

# THE BUSINESS CASE FOR CLIMATE SOLUTIONS

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(117-7)

REMOTE HEARING  
BEFORE THE  
COMMITTEE ON  
TRANSPORTATION AND  
INFRASTRUCTURE  
HOUSE OF REPRESENTATIVES  
ONE HUNDRED SEVENTEENTH CONGRESS  
FIRST SESSION

—————  
MARCH 17, 2021  
—————

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Committee on Transportation and Infrastructure



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Committee on Transportation and Infrastructure  
U.S. House of Representatives  
Washington, DC 20515

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Chairman

Katherine W. Dedrick, Staff Director

Sam Graves  
Ranking Member

Paul J. Sass, Republican Staff Director

MARCH 12, 2021

**SUMMARY OF SUBJECT MATTER**

TO: Members, Committee on Transportation and Infrastructure  
FROM: Staff, Committee on Transportation and Infrastructure  
RE: Full Committee Hearing on “The Business Case for Climate Solutions”

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PURPOSE

The Committee on Transportation and Infrastructure will meet on Wednesday, March 17, 2021, at 11:00 a.m. EDT in 2167 Rayburn House Office Building and via Cisco Webex to hold a hearing titled “The Business Case for Climate Solutions.” The hearing will explore private sector actions to develop and implement solutions to climate change, with an emphasis on the surface transportation sector. The Committee will hear testimony from Proterra, Inc; Pacific Gas and Electric Company (PG&E); Pilot Flying J; WSP USA; AECOM; Wabtec Corporation; FedEx Corporation; and Citizens for Responsible Energy Solutions (CRES).

BACKGROUND

*CLIMATE CHANGE AND THE TRANSPORTATION SECTOR*

Global use of carbon has resulted in corresponding greenhouse gas emissions (GHGs), which is the dominant cause of climate change.<sup>1</sup> According to the Environmental Protection Agency (EPA), the transportation sector is the largest source of U.S. GHGs, at 28 percent of U.S. emissions.<sup>2</sup> Electric power and industry (iron, steel, chemical, and cement production) follow with 27 percent and 22 percent of emissions, respectively.<sup>3</sup> Within the transportation sector, light-duty vehicles and medium- and heavy-duty trucks account for 82 percent of those emissions, with aircraft accounting for 9 percent, rail accounting for 2 percent, ships and boats accounting for 2 percent and other forms of transportation—including buses and motorcycles—making up the remainder.<sup>4</sup>

The U.S. transportation sector has been the largest consumer of petroleum products since at least 1949, the first year for which the Energy Information Administration has data.<sup>5</sup> In 2018, the U.S. transportation sector consumed approximately 14

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<sup>1</sup>National Aeronautics and Space Administration. “The Causes of Climate Change.” Accessed March 8, 2021.

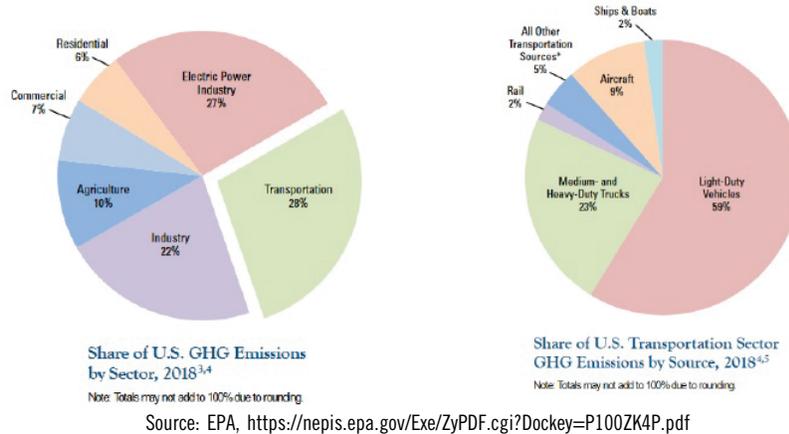
<sup>2</sup>EPA. “Fast Facts on Transportation Greenhouse Gas Emissions,” <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>. Accessed March 5, 2021.

<sup>3</sup>*Id.*

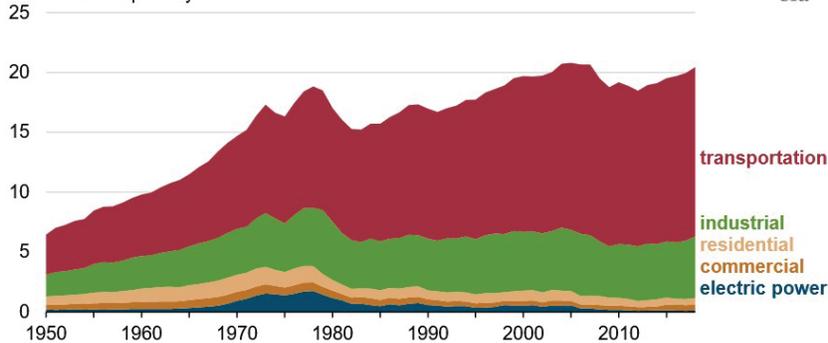
<sup>4</sup>*Id.*

<sup>5</sup>Energy Information Administration. “In the United States, most petroleum is consumed in transportation,” <https://www.eia.gov/todayinenergy/detail.php?id=40752>. Accessed March 5, 2021.

million barrels per day of petroleum products,<sup>6</sup> out of a total of 20.5 million barrels per day consumed in all sectors domestically.<sup>7</sup>



**U.S. consumption of petroleum products by sector (1950-2018)**  
million barrels per day



The impacts of climate change can pose risks to our infrastructure, the economy, and communities nationwide. At the same time, transitioning to a more sustainable surface transportation system may bring the opportunity for new domestic jobs and a more competitive position in the global economy.<sup>8</sup>

#### CLIMATE CHANGE MITIGATION AND RESILIENCE

As of 2019, the U.S. was leading the world in energy-related emissions reduction due to the expanding role of renewable energy sources and switching from coal to

<sup>6</sup>*Id.*

<sup>7</sup>*Id.*; see also Energy Information Administration. "Petroleum and other liquids," <https://www.eia.gov/petroleum/>. Accessed March 5, 2021.

<sup>8</sup>E2. Clean Jobs America 2020. <https://e2.org/wp-content/uploads/2020/04/E2-Clean-Jobs-America-2020.pdf>. Accessed March 11, 2021.

natural gas.<sup>9</sup> The COVID–19 pandemic led to a further drop in emissions, estimated at 7 percent in 2020.<sup>10</sup> U.S. GHG emissions are now below 1990 levels.<sup>11</sup>

However, between 1990 and 2018, GHG emissions in the transportation sector increased 24 percent, more than any other sector.<sup>12</sup> According to EPA, the increase is driven by increased demand for travel with vehicle miles traveled by light-duty motor vehicles increasing by 46.1 percent.<sup>13</sup> EPA attributes this increase to a confluence of factors including population growth, economic growth, urban sprawl, and periods of low fuel prices.<sup>14</sup> Without changes in carbon use, emissions will likely rise in tandem with increased economic activity as the U.S. recovers from the COVID–19 pandemic.<sup>15</sup>

Total carbon emissions have declined by nearly 11 percent since 2010.<sup>16</sup> Energy innovations have allowed the U.S. to decrease dependence on foreign energy with more net exports than imports since 2019.<sup>17</sup> As a result, public and private sector entities have a range of options by which to reduce the emissions generated by the transportation sector and to improve the resilience of the sector against the already-occurring impacts of climate change.

Mitigation of transportation related GHGs may be achieved through a variety of means. These can include: conversion of individual vehicles and fleets of vehicles to low- and zero-emission forms of power; provision of alternative charging and fueling infrastructure; provision of low- and zero-emission forms of transportation including transit, rail, walking, and biking; increased fuel economy standards that reduce the use of fossil fuels and associated operating costs for vehicle users;<sup>18</sup> improved operational practices to reduce idling and traffic congestion; shifting freight and passenger movements to more efficient modes; and innovations within the construction sector to reduce or trap emissions produced throughout the lifecycle of transportation projects. These types of interventions have the ability to reduce the transportation sector's GHGs.<sup>19</sup>

Because air pollution and greenhouse gases are often released from the same sources, reducing GHGs in an effort to slow climate change also reduces air pollutants, such as fine particulate matter (PM<sub>2.5</sub>).<sup>20</sup> Reducing these co-emitted air pollutants improves air quality and benefits human health.<sup>21</sup>

Resiliency, or strengthening the ability to anticipate, withstand, and recover from natural disasters and extreme weather, is also a central element of the U.S. response to the ongoing impacts of climate change. Resilient infrastructure pays off by saving at least \$2 on average for every \$1 spent.<sup>22</sup> Options to improve the resilience of the transportation system include: assessing vulnerability and identifying critical infrastructure; raising roadways and improving drainage; upgrading evacuation routes; relocating assets to higher ground or less flood-prone areas; using nat-

<sup>9</sup> IEA. "Global CO<sub>2</sub> Emissions in 2019." <https://www.iea.org/articles/global-co2-emissions-in-2019>. Accessed March 9, 2021.

<sup>10</sup> Global Carbon Project. "Coronavirus causes 'record fall' in fossil-fuel emissions in 2020." <https://www.carbonbrief.org/global-carbon-project-coronavirus-causes-record-fall-in-fossil-fuel-emissions-in-2020>.

<sup>11</sup> Rhodium Group. "Preliminary US Greenhouse Gas Emissions Estimates for 2020." <https://rhg.com/research/preliminary-us-emissions-2020/>. Accessed March 9, 2021.

<sup>12</sup> EPA. "Inventory of U.S. Greenhouse Gas Emissions and Sinks." <https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-chapter-executive-summary.pdf>. Accessed March 10, 2021.

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*

<sup>15</sup> Rhodium Group. "Preliminary US Greenhouse Gas Emissions Estimates for 2020." <https://rhg.com/research/preliminary-us-emissions-2020/>. Accessed March 11, 2021.

<sup>16</sup> IEA. "CO<sub>2</sub> Emissions by Energy Source, United States 1990–2018." <https://www.iea.org/countries/united-states>. Accessed March 9, 2021.

<sup>17</sup> IEA. "Net Energy Imports, United States 1990–2019." <https://www.iea.org/countries/united-states>. Accessed March 9, 2021.

<sup>18</sup> Consumer Reports. "Electric Vehicle Ownership Costs: Today's Electric Vehicles Offer Big Savings for Consumers." 2020. <https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf>. Accessed March 8, 2021.

<sup>19</sup> EPA. "Sources of Greenhouse Gas Emissions: Transportation Sector Emissions." <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>. Accessed March 10, 2020.

<sup>20</sup> West, J., Smith, S., Silva, R. et al. "Co-benefits of mitigating global greenhouse gas emissions for future air quality and human health." *Nature Climate Change* 3, 885–889 (2013). [https://www.niehs.nih.gov/research/programs/geh/geh\\_newsletter/2013/12/spotlight/reducing\\_greenhouse\\_gas\\_emissions\\_can\\_improve\\_air\\_quality\\_and\\_save\\_lives\\_cfm#:~:text=Because%20air%20pollution%20and%20greenhouse,quality%20and%20benefits%20human%20health](https://www.niehs.nih.gov/research/programs/geh/geh_newsletter/2013/12/spotlight/reducing_greenhouse_gas_emissions_can_improve_air_quality_and_save_lives_cfm#:~:text=Because%20air%20pollution%20and%20greenhouse,quality%20and%20benefits%20human%20health). Accessed March 8, 2021.

<sup>21</sup> *Id.*

<sup>22</sup> Engineering News-Record. "Resilient Infrastructure Could Save \$4.2 Trillion." <https://www.enr.com/articles/47135-resilient-infrastructure-could-save-42-trillion>. Accessed March 9, 2021.

ural infrastructure to provide protection against extreme weather; stabilizing or strengthening facilities to protect against erosion and landslides; seeking distributed sources of power to maintain transportation services in the event of a disruption to the grid; and diversifying transportation options to ensure continuity of service following a natural disaster.<sup>23</sup>

*PRIVATE SECTOR ACTIONS TO ADDRESS CLIMATE CHANGE*

A growing number of corporations have set targets to reduce GHGs, and goals to achieve carbon neutrality by a certain date, some as early as 2030.<sup>24</sup> In the United States, 209 companies have joined the Science-Based Targets Initiative to set and disclose targets.<sup>25</sup> Worldwide, more than 1,200 companies have taken such action.<sup>26</sup> These voluntary actions by corporations demonstrate businesses' steps in reducing emissions.

Many corporations are formally calling for public policy solutions, in addition to setting their own targets, to achieve a higher scale of emissions reductions. On January 20, 2021, the U.S. re-started the process to join to the Paris Agreement and on February 19, 2021, officially rejoined.<sup>27</sup> Under the agreement, the U.S. promises to reduce its emissions by about 25 percent from 2005 levels by 2025.<sup>28</sup> The U.S. was already on track to reduce emissions by about 17 percent.<sup>29</sup> Broader policy changes and innovations may help achieve the emissions reductions necessary for the U.S. to meet its commitments under the Paris agreement.

The CEO Climate Dialogue, which includes 22 major U.S. corporations among its members, states in its guiding principles: "It is urgent that the President and Congress put in place a long-term federal policy as soon as possible to protect against the worst impacts of climate change."<sup>30</sup> In December 2020, 47 leading U.S. companies issued a statement letter urging "President-elect Joe Biden and the new Congress to work together to enact ambitious, durable, and bipartisan climate solutions."<sup>31</sup>

The U.S. Chamber of Commerce updated its position on climate change in January 2021 to include support for "a market-based approach to accelerate GHG emissions reductions across the U.S. economy."<sup>32</sup> In September 2020, the Business Roundtable issued new principles on climate change, calling for market-based solutions and a "complementary suite of policies to drive innovation, significantly reduce greenhouse gas emissions and limit global temperature rise."<sup>33</sup> On March 1, 2021, the Association of American Railroads (AAR) released a report stating "the rail industry recognize(s) that the climate is changing. If action is not taken, climate change will have significant repercussions for the planet, our economies, our society, and even day-to-day railroad operations."<sup>34</sup>

<sup>23</sup> Federal Highway Administration. "Vulnerability Assessment and Adaption Framework, 3rd Ed." (2017) [https://www.fhwa.dot.gov/environment/sustainability/resilience/adaptation\\_framework/chap00.cfm](https://www.fhwa.dot.gov/environment/sustainability/resilience/adaptation_framework/chap00.cfm). Accessed March 10, 2021; Federal Highway Administration. "Synthesis of Approaches for Addressing Resilience in Project Development." (2017).

<sup>24</sup> In January 2020, Microsoft announced it would be carbon negative by 2030. <https://news.microsoft.com/climate/#january-carbon-announcement>. Accessed March 7, 2021.

<sup>25</sup> Science-Based Targets. "Companies Taking Action." <https://sciencebasedtargets.org/companies-taking-action>. Accessed March 7, 2021.

<sup>26</sup> *Id.*

<sup>27</sup> Press Release, U.S. State Department, The United States Officially Rejoins the Paris Agreement, Feb. 19, 2021, available at <https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/>; The Paris Agreement is a multi-lateral treaty, negotiated in 2015, in which developed countries commit to making the individual GHG reduction, contributions necessary to halt the overall rate of temperature increase. See: <https://unfccc.int/process-andmeetings/the-paris-agreement/the-paris-agreement>; <https://www.aar.org/wp-content/uploads/2021/02/AAR-Climate-Change-Report.pdf>.

<sup>28</sup> OBP. "U.S. Officially Rejoins Paris Agreement on Climate Change." Feb. 19, 2021. <https://www.opb.org/article/2021/02/19/u-s-officially-rejoins-paris-agreement-on-climate-change/>.

<sup>29</sup> *Id.*

<sup>30</sup> CEO Climate Dialogue. "Guiding Principles for Federal Action on Climate." <https://www.ceoclimatedialogue.org/guiding-principles>. Accessed March 7, 2021.

<sup>31</sup> Center for Climate and Energy Solution. "Top Companies Call for Ambitious U.S. Climate Policy." <https://www.c2es.org/content/top-companies-call-for-ambitious-us-climate-policy/>. Accessed March 7, 2021.

