



**MEMORANDUM**

**February 16, 2021**

**To: Subcommittee on Energy Members and Staff**

**Fr: Committee on Energy and Commerce Staff**

**Re: Hearing on “A Smarter Investment: Pathways to a Clean Energy Future”**

On Thursday, February 18, 2021, at 11:30 a.m. (EST) via Cisco WebEx online video conferencing, the Subcommittee on Energy will hold a hearing entitled, “A Smarter Investment: Pathways to a Clean Energy Future.”

**I. DECARBONIZING THE U.S. ENERGY SECTOR**

**A. Background**

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 requires limiting global temperature rise to 1.5°C above preindustrial levels by 2100. The report found that significant global emissions continue to rise and expeditious changes are necessary by 2030, and that global emissions must reach net-zero by 2050 to sufficiently limit warming; nevertheless, global emissions continue to rise.<sup>1</sup> A separate report, published in February 2021 by the National Academies of Sciences, Engineering, and Medicine, found that achieving net-zero carbon emissions in the United States by 2050 is not only feasible, but can also help the nation build an even more competitive global economy.<sup>2</sup>

The U.S. energy sector emitted 5,130 million metric tons of carbon dioxide (CO<sub>2</sub>) in 2019, reflecting a 2.8 percent decrease from 2018. This decrease is largely related to the retirement of coal plants. Overall CO<sub>2</sub> emissions from coal declined by more than 50 percent from 2007 to 2019, and showed a 15 percent decline from 2018 to 2019. However, CO<sub>2</sub>

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<sup>1</sup> 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* ([www.ipcc.ch/sr15/](http://www.ipcc.ch/sr15/)) (Oct. 8, 2018); Corinne Le Quéré et al., *Global Carbon Budget 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).

<sup>2</sup> The National Academies of Sciences, Engineering, and Medicine, *Accelerating Decarbonization of the U.S. Energy System* (2021).

emissions from natural gas increased by more than 35 percent from 2007 to 2019, and by 3.3 percent from 2018 to 2019.<sup>3</sup>

Initial estimates for overall energy sector CO<sub>2</sub> emissions in 2020 show an 11 percent decrease from 2019 numbers.<sup>4</sup> Additionally, demand for energy delivered to four end sectors (residential, commercial, transportation, and industrial) decreased to 90 percent of 2019 levels.<sup>5</sup> This decrease is largely due to the coronavirus disease of 2019 (COVID-19) pandemic and its effects on energy consumption. This trend decrease is expected to reverse as pandemic-related restrictions are lifted. Early estimates from the U.S. Energy Information Administration (EIA) predict overall CO<sub>2</sub> emissions will increase to 4.8 billion metric tons in 2021, and to 4.9 billion metric tons in 2022.<sup>6</sup>

## **B. Power Sector**

The power sector accounted for an approximate 31 percent of 2019 U.S. energy-related carbon emissions.<sup>7</sup> The domestic power sector has historically relied heavily on fossil fuels for electricity production. In 2019, fossil resources fueled about 63 percent of electricity generation, while nuclear energy produced around 20 percent, and renewable resources provided some 18 percent.<sup>8</sup>

Between 1990 and 2019, the amount of electricity generation attributed to coal decreased from 52 percent to 23 percent. Coal generation declined from 27 percent to 23 percent from 2018 to 2019. While coal generation decreased, natural gas-fired generation rose from 35 percent to 38 percent from 2018 to 2019, resulting in a nearly 7 percent increase in natural gas CO<sub>2</sub> emissions. Of the non-carbon emitting electricity generation sources, wind and solar accounted for 27 percent of 2019 generation and hydropower accounted for 18 percent.<sup>9</sup>

Decarbonizing the power sector requires significant expansion of renewable energy capacity. EIA predicts renewable energy will double from 21 percent of the electricity

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<sup>3</sup> U.S. Energy Information Administration, *U.S. Energy-Related Carbon Dioxide Emissions, 2019* (September 2020).

<sup>4</sup> U.S. Energy Information Administration, *EIA expects U.S. energy-related carbon dioxide emissions to fall 11% in 2020, Today in Energy* (December 9, 2020).

