



COMMITTEE ON ENERGY & COMMERCE

CHAIRMAN FRANK PALLONE, JR.

MEMORANDUM

October 27, 2019

To: Subcommittee on Energy Members and Staff

Fr: Committee on Energy and Commerce Staff

Re: Hearing on “Building a 100 Percent Clean Economy: Solutions for the U.S. Power Sector”

On **Wednesday, October 30, 2019, at 10:30 a.m. in room 2322 of the Rayburn House Office Building**, the Subcommittee on Energy will hold a hearing entitled, “Building a 100 Percent Clean Economy: Solutions for the U.S. Power Sector.”

I. BACKGROUND

A. Energy Use and Greenhouse Gas Emissions in the U.S. Power Sector

The power sector produces approximately 28 percent of total greenhouse gas (GHG) emissions in the United States, making it the second largest source of emissions.¹ The domestic power sector has historically relied heavily on fossil fuels for electricity production.² Electricity generation attributed to these fuels totaled approximately 64 percent of U.S. generation in 2018.³

According to the Energy Information Administration (EIA), renewable and nuclear energy sources accounted for approximately 17 percent and 19 percent of domestic electricity generation in 2018, respectively.⁴ Between 2005 and 2017, the amount of electricity generation attributed to coal decreased from 50 to 30 percent while natural gas’s contribution increased from 19 to 32 percent. In the same period, generation attributed to wind and solar also increased

¹ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (Apr. 11, 2019) (430-R-19-001).

² See generally U.S. Energy Information Administration, *Electricity explained: Electricity in the United States* (www.eia.gov/energyexplained/electricity/electricity-in-the-us.php) (Apr. 19, 2019); U.S. Energy Information Administration, *Monthly Energy Review: Figure 7.2 Electricity Net Generation* (www.eia.gov/totalenergy/data/monthly/pdf/sec7_4.pdf) (Oct. 2019).

³ U.S. Energy Information Administration, *Frequently Asked Questions: What is U.S. electricity generation by energy source?* (eia.gov/tools/faqs/faq.php?id=427&t=3) (accessed Oct. 22, 2019).

⁴ *Id.*

from two to 10 percent.⁵ EIA expects non-hydroelectric renewable energy generation to grow at a faster rate than all other sources for at least the next two years.⁶

According to EIA, in 2018, electricity demand increased in the United States, though the rate of demand growth has slowed significantly since 2007. While the residential and commercial sectors reached record-setting levels of demand due to greater cooling and heating needs, consumption by the industrial sector has been declining since 2000. Overall, EIA projects that demand will grow more slowly than in prior decades, particularly in the residential and commercial sectors, as a result of technology improvements and energy efficiency standards.⁷

B. Domestic Electricity Market Structures

The structure and operation of electricity markets vary throughout the country, but can generally be categorized as “traditional” or “restructured.” Traditional electricity markets function as monopolies insofar as one utility is responsible for the generation, transmission, and distribution of electricity to consumers in a specified region. The vast majority of electric utilities in the United States followed this vertically integrated approach prior to the 1990s. Acts of Congress and orders issued by the Federal Energy Regulatory Commission (FERC) later led some markets to restructure in an effort to encourage competition and cost reduction for consumers. Restructured markets differ from traditional markets in that they involve multiple, discrete entities that share certain resources, seek to monetize different parts of the domestic electric utility system, and often compete against each other for consumer dollars.⁸

In response to the enactment of the Energy Policy Act of 1992, FERC issued Orders 888 and 889, in part suggesting the formation of independent system operators (ISOs) as a means for certain entities to provide non-discriminatory access to transmission. FERC later issued Order 2000 promoting the voluntary formation of regional transmission organizations (RTOs) to administer the transmission grid on a regional basis throughout the bulk of the continent. Roughly two-thirds of wholesale electricity markets in the United States are restructured and served by RTOs.⁹ Markets operated by RTOs offer wholesale electricity sales, ancillary

⁵ Congressional Research Service, *U.S. Carbon Dioxide Emissions in the Electricity Sector: Factors, Trends, and Projections* (Jan. 2019) (R45453).

⁶ U.S. Energy Information Administration, *EIA forecasts renewables will be fastest growing source of electricity generation* (eia.gov/todayinenergy/detail.php?id=38053) (Jan. 18, 2019).

⁷ U.S. Energy Information Administration, *Record U.S. electricity generation in 2018 driven by record residential, commercial sales* (eia.gov/todayinenergy/detail.php?id=38572) (Mar. 6, 2019).

⁸ Congressional Research Service, *The Federal Power Act (FPA) and Electricity Markets* (Mar. 2017) (R44783).

⁹ See generally Congressional Research Service, *Electricity Markets—Recent Issues in Market Structure and Energy Trading* (Mar. 2016) (R43093); Federal Energy Regulatory Commission, *Electric Power Markets: National Overview* (ferc.gov/market-assessments/mkt-electric/overview.asp) (accessed Oct. 21, 2019); Kate Konschnik, *RTOGov: Exploring Links*

services,¹⁰ and may also include the operation of capacity markets.¹¹ Energy and capacity markets also receive power from four regional power marketing administrations, which are generally responsible for marketing power generated by dams owned and operated by the U.S. Army Corps of Engineers and Bureau of Reclamation within the Department of the Interior.¹²

C. Pathways to Decarbonizing the U.S. Power Sector

In the coming decades, the U.S. power sector will confront the dual challenges of meeting rising demand for electricity while rapidly transitioning to low- and zero-carbon power generation in order to reduce emissions. As electrification spreads across sectors and end-uses, overall electricity supply may need to double by 2050.¹³ At the same time, the carbon intensity of electricity generation would have to drop to at least 90 percent of its current level to enable deep decarbonization.¹⁴

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) released its *Special Report on Global Warming of 1.5°C*, which concluded that avoiding the worst effects of climate change will require limiting global temperature rise to 1.5°C above preindustrial levels by 2100. While the report found that significant and expeditious changes are necessary by 2030, and that global emissions must reach net-zero by 2050 in order to sufficiently limit warming, global emissions continue to rise.¹⁵

Between Market Decision-Making Processes and Outcomes, Nicholas Institute Primer 19-01, Duke University (Sep. 2019).