<sup>32</sup> U.S. Chamber of Commerce. "Our Approach to Climate Change." <https://www.uschamber.com/climate-change-position>. Accessed March 7, 2021.

<sup>33</sup> Business Roundtable. "Addressing Climate Change." <https://www.businessroundtable.org/climate>. Accessed March 7, 2021.

<sup>34</sup> American Assn. of Railroads. "Freight Railroads & Climate Change." <https://www.aar.org/wp-content/uploads/2021/02/AAR-Climate-Change-Report.pdf>. Accessed March 7, 2021.

## CLIMATE-RELATED TRANSPORTATION LEGISLATION FROM THE 116TH CONGRESS

*H.R. 2, the Moving Forward Act*

On July 1, 2020, the House of Representatives passed with a bipartisan vote of 233–188 the Majority’s H.R. 2, the Moving Forward Act, which included a surface transportation reauthorization proposal titled the Investing in a New Vision for the Environment and Surface Transportation in America (INVEST in America) Act. The INVEST in America Act proposed several provisions related to climate change mitigation and resilience. The bill proposed investments in:

- A new carbon pollution reduction apportionment program to fund highway, transit, and rail projects that would reduce greenhouse gases.<sup>35</sup>
- A new resilience-focused pre-disaster mitigation program to help States prepare for and reduce the impacts of climate change and extreme weather.<sup>36</sup>
- Transit, rail, pedestrian, and bicycle funding to provide more transportation options.<sup>37</sup>
- Alternative charging and fueling infrastructure to support Americans in shifting to lower-emission vehicles.<sup>38</sup>
- A locally-driven climate discretionary grant program, allowing communities to advance innovative solutions to reducing carbon pollution.<sup>39</sup>
- Deployment of technologies that would reduce greenhouse gas emissions from the surface transportation system.<sup>40</sup>
- Lower-emission multimodal freight projects.<sup>41</sup>
- Zero-emission buses to reduce greenhouse gases and other air pollutants.<sup>42</sup>
- A new sustainable highway materials research, development, and deployment program to reduce or sequester greenhouse gases generated during production and construction.<sup>43</sup>
- A new gridlock reduction program focused on operational improvements, travel demand management, and multi-modal solutions to traffic congestion.<sup>44</sup>

The bill also proposed policy changes to support climate change mitigation and resilience by:

- Clarifying that the Federal Highway Administration’s (FHWA) Emergency Relief Program may be used for resilience betterments.<sup>45</sup>
- Reforming the largest highway construction program to ensure that States also consider operational improvements and transit when proposing additional highway capacity.<sup>46</sup>
- Establishing a new greenhouse gas performance measure to track States’ progress in reducing carbon pollution from our highway system.<sup>47</sup>
- Creating new incentives for transit-oriented development to provide more Americans access to walkable and transit-supportive communities.<sup>48</sup>
- Ensuring consideration of climate mitigation and resilience through the planning process to encourage sustainable building for the future.<sup>49</sup>
- Modifying federal design standards to support context-sensitive street design and support the use of low- and zero-emission modes.<sup>50</sup>
- Requiring a National Academies of Science assessment of the potential impacts of climate change on the national rail network.<sup>51</sup>
- Spurring Amtrak to improve passenger rail service to encourage a shift towards passenger rail which produces less greenhouse gas emissions.<sup>52</sup>

<sup>35</sup> Division B, title I, section 1213.

<sup>36</sup> Division B, title I, section 1202.

<sup>37</sup> Divisions B and D.

<sup>38</sup> Division B, title I, section 1303.

<sup>39</sup> Division B, title I, section 1302.

<sup>40</sup> Divisions B and D.

<sup>41</sup> See, e.g., division B, title I, section 1212.

<sup>42</sup> Division B, title II, sections 2101 and 2403.

<sup>43</sup> Division B, title I, section 5302.

<sup>44</sup> Division B, title I, section 1306.

<sup>45</sup> Division B, title I, section 1203.

<sup>46</sup> Division B, title I, section 1201.

<sup>47</sup> Division B, title I, section 1403.

<sup>48</sup> Division B, title II, subtitle G.

<sup>49</sup> Division B, title I, sections 1202, 1401, and 1402.

<sup>50</sup> Division B, title I, section 1107.

<sup>51</sup> Division D, title I, section 9106.

<sup>52</sup> Division D, title II.

*H.R. 7248, the STARTER Act*

On June 18, 2020, Ranking Member Sam Graves introduced H.R. 7248, the Surface Transportation Advanced through Reform, Technology, and Efficient Review (STARTER) Act, a five-year surface transportation reauthorization bill.

The bill proposed policy changes to support climate change mitigation and resiliency by:

- Establishing the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) grant program to fund highway projects that reduce the cost and risk related to natural disasters (*Sec. 7001*).
- Modifying the purpose of the National Highway Performance Program (NHPP) to incorporate resiliency measures to diminish the impacts of natural disasters (*Sec. 7002*).
- Allowing States to use up to 15 percent of NHPP funds for protective features to improve the resiliency of a Federal-aid highway or bridge off the National Highway System (*Sec. 7002*).
- Establishing that funding under the Federal Transit Administration's (FTA) Emergency Relief Program for mitigation activities will support projects that are cost beneficial and will reduce actual risk (*Sec. 7003*).
- Clarifying that FHWA's Emergency Relief Program may be used for projects related to wildfires and sea level rise (*Sec. 7004*).
- Permitting funding under the FHWA's Emergency Relief Program to be used for mitigation projects that are demonstrated to mitigate against and reduce the risk of recurring damage from extreme weather events, flood, and other disasters (*Sec. 7004*).
- Authorizing an increase in the Federal cost share in highway funding for activities that are designed and demonstrated to reduce cost and risk associated with extreme weather (*Sec. 7005*).
- Extending University Transportation Centers' research focus to mitigation and resiliency (*Sec. 7009*).
- Establishing a five-year pre-disaster mitigation pilot program under the FHWA with funding to support projects that substantially reduce the risk of or increase the resilience to future damage from weather events (*Sec. 7010*).

This Congress the Committee will continue work on a surface transportation reauthorization ahead of the expiration of the current surface transportation programs on September 30, 2021.

## WITNESS LIST

- Mr. Jack Allen, Chief Executive Officer, Proterra, Inc.
- Ms. Laurie Giammona, Senior Vice President for Customer Care, Pacific Gas and Electric Corporation
- Mr. Charles Hernick, Vice President of Policy and Advocacy, Citizens for Responsible Energy Solutions
- Mr. Shameek Konar, Chief Executive Officer, Pilot Flying J, *on behalf of the National Association of Truckstop Operators*
- Mr. Tom Lewis, National Business Line Executive for Climate, Resilience, and Sustainability, WSP USA
- Mr. Troy Rudd, Chief Executive Officer, AECOM
- Mr. Rafael Santana, President and Chief Executive Officer, Wabtec Corporation
- Mr. Frederick W. Smith, Chairman and Chief Executive Officer, FedEx Corporation

## THE BUSINESS CASE FOR CLIMATE SOLUTIONS

WEDNESDAY, MARCH 17, 2021

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,  
WASHINGTON, DC.

The committee met, pursuant to call, at 11:03 a.m., in 2167 Rayburn House Office Building and via Cisco Webex, Hon. Peter A. DeFazio (Chair of the committee) presiding.

Present in person: Mr. DeFazio, Mr. Larsen, Mr. Cohen, Mr. Carbajal, Mr. Stanton, Ms. Newman, Mr. Graves of Missouri, Mr. Crawford, Mr. Webster, Mr. Massie, Mr. Perry, Mr. Rodney Davis, Dr. Babin, Mr. Graves of Louisiana, Mr. Rouzer, Mr. Bost, Mr. Westerman, Mr. Mast, Mr. Stauber, Mr. Burchett, Mr. Guest, Mr. Nehls, Ms. Mace, and Mrs. Steel.

Present remotely: Ms. Norton, Mrs. Napolitano, Mr. Sires, Mr. Johnson of Georgia, Ms. Titus, Mr. Huffman, Ms. Brownley, Mr. Payne, Mr. Lowenthal, Mr. DeSaulnier, Mr. Malinowski, Ms. Davids, Mr. García of Illinois, Mr. Delgado, Mr. Pappas, Mr. Lamb, Mr. Auchincloss, Ms. Bourdeaux, Ms. Strickland, Ms. Williams of Georgia, Mr. Gibbs, Mr. LaMalfa, Mr. Fitzpatrick, Mr. Johnson of South Dakota, Mr. Van Drew, and Ms. Van Duyne.

Mr. DEFAZIO. The hearing of the Committee on Transportation and Infrastructure will come to order.

I ask unanimous consent that the chair be authorized to declare a recess at any time during today's hearing.

Without objection, so ordered.

For Members participating remotely, if Members experience any connectivity issues—do I really have to keep reading this stuff? Do people not know this? It has been shortened. Good.

For Members experiencing connectivity issues or other technical problems, please inform the committee staff as soon as possible so you can receive assistance.

As chair of today's hearing, I will make a good-faith effort to provide every Member experiencing connectivity issues an opportunity to participate fully in the proceedings. It is the responsibility of each Member seeking recognition to unmute their microphone prior to speaking. Keep the microphone on mute when not speaking and avoid inadvertent background noise.

Should I hear any inadvertent background noise, I will yell at you. And finally, to insert a document into the record, please have your staff email it to DocumentsT&I@mail.house.gov.

Wow, you did shorten it. That is good. Thank you.

So today's hearing is an important step on the path to a more sustainable transportation future. The depth of interest in this hearing which resulted in eight witnesses today demonstrates the willingness and readiness of corporate America to be active partners in solving the monumental challenges we face regarding infrastructure and climate change.

As we will hear today, both private-sector action and sound public policy are necessary to meaningfully address climate change. This is not about whether we need either private voluntary reductions or Government measures. We need both.

We will need commitment at all levels of Government and from the private sector to achieve significant reduction in carbon pollution in the transportation sector, to transition to large-scale decarbonization, and to invest in the infrastructure upgrades to make our assets and facilities resilient to extreme weather events and sea level rise.

Failure to protect assets and invest in emission reductions will have real financial consequences for business and transportation agencies both now and in the long run.

So we will hear those messages loud and clear today. In 2021, we have thankfully moved beyond the polarizing discussion of whether we need to act, which has stalled progress on an existential threat to our planet and our citizens for far too long.

If any are here today to make that argument, I urge you to review the prepared remarks of our panel. Every one of the business leaders here today can affirm the denial of this reality is a bad business decision.

But these decisions are about more than just the bottom line. We will hear from our panel today that the transportation sector, in particular, holds tremendous promise for new norms that will move the needle on climate change.

To quote from Mr. Smith's written testimony, "we believe that a connected world is a better world ... and we recognize that with the privilege of connecting the world also comes the responsibility of being good stewards of the planet."

While some sectors have begun to move in the right direction on climate, the same is not true in the majority of the transportation sector, which is the largest contributor of greenhouse gas emissions in the United States.

Over the last three decades, those emissions have risen 24 percent, more than any other sector. Passenger and freight vehicles account for 82 percent of transportation sector emissions, which is why so much of this hearing will focus on surface transportation policy. The contribution to the carbon pollution problem from the way we currently move people and goods is clear.

The available solutions are equally plentiful and promising. Conversion of personal vehicles, transit buses, trucks, and locomotives to low- and zero-emission forms of power and providing alternative charging and fueling infrastructure is a rapidly expanding area that several witnesses will discuss today. Support of this transition through robust Federal investment was a key element of the bill this committee approved in the last Congress as part of H.R. 2.

Boosting investment in low- and zero-emission, and more efficient modes of transportation, including transit, freight and pas-

senger rail, walking, and biking, is an equally important mitigation strategy, and we have several witnesses who actively work on projects to expand mode choice.

H.R. 2 substantially increased investment in each of these modes while enhancing the safety of these options.

Improved operational practices to reduce idling and traffic congestion will also help make better use of the infrastructure we have. That is the smart use of our infrastructure where we get more throughput without having to add lane-miles.

And innovation within the construction sector to reduce or trap emissions produced through the life cycle of transportation projects holds significant promise. H.R. 2 focuses heavily on the development and implementation of these technologies and practices.

Each of these ideas taken together can add up to a substantial difference in mitigating the effects of climate change. Yet we know that we need to adapt. It is very real right now.

Strengthening the ability to anticipate, withstand, and recover from natural disasters and extreme weather is a major portion of the U.S. response to the ongoing impacts of climate change.

We will hear case examples from witnesses today about how these investments are no longer optional but a necessity, and that this reality is impacting the way we build and rebuild transportation assets.

Climate is changing rapidly. Time is not on our side. This committee intends to take bold steps again this Congress to support significant emissions reductions from the transportation sector, and support for action among the business community is growing.

The U.S. Chamber of Commerce recently issued updated policy that states, “durable climate policy must be made by Congress.”

At this time, I will insert into the record a statement from the U.S. Chamber of Commerce, submitted for this hearing in support of addressing climate change.

Without objection, so ordered.

[The information follows:]

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**Statement of Ed Mortimer, Vice President, Transportation and Infrastructure, U.S. Chamber of Commerce, Submitted for the Record by Hon. Peter A. DeFazio**

The U.S. Chamber of Commerce (the Chamber) is the world’s largest business federation representing the interests of more than 3 million businesses of all sizes, sectors, and regions, as well as state and local chambers and industry associations. The Chamber is dedicated to promoting, protecting, and defending America’s free enterprise system.

More than 96% of Chamber member companies have fewer than 100 employees, and many of the nation’s largest companies are also active members. We are therefore cognizant not only of the challenges facing smaller businesses, but also those facing the business community at large.

Besides representing a cross-section of the American business community with respect to the number of employees, major classifications of American business—e.g., manufacturing, retailing, services, construction, wholesalers, and finance—are represented; the Chamber has membership in all 50 states.

The Chamber’s international reach is substantial as well. We believe that global interdependence provides opportunities, not threats. In addition to the American Chambers of Commerce abroad, an increasing number of our members engage in the export and import of both goods and services and have ongoing investment activities. The Chamber favors strengthened international competitiveness and opposes artificial U.S. and foreign barriers to international business.

## INTRODUCTION

Chairman DeFazio, Ranking Member Graves, and members of the Committee, thank you for the opportunity to provide this statement for the record concerning the urgent need for bipartisan congressional action to modernize America's infrastructure that can bring innovation and technology to address climate issues. My name is Ed Mortimer and I serve as the Vice President of Transportation and Infrastructure at the U.S. Chamber of Commerce.

## NEED FOR ACTION

The Chamber has been a long-time advocate for modernizing America's infrastructure. A central component of that modernization should be policies designed to advance a cleaner, stronger transportation system—not just the roads, bridges, and transit systems that are the foundation of America's infrastructure, but the enabling systems that are necessary to modernize transportation in America.

The most recent Infrastructure Report Card from the American Society of Civil Engineers highlights the lack of infrastructure investment and the need to not just fix existing infrastructure but to modernize the aging network using the latest private sector ingenuity to build infrastructure that is durable and resilient to changing climate conditions.

The Chamber believes that effectively addressing climate change will require citizens, government, and business to work together. The American business community is central to this effort, not only through its leadership in developing and investing in innovative solutions and deploying low-carbon technologies, but also as a partner in the development of sound policies to guide this transition.

The Chamber has outlined a set of principles (attached) that shapes our advocacy and policy development as we engage with policymakers at both ends of Pennsylvania Avenue. This includes leveraging the power of business, maintaining U.S. leadership in climate science, embracing technology and innovation, aggressively pursuing energy efficiency, promoting resilient climate infrastructure, supporting trade in U.S. technologies and products, and encouraging international cooperation.

Our principles also reflect the overall consensus of the Chamber's membership that Congress should pursue market-based solutions to accelerate emissions reductions, and that the Chamber will continue its engagement to pursue meaningful, achievable progress to address the challenge of climate change.

Overall, our message remains clear: inaction is not an option.

Two areas the Chamber believes can bring bipartisan support as this Committee formulates a surface transportation bill include increased investment in electric vehicle (EV) charging stations and promoting the design and construction of modern, resilient infrastructure.