<sup>5</sup> U.S. Energy Information Administration, *Annual Energy Outlook 2021* (February 2021).

<sup>6</sup> U.S. Energy Information Administration, *After 2020 decline, EIA expects energy-related CO<sub>2</sub> emissions to increase in 2021 and 2022, Today in Energy* (January 2021).

<sup>7</sup> U.S. Energy Information Administration, *How much of U.S. carbon dioxide emissions are associated with electricity generation? FAQs* (December 2020).

<sup>8</sup> U.S. Energy Information Administration, *What is U.S. electricity generation by energy source?* (November 2020).

<sup>9</sup> See note 1.

generation mix in 2020 to 42 percent in 2050.<sup>10</sup> Deeper decarbonization of the power sector requires 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.<sup>11</sup> Additionally, increases in renewable energy generation will require significant development of high-voltage, long-distance transmission projects that cross interstate lines and planning regions.<sup>12</sup>

### C. Building Sector

The U.S. building sector consumes a significant amount of energy for a variety of purposes and operations such as heating, cooling, and lighting. Several factors contribute to the sector's adverse environmental impacts. These factors include the length of time buildings are used relative to the rate of new construction, increases in residential and commercial floor space, the proliferation of increasingly sophisticated electronic devices, and the ubiquity of fossil fuels in the energy sector.<sup>13</sup>

The majority of the building sector's emissions, including emissions from residential and commercial buildings, are largely attributed to electricity produced remotely to meet its energy demands.<sup>14</sup> In 2019, CO<sub>2</sub> emissions from the residential and commercial sectors in the United States declined by just over five percent, largely due to the overall power sector's shift away from carbon intense generation, as well as a five percent decline in cooling requirements.<sup>15</sup>

Electrifying practices that otherwise require the use of fossil fuels, such as burning natural gas for heating, can significantly improve efficiency and reduce carbon pollution.<sup>16</sup> Various federal programs have contributed to cost savings and environmental benefits for building sector entities and consumers, including the Environmental Protection Agency's ENERGY STAR program and the Department of Energy's Weatherization Assistance Program.

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<sup>10</sup> U.S. Energy Information Administration, *EIA Projects renewables share of U.S. electricity generation mix will double by 2050* (February 8, 2021).

<sup>11</sup> Center for Climate and Energy Solutions, *Decarbonizing U.S. Power* (Jun. 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).

<sup>12</sup> American Clean Power, *Vision for Driving a Clean Energy Transformation* (Dec. 2020).

<sup>13</sup> U.S. Energy Information Administration, *Department of Energy, Fossil fuels still dominate U.S. energy consumption despite recent market share decline* (Jul. 2016).

<sup>14</sup> The White House, *United States Mid-Century Strategy for Deep Decarbonization* (Nov. 2016).

<sup>15</sup> See note 1.

<sup>16</sup> Center for Climate and Energy Solutions, *Decarbonizing U.S. Buildings* (Jul. 2018).

#### **D. Transportation Sector**

Transportation is the largest domestic contributor to U.S. greenhouse gas (GHG) pollution. In 2018, the transportation sector comprised 28 percent of U.S. GHG emissions. This sector includes cars, trucks, commercial aircraft, and railroads. Within the transportation sector in 2018, 59 percent of GHG emissions came from light-duty vehicles, 29 percent from medium- and heavy-duty trucks, and nine percent from aircraft.<sup>17</sup>

Transportation-related carbon pollution increased steadily in the United States from 2012 to 2018 because of a recovering economy and moderate fuel prices. CO<sub>2</sub> emissions from transportation have increased 23 percent since 1990. Between 1990 and 2017, medium and heavy-duty truck vehicle miles traveled increased by 107 percent, resulting in an 88 percent increase in CO<sub>2</sub> emissions over that period.<sup>18</sup> Emissions from commercial aviation grew at a slower rate (17 percent) since 1990, but increased more than any other subsector in 2017.<sup>19</sup>

Mobility restrictions, limits on travel, and increased working from home, all due to the COVID-19 pandemic, are some of the major drivers leading to greatly reduced energy consumption over much of the past year. These events and economic forces set in motion by the pandemic has resulted in larger reductions in energy consumption in the transportation sector than in other end-use sectors during this period.

