61,042 (Considering how to identify, evaluate, and consider a proposed pipeline's contribution to climate change is one of the central questions in that proceeding).

223. 164 F.E.R.C. ¶ 61,099 at P 57.

224. For example, in October 2017, the Trump Administration's Bureau of Land Management and the Surface Mining Reclamation and Enforcement issued an environmental assessment that considered a broad range of GHG impacts associated with a new coal mine, including the carbon dioxide emissions from building and operating the mine (including the coal miners' commutes to the mine), the carbon dioxide emissions from transporting the coal, the carbon dioxide emissions from burning the coal, and the methane released during the mining process. *See* Environmental Assessment, DOI-BLM-CO-S010-2011-0074-EA, Federal Coal Lease (COC62920) Modification and Federal Mine Permit (CO-0106A) Revision and Renewal 76-82 (Oct. 12, 2017), https://bit.ly/2ufWNSL.2ufWNSL.

225. 15 U.S.C. § 717(f).

B. Climate Change in the Hydroelectric Licensing Process

Hydropower remains one of the largest sources of renewable electricity in the United States.[226] The Commission has licensed roughly half of the hydroelectric facilities in the United States, with other federal agencies, such as the Army Corps of Engineers, sharing responsibility for the remaining ones.[227] Pursuant to FPA section 4(e), the Commission is responsible for licensing and overseeing non-federally owned hydroelectric facilities in the navigable waters of the United States or on federally owned lands.[228] Before issuing a license, the Commission must "determine that the project is 'best adapted to a comprehensive plan for improving or developing a waterway,'"[229] which the courts have explained involves a "multifaceted obligation" to determine whether a hydroelectric project is in the public interest.[230] This multifaceted obligation includes consideration of "power development, energy conservation, fish and wildlife, recreation, other aspects of environmental quality, and other beneficial uses (irrigation, flood control, water supply)."[231]

Hydroelectric facilities can play a potentially significant role in addressing climate change. Not only do they produce zero-emissions electricity, they are generally fully dispatchable meaning that they can help integrate variable energy resources, such as wind and solar.[232] Pumped storage can play a particularly important role because it is capable of consuming electricity during periods of peak production and then returning that electricity to the grid when production declines or consumption increases.[233] The potential to both generate zero-emissions electricity and to integrate other sources of zero-emissions electricity is an important aspect of any public interest determination and should bear on whether a new or renewed license is appropriate. While those benefits do not necessarily offset the environmental harms that certain hydroelectric facilities can produce, such as harm to endangered species, they must nevertheless play an important part of the Commission's decision-making process, and should factor into the Commission's decision whether a facility is in the public interest.

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226. U.S. ENERGY INFO. ADMIN., ELECTRIC POWER MONTHLY (November 2018), https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_1_01_a.

227. FERC OFFICE OF ENERGY PROJECTS, HYDROPOWER PRIMER (2017), https://www.ferc.gov/legal/staff-reports/2017/hydropower-primer.pdf.

228. 16 U.S.C. § 797(e).

229. LaFlamme v. FERC, 945 F.2d 1124, 1128 (9th Cir. 1991) (quoting 16 U.S.C. § 803 (1988) (section 10 of the FPA)).

230. Friends of the River v. FERC, 720 F.2d 93, 98 (D.C. Cir. 1983) (citing Udall v. FPC, 387 U.S. 428 (1967)); *id.* ("The public interest determination under section 10(a) of the Federal Power Act . . . should be overarching.").

231. HYDROPOWER PRIMER, *supra* note 227.

232. DEPT. OF ENERGY, HYDROPOWER VISION: A NEW CHAPTER FOR AMERICA'S 1ST RENEWABLE ELECTRICITY SOURCE 48 (2016), https://www.energy.gov/sites/prod/files/2018/02/f49/Hydropower-Vision-021518.pdf [hereinafter HYDROPOWER VISION].

233. A. Botterud, T. Levin & V. Koritarov, *Pumped Storage Hydropower: Benefits for Grid Reliability and Integration of Variable Renewable Energy*, ARGONNE NAT'L LAB. 33-43 (2014), https://anl.app.box.com/s/tphlklclz9xu5lv79n2gzv2cfauuvmwv (discussing the potential of pumped storage to provide ancillary services and integrate renewable resources); Timothy J. Welch, *Pumped-Storage Hydropower Shows Promise for Boosting Energy Storage*, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY (Aug. 23, 2016), https://www.energy.gov/eere/articles/pumped-storage-hydropower-shows-promise-boosting-energy-storage.

It is also important for the Commission to examine ways in which hydroelectric development can contribute to a decarbonized electricity grid while minimizing other environmental harms. This includes exploring the potential for upgrading existing hydroelectric facilities,[234] developing hydroelectric facilities at existing, but non-powered dams,[235] as well as technologies that have minimal adverse environmental impacts.[236] Further promoting these, and similar facilities, has the potential to increase the total quantity of renewable capacity from hydro facilities that can be deemed to be in the public interest overall.