## INCENTIVES TO PROMOTE BUILDING ALTERNATIVE VEHICLE INFRASTRUCTURE

As this Committee looks to formulate policy to modernize the nation's infrastructure, providing flexibility and investment opportunities for state and local governments to make investments in electric charging stations are a good start.

The private sector continues its efforts to diversify the energy sources of new vehicles entering the fleet over the next 20 years. Several automakers and trucking industry companies have publicly stated their intent, without government mandate, to move toward lower emission vehicles. Building upon these efforts to encourage more private sector actions is an area many Democrats and Republicans support.

With many automakers expressing their intent to significantly increase production of electric vehicles and other alternatives, any infrastructure bill should include adequate investments to allow states flexibility to make such investments as we look to modernize the network.

To build on strong bipartisan support for the concept that users of our infrastructure must help fund the roads, bridges and transit they depend on, we must also ensure that electric and other alternative fuel vehicles contribute to this critical investment.

More than 30 states have instituted an EV fee that approximates their use of the surface transportation network, and we believe such an approach must be included in any federal legislation. Ensuring EVs and other alternative fuel vehicles invest in a modern transportation network will broaden support for this important effort from Congress and the stakeholder community.

## BUILDING MODERN, RESILIENT INFRASTRUCTURE

The Chamber believes there is broad agreement on both sides of the aisle and among experts across our nation that advancing resilience is a win-win for the environment and the economy, in particular to responding to climate risks to companies and communities.

The U.S. Chamber supports building modern, resilient infrastructure, and pre-disaster mitigation promotes projects that harden infrastructure to prepare, in advance, for future crises.

An example of what bipartisan solutions can be made includes enactment of the Safeguarding Tomorrow through Ongoing Risk Mitigation Act (STORM) of 2020. We were pleased to work with the American Society of Civil Engineers, the Mississippi River Cities and Towns Initiative, and other stakeholders on this important legislation that will capitalize state revolving loan funds that provide low-interest loans for pre-disaster mitigation. We appreciate Congress' thoughtful leadership in passing this legislation.

Enactment of this important legislation is just one tool among many that are needed. More must be done.

The U.S. Chamber has outlined our resilience policy principles (attached). Below are a few practical suggestions we believe could advance smart, bipartisan policy reforms:

- Elevate resilience as a national priority by establishing a chief resilience officer reporting directly to the President and developing a national resilience strategy, leveraging current interagency coordination under the Federal Emergency Management Agency (FEMA).
- Urge FEMA to provide the full 6% funding for the Building Resilient Infrastructure and Communities program.
- Set aside a small portion of infrastructure funding to create a resilience pre-development fund to assist small disadvantaged communities in the planning and preparing for pre-disaster mitigation projects.
- Broaden the focus on pre-disaster mitigation as the infrastructure debate proceeds across the federal family of agencies and programs (e.g., highway and Community Development Block Grant programs).
- Encourage coordination among relevant federal and state agencies to align actions, avoid duplication, and optimize resources.
- Convene state lifeline infrastructure leaders to share experiences across program areas and identify federal policy implementation and funding needs.
- Incentivize and institutionalize resilience by providing additional funding, technical assistance, and other benefits to states and communities that are most active in implementing pre-disaster mitigation, such as green infrastructure and other nature-based solutions.
- Pilot small business planning grants to catalyze strategic, contingency planning among small businesses ahead of the next disaster that may reduce possible future losses and improve resilience.
- Ensure that projects reduce risks and are cost effective by funding actions where the benefits outweigh the costs.

## CHAMBER WORKS TO BROADEN STAKEHOLDER SUPPORT FOR ACTION

To build upon our efforts to promote infrastructure modernization, the U.S. Chamber of Commerce announced in January with the Bipartisan Policy Center an important new campaign—"Build by the Fourth of July," (BB4J) which, as the name implies, calls on Congress to pass comprehensive infrastructure legislation into law by July 4, 2021. This effort includes more than 300 organizations, including major voices from business, labor, and environmental groups. While these organizations will not agree on every issue, we hope that this unified message will provide critical momentum to finally pass a historic infrastructure bill that the country sorely needs.

In our view, a successful "BB4J" effort must be comprehensive, addressing not only crumbling roads, bridges, and transit, but many other components of U.S. infrastructure, and do so in a manner that stimulates our economic recovery, improves federal project approvals, and accelerates environmental progress of recent decades. As the pledge states, "As a nation we must be able to build big things promptly to accelerate the economic recovery and build the resilient low-carbon economy of the future. We need a durable commitment and clear strategy."

Our coalition recently sent a letter to every member of Congress (attached) urging their support for these priorities.

## CONCLUSION

The time to make important infrastructure investments that address climate is NOW. Delaying action only makes the decisions more difficult and projects more costly. From the business community's perspective, the question is not *if* we need to make these decisions, but *when*.

Infrastructure investment has traditionally enjoyed broad bipartisan support, and we believe the Administration, House, and Senate must act to address the critical needs of a system that was built 60–150 years ago. We must plan to provide every American a 21st Century infrastructure system that addresses climate issues and provides multimodal mobility solutions. This critical effort starts with a timely surface transportation authorization.

The Chamber has also provided lawmakers with a variety of funding and financing options to pay for infrastructure improvements. For surface transportation, we continue to believe adjusting the federal motor fuel tax, then transitioning to a vehicle miles traveled mechanism must be considered.

Bottom line, we believe there is much common ground on which all sides of this discussion could come together to address the important climate issues the Committee is discussing today with policies that are practical, flexible, predictable, and durable. As this debate evolves with Congress and the Administration, we pledge to work constructively with this committee to engage on and evaluate specific policy approaches. Thank you for considering our views.

## ATTACHMENTS:

<https://www.uschamber.com/climate-change-position>

<https://www.uschamber.com/series/above-the-fold/resilience-good-public-policy#:~:text=According%20to%20a%20Metlife%20and,the%20environment%20and%20the%20economy.>

Mr. DEFAZIO. I thank each of our witnesses for being here today and persevering through what I know may be a long hearing. I know your time is valuable. The committee is grateful for your participation, and the time we invest in discussion today is nothing compared to the time we stand to preserve if we get this right.

[Mr. DeFazio's prepared statement follows:]

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**Prepared Statement of Hon. Peter A. DeFazio, a Representative in Congress from the State of Oregon, and Chair, Committee on Transportation and Infrastructure**

Today's hearing marks an important step on the path to a more sustainable transportation future. The depth of interest in this hearing—which resulted in eight witnesses today—demonstrates the willingness and the readiness of corporate America to be active partners in solving the monumental challenge we face.

As we will hear today, both private sector action and sound public policy are necessary to meaningfully address climate change. This is not about whether we need either private voluntary reductions or government measures. This is an all-hands-on-deck situation.

We will need commitment at all levels of government, and from the private sector, to achieve significant reductions in carbon pollution in the transportation sector, to transition to large-scale decarbonization, and to invest in the infrastructure upgrades to make our assets and facilities resilient to extreme weather events. Failure to protect assets and to invest in emissions reductions will have real financial consequences to businesses and transportation agencies both now and in the long run. And we will hear these messages loud and clear today.

In 2021, we have thankfully moved beyond the polarizing discussion of whether we need to act, which has stalled progress on an existential threat to our planet and our citizens for far too long. If any of my colleagues are here today to take that line of argument, I urge you to review the prepared remarks of our panel. Every one of the business leaders here today can affirm that denial of reality is a bad business decision.

But these decisions are about more than just the bottom line. We will hear from our panel today that the transportation sector in particular holds tremendous promise for new norms that will move the needle on climate change. To quote from Mr.

Smith's written testimony: "We believe that a connected world is a better world ... and we recognize that with the privilege of connecting the world also comes the responsibility of being good stewards of the planet."

While some sectors have begun to move in the right direction on climate, the same is not true of the transportation sector, which is the largest contributor to greenhouse gas (GHG) emissions in the United States. Over the last three decades, those emissions have risen 24 percent, more than any other sector. Passenger and freight vehicles account for 82 percent of transportation sector emissions, which is why much of this hearing will focus on surface transportation policy. The contribution to the carbon pollution problem from the way we currently move people and goods is clear.

The available solutions in the transportation sector are equally plentiful and promising. Conversion of personal vehicles, transit buses, trucks, and locomotives to low- and zero-emission forms of power and providing alternative charging and fueling infrastructure is a rapidly expanding area that several witnesses will discuss today. Support of this transition through robust Federal investment was a key element of the bill this Committee approved last Congress, H.R. 2.

Boosting investment in low- and zero-emission, and more efficient, modes of transportation including transit, freight and passenger rail, walking, and biking is an equally important mitigation strategy, and we have several witnesses who actively work on projects to expand mode choice. H.R. 2 substantially increased investment in each of these modes, while enhancing the safety of these options.

Improved operational practices to reduce idling and traffic congestion will also help make better use of the infrastructure we have. And innovation within the construction sector to reduce or trap emissions produced throughout the lifecycle of transportation projects holds significant promise. H.R. 2 focuses heavily on the development and implementation of these technologies and practices.

Each of these ideas, taken together, can add up to a substantial difference in mitigating the effects of climate change. Yet we know that the need to adapt is very real, right now. Strengthening the ability to anticipate, withstand, and recover from natural disasters and extreme weather is a major portion of the U.S. response to the ongoing impacts of climate change. We will hear case examples from witnesses today about how these investments are no longer optional, but a necessity, and that this reality is impacting the way we build and rebuild transportation assets.

The climate is changing rapidly. Time is not on our side. This Committee intends to take bold steps again this Congress to support significant emissions reductions from the transportation sector. And support for action among the business community is growing. The U.S. Chamber of Commerce recently issued updated policy that states "durable climate policy must be made by Congress." At this time, I'll insert into the record a letter from Chamber President Suzanne Clark submitted for this hearing in support of addressing climate change. Without objection, so ordered.

Thank you to each of our witnesses for being here today and persevering through what may be a long hearing. I know your time is valuable and this Committee is grateful for your participation. The time we invest in the discussion today, however, is nothing compared to the time on earth we stand to preserve if we get this right.

Mr. DEFAZIO. So, again, thanks to all, and I will note that Mr. Smith has noted that he can only be here for 2 hours. I hope that the other witnesses can stay. I expect we may go a little bit longer than that.

With that I yield to the ranking member, Mr. Graves.

Mr. GRAVES OF MISSOURI. Thank you, Mr. Chairman.

I think we can all agree that we want clean air and clean water for our communities, and that we have to prepare for the challenges that are posed by severe weather events. And those are happening with greater frequency and intensity.

While climate change is often considered to be a loaded issue that sends us all to our respective opposing partisan corners, I can tell you that protecting the environment is very much a bipartisan issue.

We have leaders on this committee who have been working hard to address the issue, and this committee has a bipartisan track record of addressing issues like resiliency and mitigation, which

prepares our infrastructure to withstand the impacts of climate change.

We are willing to work with our Democratic colleagues on goals of reducing emissions in transportation. However, my colleagues must also understand that people are not going to stop driving cars or flying on airplanes.

While dramatically increasing funding for transit and passenger rail as proposed in last year's H.R. 2 is going to take some cars off of the road in urban centers, it is often inefficient and very much unjustified in rural America.

Meanwhile, there are a couple of key points that help keep things in perspective. America is the world leader in reducing emissions, and according to the International Energy Agency, U.S. emissions reductions in the last 10 years have been the largest in world history. Plus, goods manufactured in the U.S. now are 80 percent more carbon-efficient than the world average.

There are a lot of innovative American companies that are coming up with some great solutions to reduce our emissions, and it is important as we hear from our witnesses today about the solutions that they have developed on their own so that Congress does not trample on the progress that they are making.

What works for larger companies may not work for smaller companies. Larger companies have the resources to be able to deploy.

The way to lead the world to becoming greener and more resilient is not through unachievable, one-size-fits-all policies or spending trillions on a patchwork of pilot programs. Heavy-handed mandates are only going to waste money and constrain innovation and put many of our job creators out of business.

Instead, incentives that spur American innovation and accelerate what is already being done are the key to achieving our climate goals without taking down the economy and regulating jobs simply out of existence.

I look forward to hearing from the witnesses today on the unique ways in which each of them is working to find a viable, long-term solution to reducing carbon use and growing American businesses.

[Mr. Graves of Missouri's prepared statement follows:]

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**Prepared Statement of Hon. Sam Graves, a Representative in Congress from the State of Missouri, and Ranking Member, Committee on Transportation and Infrastructure**

Thank you, Chair DeFazio. We can all agree that we want clean air and clean water for our communities, and that we must prepare for the challenges posed by severe weather events that are happening with greater frequency and intensity.

While "climate change" is often considered to be a loaded issue that sends us all to our respective partisan corners, I can tell you that protecting the environment has bipartisan interest. We have leaders on this Committee who have been working hard to address this issue. And this committee has a bipartisan track record of addressing issues like resiliency and mitigation, which prepares our infrastructure to withstand the impacts of climate change.

Having said that, you will not find bipartisan support for heavy-handed government mandates, one-size-fits-all policies, or the complete upending of our traditional infrastructure programs to enact excessive climate goals that look more like the liberal agenda outlined in the Green New Deal.

We are willing to work with our Democratic colleagues on the goal of reducing emissions in transportation. However, my colleagues must also understand that people are not going to stop driving cars or flying on airplanes.

While dramatically increasing funding for transit and passenger rail—as proposed in last year’s H.R. 2—may take some cars off the road in urban centers, it is often inefficient and unjustifiable in rural America. Additionally, COVID has completely disrupted our transportation network, and it’s important to see how the system re-balances itself and what our new reality will look like.

Meanwhile, I think there are a couple of key points that help keep things in perspective.

America is the world leader in reducing emissions. According to the International Energy Agency, U.S. emissions reductions in the last 10 years have been the largest in world history. Plus, goods manufactured in the U.S. now are 80 percent more carbon-efficient than the world average.

There are a lot of innovative American companies coming up with solutions to reduce our emissions. It’s important, as we hear from our witnesses about the solutions they have developed on their own, that Congress doesn’t trample on the progress they are making.

We must also keep in perspective that while many of these businesses testifying today are great American companies, they have the resources and manpower to change and adapt more quickly. What works for larger companies may not work for the smaller operators.

The way to lead the world in becoming greener and more resilient is not through unachievable, one-size-fits-all policies or spending trillions on a patchwork of pilot programs. Heavy-handed mandates will only waste money, constrain innovation, and put many of our job-creators out of business.

Instead, incentives that spur American innovation and accelerate what is already being done are the key to achieving our climate goals without taking down the economy and regulating jobs out of existence.

I look forward to hearing from our witnesses today on the unique ways in which each of them is working to find a viable, long-term solution to reducing carbon use and growing American business.

Mr. GRAVES OF MISSOURI. And with that, I would like to yield my remaining time to the ranking member on the Select Committee on the Climate Crisis, Mr. Graves.

Mr. GRAVES OF LOUISIANA. Thank you, Ranking Member Graves, for the yield.

Mr. Chairman, I just want to follow up quickly on the conversation that the ranking member noted and also on your comments.

Mr. Chairman, as we move forward, we have got to keep in mind that, number one, this committee has jurisdiction over transportation infrastructure and that, like the following up on the successful work of the FAST Act and other bills we have done in the past, we need to continue to advance our transportation solutions, and we need to do it in an efficient way because there is no question that we are decades behind where we need to be in regard to infrastructure progress, and it is impacting our economy. It is squeezing our economy.

Mr. Chairman, as we move forward, we also need to keep in mind that the United States has reduced emissions more than the next 12 emissions-reducing countries combined in regard to emission reductions in the energy sector. We are the global leader today in reducing emissions.

And we have done that not through regulation, not through requirements, not through picking winners and losers in technology, but by letting the markets do what they do.

As a matter of fact, when President Obama put the Clean Power Plan together, his objective was to reduce emissions by 32 percent, by 32 percent off of a 2005 baseline, and the goal that President Obama set was to do that by 2030, and, Mr. Chairman, without the impact of regulations, without the impact of mandates, without the

impact of picking winners and losers, we actually hit that target nearly 11 years earlier under President Trump.