¹⁰ Ancillary services are measures that aid grid operators in maintaining reliability. *See, e.g.*, Greening the Grid, *Ancillary Services* (greeningthegrid.org/integration-in-depth/ancillary-services) (accessed Oct. 21, 2019).

¹¹ Capacity markets allow ISOs and RTOs to meet projected consumer demand by committing to offer a given amount of power when it is needed at some point in the future. In PJM, for example, each member is required to secure enough power supply to meet predicted demand over three years. *See generally* Government Accountability Office, *Electricity Markets: Four Regions Use Capacity Markets to Help Ensure Adequate Resources, but FERC Has Not Fully Assessed Their Performance* (Dec. 2019) (GAO-18-131); PJM, Learning Center, *Capacity Market (RPM)* (learn.pjm.com/three-priorities/buying-and-selling-energy/capacity-markets.aspx) (accessed Oct. 21, 2019).

¹² Congressional Research Service, *The Power Marketing Administrations: Background and Current Issues* (Mar. 2019) (R45548).

¹³ E3, Lawrence Berkeley National Laboratory, and Pacific Northwest National Laboratory, *Pathways to Deep Decarbonization in the United States* (Nov. 2015), at 70.

¹⁴ *Id.*

¹⁵ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (Oct. 2018); Intergovernmental Panel on Climate Change, Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments (ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/) (Oct. 8, 2018); Corinne Le Quéré et al., *Global Carbon Budget*

Decarbonizing the power sector will require significant expansion of renewable energy capacity. Analyses by the Natural Resources Defense Council,¹⁶ the Union of Concerned Scientists,¹⁷ and the National Renewable Energy Laboratory (NREL)¹⁸ have concluded that renewables can provide nearly 80 percent of U.S. electricity generation by 2050. According to NREL, today's commercially available renewable technologies are "more than adequate" to meet that target.

Deeper decarbonization of the power sector will likely require a combination of measures. These include: improving and expanding end-use efficiency, grid flexibility, and grid-scale energy storage; fuel-switching to other low- or zero-carbon resources; and deploying natural or technological carbon capture.¹⁹

Several policy solutions to reduce power sector emissions are under consideration in the United States and, in some cases, have been enacted at state and federal levels. While standards and requirements vary, a majority of states—as well as the District of Columbia and Puerto Rico—mandate that a proportion of electric utility sales derive from low- or zero-carbon sources.²⁰ In some states, a renewable portfolio standard (RPS) requires utilities to source a designated percentage of electricity sales from renewable energy sources, while in others, a clean energy standard (CES) mandates a percentage of electric utility sales derive from low- or zero-carbon sources.²¹

2018, Earth System Science Data (Dec. 5, 2018); *Greenhouse Gas Emissions Accelerate Like a 'Speeding Freight Train' in 2018*, The New York Times (Dec. 5, 2018).

¹⁶ Natural Resources Defense Council, *America's Clean Energy Frontier: The Pathway to a Safer Climate Future* (Sept. 2017), at 6.

¹⁷ Union of Concerned Scientists, *The US Power Sector in a Net Zero World* (Nov. 2016), at 7.

¹⁸ National Renewable Energy Laboratory (NREL), *Renewable Electricity Futures Study: Volume 1* (2012), at ES-23.

¹⁹ See, e.g., Center for Climate and Energy Solutions, *Decarbonizing U.S. Power* (Jun. 2018); Jesse Jenkins, Max Luke, and Samuel Thernstrom, *Getting to Zero: Carbon Emissions in the Electric Power Sector*, Joule (Dec. 19, 2018); Advanced Energy Economy, *Advanced Energy Now: 2019 Market Report: Global and U.S. Markets by Revenue 2011-18 and Key Trends in Advanced Energy Growth* (Jul. 2019); C2ES, *Climate Innovation 2050: Decarbonizing U.S. Power* (June 2018).

²⁰ World Resources Institute, *INSIDER: 29 States Have Clean Electricity Standards. Are They Good Policy?* (wri.org/blog/2019/05/insider-29-states-have-clean-electricity-standards-are-they-good-policy) (May 21, 2019).

²¹ Center for Climate and Energy Solutions, *U.S. State Electricity Portfolio Standards* (c2es.org/document/renewable-and-alternate-energy-portfolio-standards/) (Apr. 2019).

Policies that incentivize the decentralization of clean electricity generation – such as onsite power generation or rooftop solar – can also accelerate decarbonization. Similarly, pricing reforms that require wholesale markets to compensate energy resources based on their low- or zero-carbon attributes may expand access to clean energy.²²

II. WITNESSES

The following witnesses have been invited to testify:

Ralph Izzo

Chairman, President & CEO
Public Service Enterprise Group Incorporated (PSEG)

Lee Anderson

Government Affairs Director
Utility Workers Union of America, AFL-CIO

Karen Palmer

Senior Fellow and Director, Future of Power Initiative
Resources for the Future

Jeff Dennis

General Counsel and Managing Director
Advanced Energy Economy

Jim Matheson

Chief Executive Officer
National Rural Electric Cooperative Association

John Bear

Chief Executive Officer
Midcontinent Independent System Operator, Inc.

²² The White House, *United States Mid-Century Strategy for Deep Decarbonization* (Nov. 16, 2016).