A complicating factor in assessing potential hydroelectric facilities of all types is that climate change may affect both the potential of hydroelectric facilities as well as their operations, such as through increased variability in water because of droughts or extreme weather.[237] These effects are likely to vary throughout the country, sometimes to the benefit and sometimes to the detriment of different facilities.[238] As climate change progresses and becomes more severe these considerations may eventually come to play a significant role in determining whether and how hydroelectric facilities are in the public interest.

VI. CONCLUSION

The Commission's ultimate responsibility is to protect the "public interest."[239] There is perhaps no greater concern to the public interest than the existential threat posed by anthropogenic climate change.[240] The Commission has the

234. *See* HYDROPOWER VISION, *supra* note 232, at 57 (explaining that "[i]mprovements to existing hydropower facilities can make them more efficient and flexible, reduce adverse impacts to fish, and aerate to improve water quality.").

235. *Id*. (explaining that "[e]xisting [non-powered dams] can be retrofitted for hydropower generation without the costs and impacts of additional dam construction and operation, and with reduced environmental impact.").

236. *See* Steven Weissman & Romany Webb, *Addressing Climate Change Without Legislation - Volume 2: FERC* 33-37, BERKELEYLAW (July 2014), https://www.law.berkeley.edu/research/clee/research/climate/addressing-climate-change-without-legislation/ (discussing the potential for the Commission to promote relatively novel forms of hydrokinetic technology).

237. *See generally* DEPT. OF ENERGY, EFFECTS OF CLIMATE CHANGE ON FEDERAL HYDROPOWER 11-12 (Jan. 2017), https://www.energy.gov/sites/prod/files/2017/01/f34/Effects-Climate-Change-Federal-Hydropower-Program.pdf; *see also* HYDRO WORLD, A VIEW ON CLIMATE CHANGE AND HYDROPOWER DEVELOPMENT (June 1, 2017), https://www.hydroworld.com/articles/hr/print/volume-36/issue-5/articles/a-view-on-climate-change-and-hydropower-development.html.

238. *See generally* DEPT. OF ENERGY, EFFECTS OF CLIMATE CHANGE ON FEDERAL HYDROPOWER 8-12 (Jan. 2017), https://www.energy.gov/sites/prod/files/2017/01/f34/Effects-Climate-Change-Federal-Hydropower-Program.pdf.

239. *See, e.g.*, FPC v. Sierra Pac. Power Co., 350 U.S. 348, 355 (1956) ("[T]he purpose of the power given the Commission by s 206(a) is the protection of the public interest.").

240. 164 F.E.R.C. ¶ 61,099 (2018) (Comm'r Glick's dissent states that "[c]limate change poses an existential threat to our security, economy, environment, and, ultimately, the health of individual citizens." (internal quotation marks omitted)); *see* FOURTH NATIONAL CLIMATE ASSESSMENT (2018), https://nca2018.globalchange.gov/downloads/ (concluding that "the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising.").

potential to play a significant role in addressing that threat through its various statutory mandates, some of which require explicit consideration of climate change and some of which do not.

Where climate change factors explicitly into the Commission's decision-making process, such as with respect to infrastructure permitting, the Commission must thoroughly examine how its decision can affect the climate in order to ensure that it is consistent with the public interest. In these instances, the Commission cannot bury its head in the sand and ignore the climate change consequences of its decisions while at the same time professing to comply with the FPA, the NGA, or NEPA. Happily, the Commission has ample tools at its disposal to accomplish this task. All it has to do to meet its statutory obligations is use them.

Even where climate change is not part of the Commission's decision-making process, the Commission's actions can still have important consequences for the nation's GHG emissions. As we have explained, regulations consistent with the Commission's longstanding approach to implementing many of its statutory mandates should have the effect, if not the intent, of facilitating the transition to the electricity grid of the future. Perhaps the best example of this phenomenon is the series of principles that the Commission has used to implement its authority over wholesale sales of electricity under sections 205 and 206 of the FPA—principles that have fostered the development of competitive electricity markets and integrated large quantities of variable energy resources. Fidelity to those principles should facilitate the development of wholesale markets in which all resources can compete on a level playing field and states can exercise their reserved authority under the FPA—characteristics that we believe will ultimately facilitate a reduction in GHG emissions.

Although the threat of climate change does not necessarily require a reinterpretation of the Commission's authority, it does raise the stakes of the Commission's actions. While the Commission is not a climate regulator, the potential climate consequences of the Commission's actions make it all the more important that the Commission faithfully execute its statutory mandates. The Commission must ensure that barriers to competition and discriminatory wholesale market rules are eliminated promptly so that all resources can participate on a level playing field. It must accommodate and give effect to state public policies, which are increasingly targeting the complete decarbonization of the electricity grid. It must also continue to adopt regulations that support the development of an efficient and cost-effective transmission grid and that faithfully implement the congressional intent behind PURPA. And, last but not least, it must consider an infrastructure project's implications for climate change when evaluating whether that project is consistent with the public interest. The urgent threat posed by climate change demands nothing less.