And we hit it in 2019, proving once again that we can move forward with affordable solutions, with clean solutions, with solutions that are based on U.S. resources and U.S. technology that are exportable as opposed to picking winners and losers and moving in the direction where we subject ourselves to the manufacturing and production capabilities of China and other countries that do not share our objectives.

So, Mr. Chairman, I look forward to working with everyone on this committee to build upon the successes and the lessons learned that we have had in the energy sector in reducing emissions and to make sure that we have a transportation bill with some clean energy solutions, not a climate change bill with transportation afterthoughts.

I yield back.

Mr. GRAVES OF MISSOURI. Mr. Chairman, if you do not mind, I have got two letters from the Portland Cement Association and the American Public Gas Association. Could I have unanimous consent to insert them in the record?

Mr. DEFAZIO. Without objection, so ordered.

[The information follows:]

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**Letter of March 17, 2021, from Sean O'Neill, Senior Vice President of Government Affairs, Portland Cement Association, Submitted for the Record by Hon. Sam Graves of Missouri**

MARCH 17, 2021.

Hon. PETER DEFAZIO,  
Chairman,  
*Transportation and Infrastructure Committee, 2165 Rayburn House Office Building,  
Washington, DC.*

Hon. SAM GRAVES,  
Ranking Member,  
*Transportation and Infrastructure Committee, 2164 Rayburn House Office Building,  
Washington, DC.*

DEAR CHAIRMAN DEFAZIO AND RANKING MEMBER GRAVES:

The Portland Cement Association (PCA), which represents cement manufacturers across the country, appreciates the opportunity to submit comments for the Transportation and Infrastructure Committee's "The Business Case for Climate Solutions" hearing. We believe it is important to take steps to combat climate change and believe cement is critical to building infrastructure to better withstand the climate crisis.

As you may know, PCA is a premier policy, research, education, and market intelligence organization serving America's cement manufacturers. PCA's members represent 93 percent of the U.S. cement production capacity and have facilities in all 50 states. Our members manufacture portland cement, the primary ingredient in concrete, an essential construction material and a basic component of our nation's infrastructure. Portland cement is used in the construction of highways, bridges, tunnels, mass transit systems, airports, runways, locks, dams, and wastewater infrastructure. Cement and concrete product manufacturing, directly and indirectly, employs approximately 600,000 people across the United States, and our collective industries contribute over \$100 billion to our economy.

The cement industry commends the attention being placed by the Committee on combatting climate change. PCA and our members are committed to working with Congress to ensure our industry continues playing our part in building our nation's resilient infrastructure and lowering our industry's carbon footprint. Recently, PCA announced our ambition to reach carbon neutrality 2050 through the entire concrete value chain. We are in the process of drafting our industry's roadmap to carbon neutrality and look forward to sharing the roadmap with you upon its completion.

From an infrastructure perspective, there is an opportunity to advance policy that reduces carbon emissions associated with the use phase of an infrastructure asset and considers the carbon sink opportunity associated with carbonization. According to the Environmental Protection Agency, the transportation sector makes up 28 percent of the United States' total emissions. Critical to reducing these emissions is designing and building transportation assets with elements to address the impacts of climate change. It is important to recognize that from an infrastructure perspective, this means not only building projects that will reduce transportation-related emissions but also improving the resiliency of our nation's infrastructure. Concrete construction plays an important role in both reducing transportation related emissions and improving the resiliency and sustainability of transportation assets.

Part of reducing transportation-related emissions is accounting for emissions reductions during the use of a transportation asset. A critical part of reducing use phase emissions is the design and construction of roadways that reduce excess fuel consumption. Whether gasoline, diesel, or electric, all vehicles use energy to move, but some of that energy is wasted. Pavement vehicle interaction (PVI) is the relationship between a vehicle's tires and a road's surface, such as roughness, texture, and deflection. PVI can lead to excess fuel consumption and greenhouse gas emissions. Research by the Massachusetts Institute of Technology's (MIT) Concrete Sustainability Hub of Virginia's interstate highway system identified 1 million tons of carbon dioxide emissions associated with excess fuel consumption over a seven-year period.<sup>1</sup> MIT's Concrete Sustainability Hub research also shows that 1.3 percent of Virginia's interstate roadways are responsible for 10 percent of its total greenhouse gas emissions. Improving PVI is especially important on our nation's freight corridors. Research has shown that lessening the impacts of deflection of 40-ton trucks could generate up to four percent in fuel savings. Building and maintaining stiffer pavements is important to reducing transportation related greenhouse gas emissions. Policies seeking to reduce transportation related emissions should seek to advance road construction using materials that translate to stiffer pavements.

Additionally, as steps are taken to combat climate change, it is important to recognize that certain infrastructure building materials can absorb more carbon than is released as carbon dioxide, therefore serving as a carbon sink. Specifically, a chemical reaction called carbonation occurs in concrete roadways, which forms calcium carbonate. Calcium carbonate forms when carbon dioxide from the air reacts with the water in concrete pores, and then with calcium compounds in concrete. As a result, the concrete roadway serves as a concrete sink. Research by MIT's Concrete Sustainability Hub demonstrates that the carbonation process could offset five percent of the carbon dioxide emissions generated from the cement used in U.S. pavements.<sup>2</sup> MIT's research also shows that 5.8 million tons of carbon dioxide could be sequestered, with 2.8 million tons from the use phase and 3 million tons coming from the end of life. This research demonstrates that policy seeking to reduce transportation related emissions consider the full life cycle of a project.

The federal government's 2019 National Climate Assessment, compiled by 13 agencies, highlights that extreme weather events will increasingly disrupt and damage critical infrastructure in communities across the country due to an increase in heavy precipitation, coastal flooding, heat, and wildfires with regional differences. PCA encourages the Committee to prioritize combatting climate change by investing in projects to improve resiliency and adaptation, enabling the nation's infrastructure to withstand a disaster better and return to operation quickly. Concrete is a durable and resilient building material critical to building infrastructure that can withstand the increase in extreme weather events. The cement industry recognizes that both gray infrastructure and natural and nature-based features (NNBF) are used to improve the resiliency of infrastructure assets. Many times, both features are used in concert with each other to improve the resiliency of infrastructure. It is important that policy seeking to improve the resiliency of infrastructure provides engineers the discretion to choose the best features on a project-by-project basis. To do this, it is important to consider the costs and benefits of project features over the life cycle of the project. Doing so will ensure the best and most cost-effective project alternative over the long-term are used in each instance.

PCA appreciates the opportunity to share our perspective on climate solutions as it relates to transportation and infrastructure. If you have any further questions, please feel free to contact Sean O'Neill, PCA's Senior Vice President of Government Affairs.

<sup>1</sup> [http://cshub.mit.edu/sites/default/files/documents/CSHub\\_PVI\\_v4\\_final\\_print.pdf](http://cshub.mit.edu/sites/default/files/documents/CSHub_PVI_v4_final_print.pdf)

<sup>2</sup> <https://cshub.mit.edu/sites/default/files/images/0120%20Carbon%20Uptake%20Brief.pdf>

Sincerely,

SEAN O'NEILL,  
*Senior Vice President of Government Affairs, Portland Cement Association.*

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**Letter of March 17, 2021, from Dave Schryver, President and CEO, American Public Gas Association, Submitted for the Record by Hon. Sam Graves of Missouri**

MARCH 17, 2021.

Hon. PETER A. DEFAZIO,  
*Chairman,  
House Committee on Transportation and Infrastructure, 2165 Rayburn House Office Building, Washington, DC.*

Hon. SAM GRAVES,  
*Ranking Member,  
House Committee on Transportation and Infrastructure, 2164 Rayburn House Office Building, Washington, DC.*

Re: March 17, 2021 Full Committee Hearing on “The Business Case for Climate Solutions”

DEAR CHAIRMAN DEFAZIO AND RANKING MEMBER GRAVES,

APGA represents roughly 1,000 retail natural gas distribution entities owned by, and accountable to, the citizens they serve. They include municipal gas distribution systems, public utility districts, county districts, and other public agencies that own and operate natural gas distribution infrastructure in their communities. Their primary focus is on providing safe, reliable, affordable, efficient, and clean natural gas service to their customers and communities. APGA members deliver natural gas to be used for residential space and water heating, cooking, and clothes drying, as well as for various commercial and industrial applications. In regard to the March 17th full Transportation and Infrastructure Committee hearing on “The Business Case for Climate Solutions,” several public natural gas utilities also supply fuel for natural gas vehicle (NGV) fueling stations, and many maintain and manage fueling operations for their own fleets or for vehicles within their community.

APGA was very appreciative of the discussion on transportation technologies, and the importance of low and no-emission vehicles in America’s pursuit of a clean energy future. Public natural gas utilities continue to play a role in reducing greenhouse gas (GHG) emissions in all sectors. Our members are good stewards of their systems and the environment; they also take seriously their role in providing affordable and reliable energy. In addition to the residential and industrial uses most are more familiar with, natural gas is used for transportation. NGVs have significantly less emissions and given the price of natural gas, offer relative price stability, which makes them an attractive option for urban fleets, long-haul shipping, and municipal or local vehicles. APGA knows that natural gas and the infrastructure and workforce that get it to America’s homes and businesses, as well as NGV fueling stations, are essential in the US furthering all aspects of clean energy policy, while still ensuring a resilient and economical energy source. The following further details how NGVs can play a critical role in achieving America’s transportation decarbonization goals. APGA suggests that the Committee consider this input, as it develops clean energy legislation, recognizing complete electrification of our nation’s transportation is bad policy.

Many APGA members are heavily invested in natural gas transportation fuels, mostly via compressed natural gas (CNG). This fuel has proven to be safe, clean, abundant, and affordable, and our members are proud to distribute. NGVs increase fuel diversity, spurring economic growth and potential for expanded application across the country. NGVs also provide two specific benefits that other fuels cannot: unmatched fuel delivery reliability and the ability for communities to reach attainment status under the National Ambient Air Quality Standards (NAAQS), as set forth in the Clean Air Act.<sup>1</sup> Municipalities take advantage of these characteristics by running and maintaining their own natural gas fleets, including maintenance and utility trucks.

CNG is resilient. Its delivery is only dependent on the availability of the natural gas via underground pipelines. Gasoline and electricity, on the other hand, can only be used so long as gasoline supply remains uninterrupted, and the electricity infra-

<sup>1</sup>“Clean Air Act” Sections, P.L. 91–604, Sec. 109.

structure remains functional. However, these are often disrupted in severe weather events. For example, the 2017 hurricane season resulted in widespread power outages and major gasoline shortages. Fortunately, natural gas was fully functional through it all. NGVs proved resilient for two reasons. One, the supply could be delivered relatively uninterrupted. Natural gas pipelines, being underground, were mostly protected from debris, wind, and storm surges. Second, CNG can be pumped without the use of electricity. The fueling stations are run on generators that are fueled by natural gas. With no need for electricity, the pumps were able to flow CNG to stations reliably.

There is an environmental benefit to NGVs, too. They offer the fastest path to reducing heavy-duty vehicle emissions.<sup>2</sup> As an example, California has the most rigorous emission standards for nitrogen oxides (NOx), but the Cummins Westport 8.9-liter ISL G NZ engine is certified to meet the California Air Resource Board (CARB) standard. As well, this same manufacturer has an engine with near-zero NOx emissions. Generally speaking, these innovations from Cummins Westport are 90% cleaner than what the current EPA standard requires.<sup>3</sup> Everyone is discussing electricity as the next transportation fuel, but why dismiss natural gas so quickly? Even in states like California, Oregon, and Washington that have the cleanest electrical grids in the nation, the NOx emitted through emissions is much worse than the direct use of natural gas in a heavy-duty vehicle with a natural gas engine.<sup>4</sup>

The US may soon face challenges of how to properly dispose of spent vehicle batteries. If electric vehicles are to be the future of transportation, the grid will likely need significant upgrades. Research by the Smart Electric Power Alliance (SEPA), shows that 75 percent of all electric utilities in the United States are not prepared to meet expected future demand in terms of grid capacity and distribution needs.<sup>5</sup> As proponents of full-fuel-cycle metrics, APGA also wants to highlight that the Union of Concerned Scientists has provided it takes so much energy to make batteries that electric vehicles with a 250-mile range have a carbon footprint 68 percent higher due to manufacturing.<sup>6</sup>

There are additional emissions reductions opportunities if renewable natural gas (RNG) is utilized in the transportation fuel market. Both APGA members, as well as private companies, are investing in this technology. The United Parcel Service (UPS) is making significant investments in RNG and CNG transportation initiatives. They recently announced plans to purchase more than 6,000 natural gas-powered trucks between 2020 and 2022, a commitment representing a \$450 million investment in the company's alternative fuel program to reduce emissions and a complement to its current RNG commitments.<sup>7</sup> Also, buses used by cities for transit can take advantage of RNG to lower emissions in their locales. Fueling with natural gas can lower GHG emissions about 12 percent, when compared to diesel. However, in research led by CARB, buses fueled with RNG can yield a carbon-negative lifecycle emissions result. Additionally, this CARB data shows RNG holds the lowest carbon intensity of any on-road vehicle fuel, including fully renewable electric.<sup>8</sup> APGA and its members support RNG technologies in the transportation sector and all others. RNG is derived from the breakdown of organic wastes and processed for use in existing natural gas infrastructure, interchangeable with geologic natural gas in homes, businesses, vehicles, manufacturing, and industrial applications. RNG, a low-carbon pathway, takes an existing carbon-emitting waste stream, either from waste or agriculture, and recycles into a usable product. APGA members' support for RNG demonstrates their investment in balanced energy solutions as it lessens environmental impacts. The Committee should consider federal support for this valuable technology.

APGA's members agree that action is needed to further clean transportation policy and are grateful for the full Committee holding this hearing, but APGA urges

<sup>2</sup>"Environment," NGV America, Accessed March 15, 2021, <https://www.ngvamerica.org/environment/>.

<sup>3</sup>"Report Overview One Sheet," NGV America, Accessed March 15, 2021, <https://cdn.ngvgamechanger.com/pdfs/game-changer-graphic-onesheet.pdf>.

<sup>4</sup>Ibid.

<sup>5</sup>"Utilities and Electric Vehicles: Evolving to Unlock Grid Value," Smart Electric Power Alliance, Accessed March 15, 2021, <https://sepapower.org/resource/utilities-electric-vehicles-evolving-unlock-grid-value/>.

<sup>6</sup>"Cleaner Cars from Cradle to Grave," Union of Concerned Scientists, Published Oct 29, 2015, <https://www.ucsusa.org/resources/cleaner-cars-cradle-grave>.

<sup>7</sup>"UPS adding 6,000 NGVs," Shale Directories, Accessed March 15, 2021, <https://www.shaledirectories.com/blog/ups-adding-6000-ngvs/>.

<sup>8</sup>"Maximize Clean Transit Investment: Natural Gas Outperforms Electric," Accessed March 15, 2021, <https://ngvamerica.org/wp-content/uploads/2021/02/NGVA-Transit-Full-Study-December-2020.pdf>

pursuit of equitable energy policy through a balanced solution. Do not pursue only electric vehicles. This drastic approach misses the mark discarding the value natural gas infrastructure and NGVs has delivered through decreased emissions now and will continue to deliver well into the future through innovations around increased use of RNG. APGA hopes the Committee will pursue policies that allow for multiple fuels, with a focus on environmental benefits balanced with reliability and affordability for all Americans. Thank you again for the opportunity to submit this input. APGA stands ready to work together in this effort.

DAVE SCHRYVER,  
*President & CEO, American Public Gas Association.*

Mr. DEFAZIO. We will now proceed to our witnesses.

Mr. Jack Allen, chief executive officer and chairman, Proterra, Inc.

Mr. Shameek Konar, chief executive officer, Pilot Flying J, on behalf of the National Association of Truckstop Operators.

Mr. Troy Rudd, chief executive officer, AECOM.

Mr. Rafael Santana, president and chief executive officer of Wabtec.

Mr. Frederick Smith, chairman and chief executive officer of the Federal Express Corporation.

Ms. Laurie Giammona, senior vice president for customer care, Pacific Gas and Electric Company.