Transportation electrification is a crucial component for achieving decarbonization goals. Light-duty passenger vehicles account for approximately 66 percent of the transportation sector's emissions, and present an opportunity for reducing the sector's overall emissions.<sup>20</sup> Current projections estimate that the share of electric vehicles in new passenger fleet vehicle sales will be about ten to 15 percent by 2025. Infrastructure must be significantly scaled up to meet this need. Current estimates show that only 25 percent of the necessary workplace and public chargers necessary to meet 2025 demand are in place, and that growth in charging infrastructure must increase by an estimated 20 percent annually to meet 2025 targets.<sup>21</sup> In addition to light duty vehicles, battery-electric buses are estimated to account for nearly 70 percent of the global bus

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<sup>17</sup> U.S. Environmental Protection Agency. *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emission* (June 2020).

<sup>18</sup> U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, Chapter 3: Energy* (Apr. 11, 2019) (430-R-19-001).

<sup>19</sup> U.S. Environmental Protection Agency, *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions Office of Transportation and Air Quality 1990 –2017* (Jun. 2019) (EPA-420-F-19-047).

<sup>20</sup> Center for Climate and Energy Solutions, *Electric Vehicles* ([www.c2es.org/content/electric-vehicles/](http://www.c2es.org/content/electric-vehicles/)) (accessed Feb. 11, 2021).

<sup>21</sup> Resources for the Future. *Progress and Potential for Electric Vehicles to Reduce Carbon Emissions* (Dec. 8, 2020).

fleet by 2040.<sup>22</sup> In contrast, medium- and heavy-duty trucks may be slower to electrify.<sup>23</sup> Electrification using either batteries or fuel cells will ultimately require significant cost reductions in onboard storage and performance improvements, as well as expanded battery charging and hydrogen refueling infrastructure.<sup>24</sup>

## II. FEDERAL LEADERSHIP AND RECENT EXECUTIVE ACTIONS

Since taking office in late January, President Biden has taken several executive actions to prioritize clean energy and the decarbonization of the energy sector.

On January 27, 2021, President Biden signed a series of Executive orders related to climate change and decarbonization. Among other things, these Executive orders direct his administration to:

- Procure carbon pollution-free electricity and clean, zero-emission vehicles;
- Develop a plan to increase the resilience of facilities and operations to the impacts of climate change;
- Eliminate fossil fuel subsidies as consistent with applicable law and identify new opportunities for the deployment of clean energy technologies and infrastructure;
- Ensure that every federal infrastructure investment reduces climate pollution and that steps are taken to accelerate clean energy and transmission projects under federal siting and permitting processes in an environmentally sustainable manner; and
- Establish an Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, and direct federal agencies to coordinate investments and other efforts to assist coal, oil and natural gas, and power plant communities.<sup>25</sup>

Further information about President Biden’s executive actions on climate change and clean energy may be found in the Environment and Climate Change Subcommittee’s hearing memorandum of [February 9, 2021](#) entitled, “Back in Action: Restoring Federal Climate Leadership.”

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<sup>22</sup> Bloomberg New Energy Finance, *Electric Vehicle Outlook 2019* (May 2019).

<sup>23</sup> National Renewable Energy Laboratory, *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States* (2018) (NREL/TP-6A20-71500).

<sup>24</sup> White House, *United States Mid-Century Strategy for Deep Decarbonization* (Nov. 2016).

<sup>25</sup> White House, *FACT SHEET: President Biden Takes Executive Actions to Tackle the Climate Crisis at Home and Abroad, Create Jobs, and Restore Scientific Integrity Across Federal Government* (Jan. 27, 2021).

### **III. WITNESSES**

The following witnesses have been invited to testify:

**Dr. Stephen W. Pacala**

Professor of Ecology and Evolutionary Biology  
Princeton University

**Ms. Paula R. Glover**

President  
Alliance to Save Energy

**Mr. Craig Gordon**

Senior Vice President, Government Affairs  
Invenergy

**Mr. Richard J. Powell**

Executive Director  
ClearPath Inc.

**Mr. Daniel C. Camp III**

Chairman  
Beaver County Commissioners