Mr. Tom Lewis, national business line executive for climate, resilience, and sustainability at WSP USA.

And Mr. Charles Hernick, vice president of policy and advocacy, Citizens for Responsible Energy Solutions.

As I said, this is a long witness list, but I appreciate you all being here. We have your written remarks, so if you would all summarize in a 5-minute statement, that would be most desirable.

With that, Mr. Allen.

**TESTIMONY OF JACK ALLEN, CHIEF EXECUTIVE OFFICER AND CHAIRMAN, PROTERRA, INC.; SHAMEEK KONAR, CHIEF EXECUTIVE OFFICER, PILOT FLYING J, ON BEHALF OF THE NATIONAL ASSOCIATION OF TRUCKSTOP OPERATORS; TROY RUDD, CHIEF EXECUTIVE OFFICER, AECOM; RAFAEL SANTANA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, WABTEC CORPORATION; FREDERICK W. SMITH, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, FEDEX CORPORATION; LAURIE M. GIAMMONA, SENIOR VICE PRESIDENT FOR CUSTOMER CARE, PACIFIC GAS AND ELECTRIC COMPANY; TOM LEWIS, P.E., J.D., NATIONAL BUSINESS LINE EXECUTIVE FOR CLIMATE, RESILIENCE, AND SUSTAINABILITY, WSP USA; AND CHARLES HERNICK, VICE PRESIDENT OF POLICY AND ADVOCACY, CITIZENS FOR RESPONSIBLE ENERGY SOLUTIONS**

Mr. ALLEN. Thank you, and good morning, Chairman DeFazio, Ranking Member Graves, and the members of the committee.

I thank you for the opportunity to testify at today's hearing on the business case for climate solutions.

Mr. Chairman, I want to thank you and this committee for driving the Federal surface transportation policies and funding levels that will position America to compete and lead the future of transportation globally.

The investments and overarching focus on reducing emissions through H.R. 2 are exactly the bold steps that climate change and the opportunity for jobs and new industries demand.

I am here today representing Proterra, Inc., an American electric vehicle technology company. Proterra has been delivering battery-electric transit buses to U.S. transit agencies since 2010. Our buses have delivered over 17 million miles of service, and we serve communities in over 40 States and the District of Columbia.

We have over 130 customers, including municipal transit agencies, airports, universities, and commercial businesses.

Proterra is also a leader in the design and manufacturing of battery systems and electric drivetrains for commercial vehicles, and we provide charging infrastructure solutions for agencies and fleets.

Our charging solutions enable bidirectional vehicle-to-grid applications, allowing electric vehicles to be strategic assets to the power grid.

We provide our products and our services to other vehicle manufacturers, and our technology will be powering coachbuses, schoolbuses, delivery trucks, low-floor shuttles, and construction equipment in the United States and globally, in collaboration with some of the biggest names in the industry.

Most importantly, we are an American company, an American technology leader. Our products are designed, engineered, and manufactured in our factories in the United States.

We hold over 70 patents. We employ over 600 people across the Nation, and we operate 3 U.S. factories. Our products comply with Made in America policies, and our businesses support hundreds of other U.S. businesses, including small businesses.

Over 75 percent of the components in Proterra vehicles are sourced from American companies in more than 30 States, including Illinois, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, and Texas.

As battery costs continue to decline and vehicle ranges increase, transitioning to zero-emission electric vehicles is not just the right thing to do for public health and to lower emissions, it is the smart thing to do for businesses.

Compared to just 4 miles per gallon in diesel vehicles, Proterra vehicles have a fuel economy of 25 miles per gallon equivalent and a low total cost of ownership compared to diesel or natural gas vehicles.

In addition to heavy-duty electric vehicle battery systems like Proterra's, we create economies and business opportunities well beyond transportation of goods and services. We have designed our battery systems to serve the development of multiple industries and applications.

Our battery systems are built to last. They carry 6- to 12-year warranties, and after that they still have the capacity for second-life applications, such as stationary energy storage, and beyond that, our batteries are designed for easy separation of components and are recyclable.

The United States is positioned to lead the world in this emerging market for clean energy and clean mobility. This opportunity

for U.S. leadership and manufacturing expansion is worthy of strong support from the Federal Government.

The Federal Government, including the work of this committee, has already played a critical role in the early adoption of electric vehicle technology, and we ask that you continue to do so.

Public transit funding through the FAST Act's Low or No Emission Vehicle program, for example, has accelerated our technology development to support the demand from U.S. transit agencies' investments in battery-electric buses.

By driving greater investment into the market, the Federal Government can send a strong signal to the industry and to the supply chains that the United States is committed to electrification, strengthening domestic supply chains for manufacturing and materials that will lower cost through economies of scale while creating even more American jobs in this rapidly growing global market.

Thank you for the opportunity to testify before you today, and I look forward to answering your questions.

Thank you.

[Mr. Allen's prepared statement follows:]

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**Prepared Statement of Jack Allen, Chief Executive Officer and Chairman,  
Proterra, Inc.**

Chairman DeFazio, Ranking Member Graves, and Members of the Committee, thank you for the opportunity to testify at today's hearing on "The Business Case for Climate Solutions."

My name is Jack Allen, and I am the CEO of Proterra.

I am honored to appear before you today to discuss the opportunity for American industry to drive the next wave of innovation and economic growth and provide solutions to reduce greenhouse gas emissions through electric vehicle technology.

Proterra is a leader in the design and manufacture of battery systems and electric drivetrains for commercial vehicles, charging infrastructure solutions for commercial vehicle fleets, and zero-emission, battery-electric transit buses. Our mission is to advance electric vehicle technology to deliver the world's best performing commercial vehicles.

Proterra is an American company and an American technology leader. Our products are designed, engineered, and manufactured at our factories in the United States. We employ over 600 people across the nation, with most of those employees located at our bus production plant in Greenville, South Carolina, our battery and bus production plant in City of Industry, California, and our battery production and powertrain testing lab in Burlingame, California.

Our sole focus is battery-electric vehicles. We are not hampered by investments in legacy technologies. While the internal combustion engine has had a good run, the future is electric. Market demand for electric vehicles is rising because battery electric vehicles can meet the demands of customers at a lower cost of ownership than diesel vehicles. At the same time, electric vehicles impose fewer costs on our communities and advance our climate goals.

Mr. Chairman, I want to thank you and this Committee for driving federal surface transportation policies and funding levels that will position America to compete and lead the future of transportation globally. The investments and overarching focus on reducing emissions throughout H.R. 2 are the bold steps that climate change and the opportunity for jobs and new industries demand.

Federal policy supporting the development of alternative fuel technologies and investments in zero emission vehicles has been critical to U.S. competitiveness in these new industries and to advancing U.S. technology leadership. In turn, those policy signals have been followed by significant private investment in companies such as Proterra that have created new jobs. These jobs are full time, high paying, skilled jobs in manufacturing, engineering, and related support functions. While the Bureau of Labor Statistics stopped measuring employment in industries that produce goods or provide services that benefit the environment in 2013, in 2011 more than 3.4 million Americans were employed in the green sector, including over

500,000 in manufacturing jobs.<sup>1</sup> In March 2020, The Institute for Applied Economics at the Los Angeles County Economic Development Corporation reported that the electric vehicle industry in California alone has provided over \$9.6 billion in labor income and thousands of well-paying jobs. California's EV industry provided over 275,600 jobs with average annual wages of \$91,300 in 2018 alone.<sup>2</sup>

Expanding the electric vehicle industry and investing in supporting infrastructure, and commercial electric vehicles, will continue to create new job opportunities. Such efforts will ensure that American companies become global leaders in research, development and manufacturing of zero emission vehicles.

Proterra is one of those leaders.

We delivered our first battery electric bus to Foothill Transit in San Gabriel Valley over ten years ago. Since then, we have delivered over 550 battery electric transit buses throughout North America. We've sold more than a thousand electric transit buses; however, battery electric buses still only represent approximately 1% of the overall transit bus market.

Through deploying those transit buses, we have learned what it takes to design and manufacture a commercial, heavy-duty, all-electric vehicle. We have just launched our fifth-generation battery electric bus, the ZX5, in 2020, and our battery technology has been proven through over 17 million miles of revenue service. There is much to be done to transition the U.S. transportation system to zero emission fleets, and American companies, like Proterra, can meet this opportunity.

We have developed intellectual property and hold over 70 patents on our innovative solutions. In addition, we have taken our expertise in transit vehicles and built a business providing electric powertrain systems to other commercial OEMs. Our battery systems—also designed and manufactured in the United States—will power other transit buses, coach buses, school buses, delivery trucks, low-floor shuttles, and construction equipment in the United States, and other countries.

Critical to transportation electrification is charging infrastructure. In fact, recent news headlines are pressing this point to policymakers as well as the public. To date, Proterra has deployed an industry-leading 54 megawatts of charging systems for our customers through 45 projects in North America. Proterra is a full-service provider of charging solutions including the software to manage fleet charging and the expertise to plan large-scale, cost-effective charging solutions for vehicle fleets. We recently completed our largest charging installation for the City of Edmonton, Canada, with 40 Proterra electric buses and a first-of-its-kind overhead charging solution for a bus depot in North America.<sup>3</sup> Our new charging hardware manufacturer, Power Electronics, is investing in a manufacturing facility in Arizona to support Proterra's Energy business.

Proterra's business supports hundreds of suppliers, including US small businesses and disadvantaged business enterprises, women-owned businesses, and veteran-owned companies. Over 75 percent of the components in Proterra vehicles are sourced from American companies in more than 30 states including Illinois, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, and Texas.

The road to building the future of zero emission transportation in the U.S. begins with public transit. I would like to thank the Members of this Committee for your leadership in advancing the American Rescue Plan and previous COVID-19 emergency relief legislation which have provided necessary funding to public transit agencies in both urban and rural areas of the nation that provided a lifeline during the pandemic. In 2019, Americans took 9.9 billion trips on public transportation. Public transportation brings Americans to work. Over 71% of public transit riders are employed.<sup>4</sup> During the COVID-19 pandemic, our essential workers depended on public transportation and your actions helped transit agencies meet that need.

Congress also took the historic step in the FAST Act to fund the Federal Transit Administration's Low and No Program from the Highway Trust Fund. Stable funding from the authorization act buttressed by supplemental funding through the annual appropriations process for the past 4 fiscal years has provided approximately \$500 million in investments for this program which has supported over 200 separate awards to help communities electrify. As a result of this modest federal investment, more than 2700 zero emission buses are running in revenue service or soon will be

<sup>1</sup> U.S. Bureau of Labor Statistics, <https://www.bls.gov/green/home.htm>, last accessed on March 13, 2021.

<sup>2</sup> <https://laedc.org/2020/03/01/laedc-ev-industry-report/>, last accessed on March 13, 2021.

<sup>3</sup> <https://www.thefourth-revolution.com/buses/edmonton-transit-agency-becomes-first-in-north-america-to-deploy-overhead-in-depot-charging-for-electric-buses/>

<sup>4</sup> <https://www.apta.com/news-publications/public-transportation-facts/>, last accessed on March 14, 2021.

deployed.<sup>5</sup> Just as importantly, the program has demonstrated a federal commitment to electric vehicle deployment and the growing level of funding has sent a signal of support for accelerating electric vehicle adoption for public transportation.

Driven by technological and cost advancements, electrifying transportation increasingly offers a winning formula to cities, states, companies, and other fleet operators.

Over the past decade, battery costs have declined substantially. According to Bloomberg New Energy Finance, since 2010, lithium-ion battery pack prices have fallen 89 percent.<sup>6</sup> At Proterra, we have lowered our battery pack cost by 86 percent since 2017.

Over our five generations of bus development, we have routinely increased range and drive performance. Our newest model of electric bus, the 40-foot Proterra ZX5, can be equipped with 675 kilowatt hours of energy storage on board to deliver up to 329 miles of drive range, which represents the most energy storage and longest drive range of any 40-foot electric bus available in the market today.

Going electric does not mean compromising on vehicle performance. A Proterra electric transit bus can accelerate 1.5 times faster than a standard diesel bus, with nearly twice the horsepower, giving it the ability to tackle steep hills with grades up to 27 percent.

Battery-electric transit buses offer a low total cost of ownership and less volatile fuel costs when compared to internal combustion engine vehicles. Proterra's drivetrain and propulsion system enables fuel economies of up to 25 MPGe, a substantial improvement over conventional combustion engines fueled by CNG or diesel. Further because electric buses have fewer parts, require no oil changes or emissions tests, and place less wear on braking systems, operating and maintenance expenses are substantially lower compared to diesel and CNG alternatives.

Simply put, transitioning to zero-emission, electric vehicles is no longer just the right thing to do for public health reasons and to address climate change, it is the smart thing to do for businesses.

That's why private business along with cities, states, schools, airports, and others are advancing bold initiatives to switch entirely to zero-emission vehicle fleets.

Last summer, for example, 15 states and Washington D.C. signaled their intent to transition to 100% zero-emission trucks and buses by 2050.<sup>7</sup> California has continued its embrace of electric vehicles through meaningful standards advanced last year to transition commercial trucks like delivery vans, school buses and other large vehicles to zero-emission technology by 2035.<sup>8</sup>

Major automakers including GM and Ford along with truck manufacturers like Daimler are driving significant investment into accelerating their conversion to electric vehicles.<sup>9</sup>

Also, leading delivery and e-commerce companies including FedEx, UPS, and Amazon are on a path to electrifying their fleets in the coming years.<sup>10</sup>

Now, as demand for transportation electrification accelerates, electric vehicle technology is an opportunity for the United States to be at the leading edge of the innovations that will create good American jobs, modernize our nation's infrastructure, and help build a more just and resilient economy.

Last summer, this Committee spearheaded HR2: The Moving Forward Act which provided for bold investments in our future and decisive action to create US leadership globally in zero emission transportation. The competition in these markets is formidable. In China, there are 450,000 EV buses on the road and China has made massive investments in EV technology.

We believe the technologies we need to meet the global demand for zero-emission transportation, can and must be built right here in the United States. We've experienced this first-hand at Proterra.

In December 2020, Proterra marked the opening of a new battery production line in Los Angeles County. This facility will expand our production capacity to manufacture our industry-leading battery technology systems that power our fleet of transit

<sup>5</sup> [https://calstart.org/wp-content/uploads/2021/01/Zeroing\\_In\\_on\\_ZEBs\\_FINALREPORT\\_1262021.pdf](https://calstart.org/wp-content/uploads/2021/01/Zeroing_In_on_ZEBs_FINALREPORT_1262021.pdf)

<sup>6</sup> <https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/>

<sup>7</sup> <https://ww2.arb.ca.gov/news/15-states-and-district-columbia-join-forces-accelerate-bus-and-truck-electrification>

<sup>8</sup> <https://www.gov.ca.gov/2020/09/23/governor-newsom-announces-california-will-phase-out-gasoline-powered-cars-dramatically-reduce-demand-for-fossil-fuel-in-californias-fight-against-climate-change/>

<sup>9</sup> <https://www.nytimes.com/2021/01/28/business/gm-zero-emission-vehicles.html>

<sup>10</sup> <https://www.nytimes.com/2020/08/27/business/electric-delivery-vehicles-ups-fedex-amazon.html>

buses as well as commercial vehicles, such as school buses and delivery vans. With the opening of our new battery production line, we are hiring over 30 employees in Los Angeles County—providing much needed jobs during the pandemic—and these new jobs will include more than two dozen union represented positions.

The new battery production facility is also the first to be co-located within a vehicle manufacturing plant—showcasing our ability to bring state-of-the-art battery production directly to vehicle manufacturers.

Successfully building an advanced manufacturing workforce requires investing in training and development. That’s why, along with the United Steelworkers Local 675, our community partners, and Los Angeles County, we launched a first of its kind training program for job applicants interested in electric vehicle manufacturing and celebrated the first graduating class in January.

This training program was developed to advance diversity, equity, inclusion in the EV manufacturing sector by targeting historically underrepresented groups with barriers to employment, including women, people of color, aging foster youth, veterans, and the formerly incarcerated.

As the transportation industry transitions from fossil fuels, we, along with our partners at USW Local 675, are modeling how American manufacturing companies and workers can come together to create the manufacturing jobs of the 21st century.

The benefits of electric vehicle technology extend far beyond how we move people and deliver goods throughout our communities, too. Proterra has designed our battery systems to serve the development of multiple industries and applications.

The recent widespread power outages in Texas have demonstrated the need for grid resilience, and electric vehicles can play an important role. We can create a more resilient energy and transportation system that works for everyone including cities and states operating electric vehicle fleets as well as the utilities and regulators that manage the grid.

Electrifying school bus fleets provides an excellent opportunity. In 2018, Proterra and our partner Thomas Built Buses unveiled a Proterra powered electric school bus. The all-electric Saf-T-Liner C2 Jouley is powered by Proterra’s electric vehicle technology and built on the Thomas Built Buses school bus platform—all manufactured here in the United States, in California and North Carolina respectively.

The Jouley electric school bus is capable of supplying power back to the electricity grid using bidirectional charging and vehicle-to-grid technology. This means we can send stored power back to the electricity grid at times when it’s needed most or even to provide back-up power to critical facilities like schools during a power outage, as the electric utility DTE Energy will be testing with their recent acceptance of six electric school buses to serve students in Michigan.<sup>11</sup>

Just last month, the Montgomery County, Maryland Board of Education approved a project with Highland Electric Transportation, to convert its school bus fleet to all-electric, starting with 326 school buses over the next four years. This project represents the largest single procurement of electric school buses in North America. In addition to delivering health and climate benefits by reducing diesel pollution, these Proterra Powered electric school buses will lend their batteries to deliver stored power to the local electricity markets, helping the community integrate renewable energy and support grid resiliency.<sup>12</sup>

Utilities are focused on ensuring the right-sized charging infrastructure is in place to meet the needs for electric vehicles. These initial deployments show promise and policymakers should support additional opportunities to explore how charging infrastructure projects can lighten demand and deliver power back to the electricity grid.

Accelerating the switch to clean transportation will require partnership and coordination, and we are excited to work with electric utilities across the country, including PG&E, which is represented on this panel, to advance creative solutions to meet our energy demands.

Beyond transportation, there are further business opportunities for U.S. innovation and job creation.

Proterra batteries come with up to 12 year warranties, depending on the application. When Proterra batteries have met their useful life in a vehicle, these batteries still retain a significant amount of energy that can be used in second-life applications such as stationary energy storage. In fact, our batteries are designed with second life applications in mind.

When batteries are no longer suited for those applications, there is an entire industry to be built in the U.S. to recycle components for reuse. Proterra battery packs are designed for easy separation of components for recycling purposes, allow-

<sup>11</sup> <https://www.michigan.gov/mienviroment/0,9349,7-385-93394-551135--,00.html>

<sup>12</sup> <https://www.proterra.com/press-release/montgomery-county-approves-largest-electric-school-bus-order/>

ing for 100% of aluminum used in the battery pack to be recycled. We also work with top-tier recycling companies such as Redwood Materials in Carson City, Nevada that specialize in extracting and repurposing materials inside lithium-ion automotive batteries.

This regenerative cycle of use and reuse can support the creation of new jobs, help the United States maintain a competitive economic advantage by spurring new domestic industries, and strengthen our national security by reducing reliance on foreign industries for minerals and mining for critical raw materials.

The United States is positioned to lead the world in this emerging market for clean energy and clean mobility. This opportunity for U.S. leadership and manufacturing expansion is worthy of strong support of the federal government. The federal government has played a meaningful role in the early adoption of electric vehicle technology, and we strongly urge you to continue to do so at a scale and with a sense of urgency that the climate crisis demands. Through meaningful measures to expand support for this emerging industry through policies that promote manufacturing, a domestic supply chain, and workforce training, we can bring the next wave of innovation directly to communities across the United States.

For your consideration, Proterra recommends the following measures to accelerate the adoption of zero emission vehicles:

- *Increase funding for zero emission buses and related infrastructure.* The Low or No Emission Vehicle Program (Low No) has been responsible for funding thousands of electric transit buses, and we urge you to reauthorize the program and apply significantly greater resources to it to meet growing demand. The INVEST in America Act, which later became the Moving America Forward Act, included bold investments that dedicate significant resources for zero emission buses through the “zero-emission bus grants” program as well “Bus facility and fleet expansion competitive grants” program. As the Congress and this Committee begin the surface transportation reauthorization process again, we support reforming the Low No Program as a zero emission bus grant program and endorse funding at the levels called for in the HR 2 or Congresswoman Brownley’s Green Bus Act.
- *Incentivize domestic manufacturing and supply chain.* We urge Congress to modify the eligibility of the existing Advanced Technology Vehicle Manufacturing (ATVM) loan program to include heavy duty vehicle and suppliers to heavy duty original equipment manufacturers (OEMs). Access to low cost capital through this program would allow companies to invest in state-of-the-art manufacturing and build the supply chain for domestic components that will allow us to compete against aggressive foreign competition. It will also entice foreign battery cell manufacturers that are the market leaders to open manufacturing facilities in the United States and to import considerable intellectual property and create new American jobs.
- *Support deployment of electric vehicles for other public fleets.* We recommend that Congress establish grant programs that are modeled on previous successful efforts like the Low or No Emission Vehicle Program that would support the electrification for other heavy duty vehicle fleets such as school buses and municipal fleets.
- *Electrification of Federal Vehicles.* Proterra applauds the Administration’s goal to electrify the federal fleet of vehicles, which boost electric vehicle manufacturing domestically. While opportunities for light duty vehicles garner much of the attention, we believe that deploying zero emission buses at national parks, military facilities, and other federal installations would bring immediate environmental and public health benefits while also reducing operating costs for these agencies over time.

Through these policies, the federal government can send a strong signal to the industry and supply chains that the United States is committed to electrification and will drive greater private investment into the market, thereby creating even more American jobs in this rapidly growing market.

Thank you for the opportunity to testify before you today. I look forward to answering any questions that you may have.

Mr. DEFAZIO. Representative Burchett would like to briefly introduce the next witness.

Mr. BURCHETT. I caught that “briefly,” Mr. Chairman. Thank you.

Mr. Chairman, today I have the honor of introducing Shameek Konar from Pilot Flying J. He is the chief executive officer, and I

note that Congressman Cohen has someone from Tennessee as well, Mr. Smith, and I remember meeting him at Jimmy Kelly's in Nashville, Tennessee, with then-Senator Cohen. So I am interested to hear his testimony as well.

But today I am honored to welcome Mr. Konar to our hearing. Since 2017, Mr. Konar has been instrumental in growing Pilot's energy business. Founded in 1958 by Jim Haslam in Knoxville, Tennessee, Pilot Flying J is now the 10th largest privately held company in the United States.

And on a personal note, Mr. Haslam has been a good friend to me. I saw him Saturday at our little coffee club we have at one of his Pilots, and we were practicing social distancing if anybody is listening to this.

But Mr. Haslam has always been very benevolent to the community, literally giving millions and millions of dollars to the community. I saw just in today's press that his family had given another \$1 million to the University of Tennessee.

But on a personal note, when I was a young State legislator, I went back to my elementary school, and I asked the principal if there is anything any of the kids needed, and she said, yeah, there was one kid that needed a jacket and he was poor.

I was pulling down about \$16,500 a year, and I figured I could afford about half of that jacket. So I called Big Jim Haslam on the phone, and he said—he calls me Timmy because he's known me since I was a little boy—"Timmy, just come on by and pick up the check."

We went half on that jacket, I remember, and the kid got to go home that day warm. And I remembered one thing he said. He said, "Just don't tell anybody, Timmy. Just keep it anonymous."

And I have honored that until this point right now, but it has been several years. So I feel it is important that we point out that these folks have a very huge impact on our local community.

But back to Pilot, it is also the largest operator of travel centers in North America with over 900 retail and fueling locations in 44 States, employing more than 28,000 team members. Pilot's success is emblematic of the American energy sector.

Pilot and other businesses like it have chosen to make great strides on environmental issues. Because of private-sector innovation, the United States is working towards significant emissions reduction, and I hope Pilot Flying J continues its good work.

And I will note Mr. Haslam has his autobiography out now, and it was started basically in one little station across the border in, I believe, Bristol, Virginia, and now its impact is literally nationwide.

Mr. Chairman, I ask unanimous consent to submit for the record a letter in support of this testimony from the National Association of Convenience Stores and the Society of Independent Gasoline Marketers of America.

Mr. DEFAZIO. Without objection, so ordered.

[The information follows:]



**Letter of March 17, 2021, from the National Association of Convenience Stores and the Society of Independent Gasoline Marketers of America, Submitted for the Record by Hon. Tim Burchett**

MARCH 17, 2021.

Hon. PETER DEFAZIO,  
*Chairman,*  
*Committee on Transportation and Infrastructure, U.S. House of Representatives,*  
*Washington, DC.*

Hon. SAM GRAVES,  
*Ranking Member,*  
*Committee on Transportation and Infrastructure, U.S. House of Representatives,*  
*Washington, DC.*

DEAR CHAIRMAN DEFAZIO AND RANKING MEMBER GRAVES:

The National Association of Convenience Stores (“NACS”) and the Society of Independent Gasoline Marketers of America (“SIGMA”) (collectively the “Associations”) write to support the testimony of Mr. Shameek Konar of Pilot Flying J Travel Centers LLC at the hearing on “The Business Case for Climate Solutions.”<sup>1</sup>

Fuel retailers in the United States are well positioned to play an important role in the development of infrastructure to offer American motorists not only traditional liquid motor fuels but also a range of alternatives, including electricity to power their vehicles.

OVERVIEW OF THE ASSOCIATIONS AND THE RETAIL FUELS MARKETPLACE

Collectively, the Associations represent approximately 80% of retail sales of motor fuel in the United States. The fuel wholesaling and convenience industry employed about 2.46 million workers and generated more than \$647.8 billion in total sales in 2019, representing approximately 3 percent of U.S. gross domestic product. Of those sales, approximately \$395.9 billion came from fuel sales alone.<sup>2</sup>

The retail fuels market is the most transparent, competitive commodities market in the United States. Retailers post fuel prices on large exterior signs, which consumers use to shop for the best prices.<sup>3</sup> Many consumers drive out of their way to save a few cents per gallon. The Associations’ members operate on tiny margins—generally several cents per gallon of fuel sold.

The competitive nature of the retail fuels market compels retailers to pass through cost savings to consumers in order to maintain and increase their market share. It is in retailers’ interests to increase the amount of fuel they sell to consumers. This is not only because those sales drive profit opportunity in and of themselves, but also because such sales drive in-store traffic, which is another source of profit for the retailer. These dynamics can be harnessed to create a growing market for alternative transportation energy sources.

ELECTRIC UTILITIES, FUEL RETAILERS, AND EV CHARGING INFRASTRUCTURE

The Biden Administration has committed to adding 500,000 electric vehicle (EV) charging stations over the next decade. The most efficient, cost-effective path to achieving this goal is a partnership between utilities and fuel retailers, with support from federal policymakers.

Federal policy should incentivize and leverage private investment in bringing electricity as an alternative fuel to market. By the same token, federal policies should not undercut incentives for retailers to invest in EV charging infrastructure.

The biggest impediment currently to fuel retailers investing in EV charging is the practice of utilities charging all of their electricity customers more in order to pay for their investments in EV charging infrastructure. Where this occurs, utilities are able to compete with private sector groups without risking a single dollar of their own. This tilts the cost for electric charging infrastructure in favor of utilities such that the private market cannot compete, placing existing and new market participants at a competitive disadvantage which they cannot overcome. The predictable

<sup>1</sup>U.S. House Committee on Transportation and Infrastructure, “Hearing on The Business Case for Climate Solutions,” (Mar. 17, 2021).

<sup>2</sup>Data from the National Association of Convenience Stores, State of the Industry Report (2019).

<sup>3</sup>In addition to price signs seen from the road, consumers also frequently use applications, such as Gas Buddy, to compare fuel prices. According to a 2019 NACS survey, 59% of consumers say price is the most important factor in determining where they buy fuel. See NACS. (2019). *Consumer Behavior at the Pump*. Retrieved from <https://www.convenience.org/Topics/Fuels/Documents/How-Consumers-React-to-Gas-Prices.pdf>.

result is that the private market will not risk capital investment in EV infrastructure when it knows it cannot make a return on that investment due to the unfair competition from utilities.

Furthermore, some states classify businesses that sell electricity for the purpose of charging EVs as utilities, effectively prohibiting such sales from anyone other than utilities. Federal policy preempting these state regulations should be established, allowing non-utilities such as fuel retailers to resell electricity commercially.

Finally, federal policy should maintain the ban on commercialized Interstate rest areas, including disallowing EV charging within federal Interstate rights of way. This will ensure that off-highway businesses are not discouraged from investing in EV charging. Our industry has supported the ban on commercial activity and electric charging should be treated no different from any other commercial service. If EV charging is opened up at Interstate rest areas, it will undercut private sector investments in that infrastructure at Interstate exits. That will mean fewer, not more, EV chargers.

#### CONCLUSION

The Associations' members' sole objective is to sell legal products, in a lawful way, to customers who want to buy them. As new fuels enter the market, our members want to be able to sell those fuels lawfully and with minimal volatility and risk. While the Associations' members are agnostic to the type of fuel sold to satisfy consumer demand, it is best for the American consumer to have a reliable source of fuel at competitive and stable prices.

As such, the Associations believe that EV charging should be an open, competitive market. Convenience and fuel retailers should be able to sell electricity in a competitive market on equal footing with other market actors. Allowing private sector competition will spur efficient investment in and development of electric charging infrastructure. And, it is the best way to ensure that vehicle owners continue to get the best prices and experience as electricity is introduced into the fuels market.

This Committee, utilities, and fuel retailers all have vital roles to play in building the nation's first EV charging network, together. Our industry is eager to work with the Committee to help it achieve this objective.

Sincerely,

*National Association of Convenience Stores.  
Society of Independent Gasoline Marketers of America.*

Mr. DEFAZIO. Mr. Konar, you are recognized for 5 minutes.

Mr. KONAR. Thanks for that very, very generous introduction.

Chairman DeFazio, Ranking Member Graves, and members of the committee, thank you for inviting me to testify today.

My name is Shameek Konar. I am the chief executive officer for Pilot Flying J, which is the largest travel center network in the United States.

I am testifying on behalf of NATSO, the National Association of Truckstop Operators.

Today I hope to demonstrate to you that travel center companies and the broader retail fuel industry are invaluable partners as you seek to minimize the transportation sector's carbon footprint.

Our industry has demonstrated that we are prepared to invest in any transportation fueling technology that our customers desire.

We are eager to continue playing this important role as we transition to the next generation of transportation energy.

The Biden administration wants to add 500,000 EV charging stations over the next decade. My testimony will focus on the most efficient, economical way to accomplish this objective and lower the carbon footprint of transportation fuel.

We will need a partnership. We need a partnership between utilities and fuel retailers with support from the Federal Government to achieve this. In order to develop policies that facilitate this partnership, there are fundamentally two buckets of activities that we need to pursue.

First, the power grid needs to be restructured. As EV charging stations are installed, generation, transmission, and distribution networks will need to be expanded to meet this new demand.

Drivers must be assured that they will be able to refuel as reliably as they do today in order to expedite adoption of EVs.

Second, the market dynamics that govern our industry today should be replicated to accommodate EVs. This will ensure that customers have multiple recharging options that are competing for their business on price, on speed of service, and on quality of service.

As it relates to reducing range anxiety, one of the primary impediments to EV adoption is a nationwide network of fast charging stations.

We believe that this is achievable, but there must be a policy framework to harness our core competencies of the utilities, as well as the retail fuel sectors to make this work.

The utility sector is best suited to perform the generation, development, and power grid restructuring work that will be essential to facilitate this network.

The fuel retailers, on the other hand, like us are best positioned to own and operate EV charging stations and provide transportation energy to customers, along with services, in the manner that they are accustomed to today.

Until the number of EVs on the road reaches a critical mass, however, there is an important role for Federal policy to bridge this gap and make private investments more viable while providing long-term consumer benefits and a reduction in the carbon emission footprint of the sector.

These policies should encourage utilities and fuel retailers to focus activities where we are the most productive.

At the same time, policies that may appear to be quick and easy solutions often undermine our objective, either utilities' incentives to restructure the power grid or the retailers' incentive to invest in charging infrastructure.

For example, some electric utilities have had to increase cost to all ratepayers to underwrite their investment in EV charging stations and electricity that powers EVs.

Businesses like mine cannot do this, and we cannot compete in this environment with those who do. But this would make it very difficult for us to invest and actually hamper our goal of reducing the carbon footprint.

Some advocates are also interested in allowing EV charging at interstate rest areas. This will discourage, again, companies like mine and other retailers in this industry from investing in charging infrastructure. It will also signal to prospective drivers that when they recharge, they will not have access to all of the amenities and the security they have come to expect from this sector.

Approaches like these would undermine the business case for companies like Pilot and other fuel retailers to leverage our existing investment—and we have tens of billions of dollars invested in the sector—to develop EV charging infrastructure.

As I have said, there is a very strong business case for us to be actively engaged in this space.

It is our sincere hope that we can continue working with you, your staff, and my fellow witnesses to do just that.

On behalf of NATSO and Pilot, I thank you for inviting me to testify here today, and I am happy to answer any questions that you or the committee may have.

[Mr. Konar's statement follows:]

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**Prepared Statement of Shameek Konar, Chief Executive Officer, Pilot Flying J, on behalf of the National Association of Truckstop Operators**

I. SUMMARY OF TESTIMONY

- The National Association of Truckstop Operators (NATSO) is the premier national trade association representing off-highway fuel retailers, from multi-billion dollar travel center and convenience store chains to small, single-store operators. Pilot Flying J (Pilot) is the largest travel center chain in the United States, with more than 28,000 employees helping operate a nationwide network of more than 900 retail and fueling locations providing travelers with convenient stops that offer a variety amenities and products to make road travel easier.
- NATSO supports policies that incentivize fuel retailers to invest in alternative fuels, and reward businesses that make those investments. Because fuel retailers are fuel agnostic, we are invaluable partners for policymakers whose objectives include increasing consumption of alternative fuels. With the right alignment of policy incentives, fuel retailers are best equipped to facilitate a faster, more widespread and cost-effective transition to alternatives—including electricity—in the coming years. The optimal way to lower transportation fuels' carbon footprint is through policies that (i) encourage businesses such as Pilot to offer more alternatives, and (ii) make those alternatives more economically attractive to consumers.
- As customers utilize electric vehicle (EV) charging stations, they will expect a seamless and predictable experience not unlike their current refueling experience, grounded in safe, accessible amenities and affordable, competitive pricing. The market dynamics that govern today's liquid fuel retail sector should be replicated to facilitate greater EV adoption.
- Achieving the Biden Administration's goal of adding 500,000 EV charging stations over the next decade will require a partnership between utilities and fuel retailers, with support from federal policymakers. If designed and implemented properly, such a partnership would benefit all three stakeholder groups and ultimately achieve environmental policy goals.
- There are two components to this partnership: *Power grid restructuring* to accommodate the significant demands that an EV refueling network (and electrification of various other sectors such as home heating) will place on the grid as the world transitions away from fossil fuel; and the *consumer fueling experience* to provide customers a safe, ubiquitous, reliable, affordable and competitive market for recharging activities.
- Federal incentive policies should harness the core competencies of the utility and retail fuel sectors. Neither sector can create a sustainable, nationwide EV charging network without the other, especially in an expeditious, efficient and economical way. The *utility sector* is best suited to perform the requisite generation development and power grid restructuring work. *Fuel retailers* are best positioned to own and operate EV charging stations (especially along Interstate highway locations) and provide transportation energy—including electricity—to consumers. Grant programs or other federal policies designed to encourage investment in EV charging infrastructure and supply equipment should be designed in a manner that is consistent with each sector's respective area of expertise.

II. INTRODUCTION

Chairman DeFazio, Ranking Member Graves and distinguished members of the House Transportation and Infrastructure Committee—Thank you for the opportunity to testify at this important hearing examining the business case for climate solutions. On behalf of the National Association of Truckstop Operators (NATSO) and Pilot Flying J (Pilot) where I am Chief Executive Officer, we are eager to work

with you—and with my fellow witnesses—to improve the environmental characteristics of transportation energy in the United States.<sup>1</sup>

The most expeditious, efficient and economical way to achieve environmental advancements in transportation energy technology is through market-oriented, consumer-focused policies that encourage businesses such as Pilot to offer more alternatives and our customers to purchase those alternatives. Fuel retailers are in the business of providing competitively priced fuel and services to our customers. Unlike refiners, power generators, and biofuels producers, fuel retailers are agnostic to what the form of fuel is; our goal is to provide customers “what they want, when they want it, and at a price they are willing to pay.” Fuel retailers have demonstrated in recent years that we are prepared to invest in any transportation fueling technology that our customers desire.<sup>2</sup> With the right alignment of policy incentives, fuel retailers are well equipped to facilitate a faster, more widespread and cost-effective transition to alternatives—including electricity—in the coming years.

Over the past decade, companies such as Pilot have invested significant amounts of money to bring alternative fuels to market. While we invested capital and took business risk, the transparent framework laid out by policymakers such as yourselves essentially gave us a framework and a line of sight on how we would generate a return on our investment. As a result, we responded to your policy signals and engaged in behavior that you have determined is beneficial for society at large. We are eager to continue playing this important role as we transition to the next generation of transportation energy.

I encourage the Committee to learn from the successes of the last twenty years, and apply those lessons to any incentive programs that you create for the next twenty years. Once an incentive and regulatory regime is in place that enables travel center companies and other fuel retailers to gain customers and market share by investing in electric vehicle (EV) charging (or any other technology), the private sector will bring those fuels to market more effectively and efficiently than the government or any government-sponsored monopoly, because this is our core-competency. I discuss these issues in more detail below.

### III. BACKGROUND

#### A. *NATSO and the Travel Center Industry*

I am testifying today on behalf of NATSO, which is the premier trade association representing travel centers, truckstops, and off-highway fuel retailers. NATSO represents approximately 300 companies that operate nearly 7,000 travel centers, as well as tens of thousands of convenience stores. Our membership is comprised of both large, multi-billion dollar travel center and convenience store chains, as well as small, single-store operators. Given the breadth of its membership, NATSO represents a substantial majority of retail sales of diesel fuel in the United States.

The travel center and truckstop industry is a diverse, sophisticated and evolving industry. These locations effectively function as “hotels” for the over-the-road transportation industry—because the number of hours that a driver can drive is limited, drivers stop at our facilities to fuel, eat, shower, sleep, shop, cash checks, etc. Almost every travel center location is in close proximity to an Interstate highway and includes multiple profit centers, from motor fuel sales and auto-repair and supply shops, to hotels, sit-down restaurants, quick-service restaurants, food courts, and convenience stores. Although the industry was once tailored solely to truck drivers, it now caters to the entire interstate traveling public, as well as the local population that lives in close proximity to a travel center location. These travel centers are often located in relatively remote areas and can at times be one of the only sources of food, convenience and fueling for local residents.

Fuel retailers’ sole objective is to sell legal products, in a lawful way, to customers who want to buy them. As new fuels enter the market, retailers want to be able to sell those fuels lawfully and with minimal volatility, risk, and inconvenience for our customers. Our industry is agnostic as to which fuels we sell to satisfy consumer demand. Our bias is simply that we believe it is best for the American consumer—and America’s industrial position in the world marketplace—to have reasonably low and stable-priced energy.

<sup>1</sup>In addition to NATSO, Pilot is also an active member of the National Association of Convenience Stores (NACS) and the Society of Independent Gasoline Marketers of America (SIGMA). Pilot and NATSO both support NACS and SIGMA’s joint submission to the Committee to be inserted into the hearing record.

<sup>2</sup>The amount of biofuels that Pilot sells today in response to the Renewable Fuel Standard, and Pilot’s and NATSO’s aggressive support of enhanced biofuel incentives demonstrates this.

All of NATSO's members, large and small, believe it is imperative that policies designed to encourage investment in alternative fuels must account for the fact that a majority of fuel retailers are small businesses. Any approach to setting policy that does not ensure these businesses are able to continue growing and creating jobs in the 21st Century will be less successful than policies that enable the *entire* retail fuels industry—large companies and small companies—to participate.

In 2020, NATSO launched the National Highway Charging Collaborative with ChargePoint, the world's largest EV charging network. The collaborative has committed to leveraging \$1 billion in capital to deploy charging at more than 4,000 travel plazas and fuel stops that serve highway travelers and rural communities. NATSO and ChargePoint continue to work together to identify public and private funding sources that may be available to support the expansion of EV charging at strategically determined locations.

#### *B. Pilot Flying J*

Pilot started in 1958 with a single gas station in Gate City, Virginia. Our founder, James A. Haslam II, wanted to build a business to support his growing family and to provide people with the gas and conveniences they need while on the road. In 1981, with 100 convenience stores, Pilot opened its first full-size travel center in Corbin, Kentucky.

Today, Pilot has more than 28,000 employees helping operate a vast, nationwide network of more than 900 retail and fueling locations providing travelers with convenient stops that offer an incredible variety of amenities and products to make road travel easier. The Pilot Flying J travel center network includes locations in 44 states and six Canadian provinces with more than 630 restaurants and 35 Truck Care service centers. Our One9 Fuel Network connects smaller fleets and professional drivers to the services they need at a variety of fueling locations.

We supply more than 11 billion gallons of fuel per year, including approximately one billion gallons of biofuel (such as biodiesel, renewable diesel, and ethanol). The carbon reduction from our biofuel portfolio is equivalent to taking approximately one million cars "off the road" each year. Our sourcing infrastructure, strong market presence and expertise in energy and logistics optimizes the distribution of not only diesel fuel and gasoline, but also biofuels and diesel exhaust fluid (DEF). Over the last 10 years, Pilot has significantly increased the amount of biofuels that we supply to our customers based on the policy incentives of the Renewable Fuel Standard (RFS) and other state policies such as California's Low-Carbon Fuel Standard. Today, Pilot is one of the largest sellers of biofuels in the country.

### IV. FUEL RETAILERS ARE FUEL-AGNOSTIC

#### *A. Competition and Retail Fuel Prices*

The retail fuels market is the most transparent, competitive commodities market in the United States. As every American knows, customers can see gasoline retailers' price signs from blocks away, or compare prices on cell phone applications. These signs represent more than just pricing information; they are a value proposition to potential customers, not only with respect to fuel but also food and other convenience items and amenities that we offer at our facilities.

While the gasoline market is extraordinarily competitive—consumers will often change where they buy gas to save just a few cents per gallon—the retail diesel market is even more competitive and transparent. Many travel centers' customers—truck drivers and trucking fleets—are more savvy and price-conscious than typical American motorists (fuel generally amounts to 20–30% of a motor carrier's overall costs). Truck drivers are often aware of retail fuel prices when they are 100 miles away from potential refueling sites, and fleet managers use this information to direct drivers to specific retail locations in order to purchase the lowest-priced fuel available. Every time a truck refuels, it is on average 100 gallons, so even a penny difference in the price of diesel per gallon amounts to a dollar. Given the number of trucks that visit our stores every day, pennies add up quickly. This imposes strong downward pressure on retail diesel prices.

The competitive nature of retail fuel markets compels retailers to pass through cost savings to consumers in order to maintain and increase their market share. It is in retailers' interests to increase the amount of fuel that we sell to consumers. This is not only because those sales directly drive profit opportunity, but also because such sales drive in-store traffic, which is a source of profit for the retailer.

Given the transparency and competitiveness of fuel pricing, retailers are generally "price takers" for fuel, where the market essentially sets the price. This means that we must compete on prices of other items we sell, speed, and quality of service to retain our customers and potentially gain market share. In addition, the trans-

parency of fuel markets exerts a constant downward pressure on retail fuel prices, which benefits customers and forces successful retailers to run efficient and cost competitive business platforms.

Notwithstanding these challenging dynamics, gas stations and travel centers are located in every community and at highway exits throughout the United States. One would be hard-pressed to identify any other industry where there are multiple retailers selling the same, fungible product on the same street corner. Yet, as we all know, that circumstance is not uncommon in the retail fuel industry.

*The American consumer is the ultimate beneficiary of this dynamic.* Policymakers and proponents of enhanced EV charging infrastructure investment should be mindful of this, and harness the consumer-oriented, efficient and innovative retail fuel industry to convert environmental aspirations into consumer-accepted realities.

#### *B. Retailers Respond to Consumer Demand; We Do Not Create It*

Offering a product for sale does not guarantee consumers will purchase it. Retailers cannot force consumers to buy a particular product. Rather, retailers sell what consumers demand. In fact, the primary trait of any successful retailer is an ability to identify what his or her customers want to buy and then sell that product at a price that is both attractive to the consumer while enabling the retailer to earn a profit. In this respect, fuel retailers are quite effective surrogates for consumers.

This is even more relevant when it comes to adoption of EVs or other alternative fuels vehicles. In the world of liquid fueling it takes a four-wheel customer two to three minutes to complete a fueling experience (average fueling for cars and light commercial vehicles is approximately 10 gallons at a time). In the world of EVs, however, this will expand to 20 to 40 minutes for a charge, depending on the vehicle and the type of charger available. This will place a lot of emphasis on the type of experience that the consumer has at the retail fueling station, because instead of a five minute “stop,” this will be a 30-minute “experience.”

Consumer satisfaction with this experience is essential to widespread adoption of EVs. The retail fueling industry is focused on competing on speed, customer service, and amenities. We will have every incentive to make this customer experience the best it can be. The most successful travel centers today have already embraced a changing culture, shifting profit centers to food and beverage options, as well as offering Wi-Fi, convenience shopping, and security. We are prepared to continue to evolve with our customers. As new, faster charging technologies come to market, for example, retailers will be forced to invest in those technologies in order to compete.

If Congress wants to incentivize increased investment in and consumption of more environmentally friendly alternative fuels, it must keep in mind this fundamental market reality: *motorists and truck drivers do not purchase products because fuel retailers sell them; fuel retailers sell products and services because our customers purchase them.*

#### *C. Fuel Retailers are Eager to be Collaborative Partners in Bringing Alternative Fuels to Market*

NATSO strongly supports policies that incentivize fuel retailers to invest in bringing alternative fuels that customers want to market, and reward businesses that make those investments.

Because fuel retailers are fuel agnostic, we are invaluable partners for policymakers whose objectives include increasing consumption of alternative fuels. The market is extraordinarily capable of efficiently and expeditiously bringing the lowest-cost fuels to the end user. Fifteen years ago, Pilot blended and sold a nominal amount of biofuel. In response to a variety of federal and state programs, today we sell more than one billion gallons of biofuels each year (with ample room for growth). The impact of our biofuels program is equivalent to taking one million cars “off the road” every year from a carbon emissions perspective.

Our experience at Pilot is similar to that of dozens of other retail fuel companies throughout the United States. As an industry, we have adapted in response to tax and other incentives to sell lower carbon intensity alternatives to gasoline and diesel. The companies that have done this successfully generally have been more profitable than the companies that have not done this successfully. Although the fuels of the future will be different than the fuels of the past, we have made transitions before and we can do it again. Congress has at its disposal a nimble, sophisticated industry that is able to adapt to clear policy signals and provide customers the fuels that they want.

## V. UTILITIES, FUEL RETAILERS, AND EV CHARGING INFRASTRUCTURE

The Biden Administration has established a goal of adding 500,000 EV charging stations over the next decade. This Committee has an important role to play in

making this goal a reality. The most efficient, cost-effective path to achieving this is a partnership between utilities and fuel retailers, with support from federal policymakers. If designed and implemented properly, such a partnership would benefit both utilities and fuel retailers and ultimately achieve environmental policy goals while benefitting the American consumer.

#### A. Adoption of EVs

In order for the American consumer to transition to EVs, three conditions need to be met:

- (1) *Vehicle Affordability*—The vehicles need to be affordable (for consumers and businesses), including maintenance costs and other operating economics over the life of the vehicle.
- (2) *Vehicle Functionality and Reliability*—The vehicles need to be functionally capable for the relevant use cases and as reliable as serving consumer needs as internal combustion engine vehicles.
- (3) *Refueling Network*—There needs to be a robust network of fueling stations so that vehicles are not limited in their use and consumers feel comfortable and safe traveling throughout the nation (much as they feel with the existing liquid refueling marketplace), and eliminating the “range anxiety” concern associated with EVs.

Light-duty passenger EVs are on their way to satisfying the first two criteria. The biggest impediment to more widespread adoption is the lack of a robust nationwide refueling network, and the services and amenities that consumers have come to expect alongside such a network (*e.g.*, foodservice facilities, restrooms, security, etc.). The ultimate solution for heavy-duty vehicles (*i.e.*, long-distance freight carriers) is less clear, with various technologies from hydrogen fuel cells to EVs competing to satisfy the conditions referred to above. A recent survey found that the primary concerns potential EV customers had (with over a 40% positive response) were vehicle costs, range and an inadequate charging network.<sup>3</sup>

The current shortfall with respect to a nationwide refueling network on the light duty side can be overcome through a coordinated partnership between utilities and fuel retailers with support from the federal government.

#### B. Infrastructure Needs and Market Reforms Necessary for an EV Refueling Network

Before addressing what the partnership between utilities and fuel retailers should look like, one must understand the various changes that need to be made to existing electricity infrastructure and EV charging markets in order to provide a sufficient refueling network.

1. *Power Grid Restructuring*—An EV refueling network will place significant demands on the electric grid as well as the generation fleet. This will be in addition to pressures that the utility sector faces from:
  - a. The fact that significant portions of the electricity system are more than 50 years old and need replacement;
  - b. As the power sector transitions to zero carbon emissions for the existing demand, they will have to build significant amounts of renewable generation and work on grid reliability and storage issues;
  - c. Transitioning of activities currently fueled by fossil fuels (such as home heating and industrial processes (boilers, etc.)) to green power.

In addition to these demands on the utilities, achieving greater EV adoption requires fundamental restructuring of and enhancements to the nation’s power grid and generation fleets. We will have to build more renewable generation and storage assets. As charging stations are installed throughout the country, generation, transmission and distribution networks will need to be expanded in order to serve the new network of charging stations.

2. *Customer Fueling Experience*—As customers utilize EV charging stations, they will expect a seamless and predictable experience not unlike their current refueling experience; one that is grounded in safe, accessible amenities and affordable, competitive pricing. In essence, the current market dynamics that govern the liquid fuel retail sector should be replicated to facilitate a future where most consumers drive vehicles that run on electricity. Although we anticipate constant innovation and improvements, recharging an EV simply takes a lot longer than refueling a car with gasoline (20–40 minutes versus a two to three minute gasoline fill). This underscores the need for safety, services, and other amenities at EV fueling locations. Failing to fulfill consumers’ expect-

<sup>3</sup> See Utilities: The Unintended Bottleneck to MASS EV Penetration, *Stephen C. Byrd, Adam Jones et al, Morgan Stanley Research* (Oct. 28, 2020).

tations with respect to their refueling experience will inevitably hinder their desire to shift to EVs.

### *C. Necessary Partnership Between Utilities and Fuel Retailers*

A nationwide network of EV charging stations is well within our grasp. All it takes is coherent framework of national policies that *harness the core competencies of the utility and retail fuel sectors*. Neither sector can create a sustainable, nationwide EV charging network without the other; however, both sectors require substantial federal incentives and unambiguous policy signals in order to justify the necessary investments. The structure and implementation of these policies is the key to creating a nationwide EV charging network.

#### *i. Utility Sector*

The utility sector is best suited to perform the requisite generation development and power grid restructuring work given its expertise in the infrastructure and its regulated monopoly structure. Utilities that function under a ratebased framework can generally afford to expand existing infrastructure to accommodate EV charging stations. Utilities are well equipped to partner with charging station owners and site hosts to (i) effectuate necessary generation and transmission capacity upgrades and (ii) develop pricing structures to accommodate the nascent market for retail sales of electricity as a motor fuel. This plays to their core strengths of deploying long-term capital and developing, operating and maintaining critical infrastructure.

#### *ii. Retail Fuel Sector*

Fuel retailers are best positioned to own and operate EV charging stations and provide transportation energy—including electricity—to consumers.

Retailers are strategically located throughout the country where refueling demand is greatest, operating in the most transparent, competitive markets in the world and competing with one another on price. It is not uncommon to see multiple fuel retailers at the same intersection or exit on a highway competing on price, leading to price transparency and lower prices for customers.

Due to the price transparency and fungibility of the commodities they sell, fuel retailers are forced to compete on other non-price attributes such as quality of service, cleanliness, security, amenities, food, loyalty programs, and speed. As a result, they have a keen understanding of consumer preferences and tendencies and have to use this knowledge to make the customer fueling experience positive in order to compete.

The retail fuel industry has a history of being very nimble and has repeatedly responded to policy incentives for alternative fuels and shifting customer preferences. This is a service-based, fuel agnostic industry; we recognize that EV charging is the likely next step in the evolution of what our customers want. We are best positioned to provide EV charging services faster and cheaper than anyone else.

#### *iii. Policy and Regulatory Environment*

Until the number of EVs on the road reaches a critical mass, there is an important role for federal policy to “bridge the gap” and make private investments more viable while providing long-term consumer benefits.<sup>4</sup> This would be comparable to the experience from the power generation sector, where numerous programs including investment tax credits, portfolio standards, cap and trade systems, and grants have fostered the development of renewable generation—especially wind and solar—to get those technologies to a point of scale and economic parity. The transportation sector needs to follow a similar path to foster the development and the adoption of EVs by the customer.

These policies should be developed keeping three key principles in mind:

- *Capital Efficiency*—Leveraging core-competencies of the constituencies in the value chain and incentivizing them to accelerate development of the necessary infrastructure.
- *Speed to Market*—Given the urgency of climate change, speed is more important than perfection in market structure, hence policy should incent those who can solve the problem most expeditiously.
- *Alignment*—Incentivizing existing fuel retailers to adapt, and co-investing with them, will lead to a better outcome. If companies are encouraged to put capital

<sup>4</sup>The current utilization of publicly available DC Fast charging infrastructure remains low, at less than two hours per day per charger. At these levels, the investment economics in the infrastructure lead to negative returns. This is the classic “chicken or egg” problem, where EV infrastructure will get built if there is sufficient demand; but until then “bridging” is required, where government incentive programs can facilitate the development of infrastructure until stand-alone economics allow for private investment.

at risk, it will enable the sector to champion the adoption of EV charging stations (as has occurred with respect to biofuel incentives) as opposed to fighting it.

The federal government should develop policies to ensure a level playing field, including incentives to incubate and foster development that will provide long-term consumer benefits. Policy mechanisms worth considering include:

- *Direct Investment and Tax Credits*—Targeted grant and rebate programs that improve the economics associated with power grid restructuring (for the utility sector) and the installation of EV charging stations and sale of electricity to EV users (for the retail fuel sector) can expedite investments in a space where sufficient consumer demand remains many years away. Similarly targeted tax credits can complement direct federal investment.
- *Low Carbon Fuel Programs*—Low carbon fuel programs can make electricity more cost-competitive with other transportation fuels. This has been very successful in the development of biodiesel and renewable diesel through the RFS program. Critical to the development of any such program will be science-based lifecycle analyses of greenhouse gas emissions associated with different fuel technologies.
- *Reselling Electricity*—Governments should permit all EV charging station owners to generate a profit by selling electricity to EV owners without being subject to regulation as a utility. This allowance is essential if fuel retailers are to have any incentive to invest in EV charging technology.
- *Uniform Pricing*—There should be uniform pricing measurements (e.g., dollars per kilowatt-hour) and requirements for consumer-friendly price disclosures.

Conversely, policies that at first blush appear to be quick and easy solutions may have the unintended consequence of undermining either utilities' incentives to restructure the power grid or retailers' incentive to invest in EV charging infrastructure. Examples of these counterproductive policies include:

- *Forcing ratepayers to underwrite utilities' investment in EV charging stations or to subsidize the retail cost of electricity that charges electric vehicles*—Where this occurs, the utilities are operating in a guaranteed rate of return environment without putting capital at risk. Retailers cannot compete with electric utilities in this environment. While there is good reason for ratepayers to help underwrite the cost of restructuring the power grid to accommodate EV charging, there is no public policy rationale why utilities should be given a leg up over private actors who wish to enter the market for chargers that consumers use to power their vehicles. *Utilities' pursuit of this uncompetitive arrangement is the single greatest deterrent today to fuel retailers' investing in EV charging infrastructure.* It also results in an extraordinarily regressive transfer of wealth from all ratepayers (regardless of income) to utilities and EV drivers.<sup>5</sup>

<sup>5</sup>By way of background, investor owned utilities are granted a monopoly by state regulatory commissions to provide utility service. They are granted a monopoly over the provision of electricity, for example, because it is economically inefficient for multiple companies to build overlapping infrastructure in order to serve the same end-users. In exchange for this loss of market freedom, the "monopoly compact" provides the utility a guaranteed rate of return on commission-approved investments. It further provides for the collection of revenue to cover the utility's costs through approved rates.

As a general matter, utilities try to keep the cost of recovery of capital investments within the "rate class," meaning they attempt to assign the cost to those that will benefit from the investment. From time to time, utilities seek to go beyond this practice to accomplish goals outside of the utility's basic mission. Most economists frown upon such "cost-shifting." When utilities utilize their monopoly powers to insert themselves into the consumer-facing refueling space, it is an example of "cost-shifting."

Rate based investments made by utilities are not subject to market risk. Once approved by the state public utility commissions, these investments provide a *guaranteed* rate of return for utility shareholders. The return is independent of how the investment performs, whether it becomes obsolete or not, or even if it is ever used. The rate of return is guaranteed. *Private* companies competing for the same customer have very little chance of effectively competing for business against a utility that has no risk on capital deployed, and no incentive to ensure superior performance.

Utilities deploy their capital investments for customers through approved "tariffs," which outline the terms and conditions to the customer. By design, utility tariffs are "one size fits all." This keeps it simple when managing many customers, but it is also very restrictive: once you're in, you're in. There is no getting out, and they are very difficult to change after the fact.

By contrast, private market solutions are *flexible* and *responsive to customer needs*. They have to be or a business will lose a customer. Utilities do not have this concern. There is no competition, and there is nowhere else for a customer to go. What's more, because tariffs do not allow for changes to the base investment, they are effectively static. In a rapidly developing and evol-

Continued

- *Allowing EV charging infrastructure at Interstate rest areas*—Not only would this discourage off-highway fuel retailers from investing in charging infrastructure, but it will signal to prospective EV drivers that if they purchase an EV they will need to refuel at often remote, poorly maintained state-run rest areas rather than the off-highway travel centers and fuel retailers with all of the amenities, security and services that drivers have come to expect. *Carving out an exception for EV charging to the longstanding ban on commercial activities at rest areas is a simplistic, shortsighted and counter-productive attempt to overcome a complex but eminently solvable problem.*
- *Permitting utilities that own EV charging stations to charge other EV station owners higher rates for power than the internal transfer price they charge their own operations*—A prohibition on such practices is the only way to provide a level playing field and ensure competitive pricing for individual consumers.

The framework discussed above significantly enhances the disciplined, expeditious and economic adoption of EVs with the utility sector and retail fuel sector focusing on their core competencies to deliver the solution. *For maximum impact, grant programs or other federal investment designed to encourage investment in EV charging infrastructure and supply equipment should be dispersed in a manner that is consistent with the principles and guardrails outlined above.*

## VI. CONCLUSION

As discussed in the foregoing testimony, it is clear to us that there is an elegant and effective solution available to accelerate the transition to electric vehicles and materially impact the level of greenhouse gas emissions through a partnership between fuel retailers and the utility sector (with assistance from the government) where:

- *Retailers* focus on servicing customers, are aligned with the adoption of EVs (as they will displace liquid fuels for many four-wheel customers) and provide the incremental amenities required in light of the 10- to 20-fold increase in fueling times. Retailer participation is necessary for a seamless transition to EVs.
- *Utilities* focus on the development of low carbon generation and the development of transmission and distribution infrastructure that makes clean electricity reliably available to the retailers and other charging station owners to sell fuel to the end-use customers.
- *Government* should provide a “bridge” through incentive mechanisms in the early states when the stand-alone economics do not warrant investment; government should also provide a policy framework that supports the provision of electricity and a level playing field for the retailers to compete with one another for consumers.

Thank you for the opportunity to present testimony before you today. On behalf of NATSO, I look forward to continuing to work with Congress on these issues, and am happy to answer any questions you may have.

Mr. DEFAZIO. Thank you, Mr. Konar.

Mr. Troy Rudd.

Mr. RUDD. Good morning, Chairman DeFazio, Ranking Member Graves, and distinguished members of the committee.

Thank you for the opportunity to testify today.

My name is Troy Rudd. I am the chief executive officer of AECOM. Our 47,000 professionals, including 19,000 U.S. employees, deliver vital infrastructure projects worldwide that are designed to uplift our communities, advance economic growth, and improve health, safety, and overall quality of life.

We are ranked number one globally for transportation engineering and design and environmental services. By drawing on our experience working on all continents and as proud partner with the Federal Government, State and local government agencies, and the

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ing marketplace, such as that for EV charging infrastructure, using regulated tariffs to deploy solutions virtually ensures the investment will be obsolete shortly after it is deployed. There is no mechanism to upgrade the investment to keep pace with the technology. It is comparable to buying a brand new iPhone for every American in 2010, and then not enabling them to buy a new one for at least a decade.

private sector in the U.S., we hope to be a resource to the committee on these topics, and we thank you for the important work that you are doing.

The business case for climate solutions in transportation is predicated on delivering the following outcomes, we believe, for all Americans:

Creating jobs and, more importantly, lasting careers;

Accelerating innovation and mobility to meet the needs of the future;

Enhancing the quality of life and the environment by reducing emissions;

Ensuring infrastructure resiliency;

And stimulating economic growth that drives continued prosperity.

In my testimony, I would like to focus on three areas where Government leadership can help achieve the outcomes I have described.

First is advancing electrification. AECOM has guided more than 20 public agencies and many private-sector clients with early adoption of electrification. In Los Angeles for their Department of Transportation, we are delivering infrastructure to support full fleet conversion to battery-electric buses.

In other cities, we have studied the impacts of electrification on the grid, how transit agencies can best convert to electric, and how they can leverage battery storage of EVs even during grid outages.

These projects have demonstrated numerous benefits in terms of emission reductions, especially in areas of vulnerable populations; job creation, and resiliency.

We believe the Federal Government can play an important leadership role in accelerating electrification efforts by supporting the deployment of a reliable, accessible national electric charging network in four ways:

Working with the private sector in setting design standards to encourage interoperability of charging infrastructure;

Prioritizing pilot projects to convert large State, municipal, and private-sector fleets;

Investing in other charging innovations, including dynamic charging imbedded in roads and freeways;

And advancing the use of electric vehicles by electrifying the U.S. Postal Service fleet and deploying regional and rural charging infrastructure.

Second is building resilient infrastructure. Assuring more resilient infrastructure is an important area of concern for our clients and where Government can make a significant impact.

In 2020 alone, the U.S. faced 22 natural disaster events with losses exceeding \$1 billion each, the highest number ever in a single year and the 6th consecutive with 10 or more billion-dollar events.

We have conducted transportation climate risk analysis for clients like BNSF Railway, the San Francisco Bay area Metropolitan Transportation Commission, the New York City Economic Development Corporation, and many more, all looking at risk reduction strategies for climate events.

These analyses find that potential losses due to natural disaster disruption can be offset by smaller adaptation investments today.

AECOM supports reauthorization reforms that incentivize project investments that take into account environmental, social, and safety benefits beyond traditional life-cycle costs, and criteria that prioritizes new investment decisions with long-term preservation and performance of the assets in mind.

Third is unlocking innovation. We also need Government to act boldly in support of new modes of mobility. In our recent fiscal year, AECOM worked on more than 29,000 projects for transportation clients in the United States.

We found that projects which include more innovation are often delayed by rigid commercial models, dated standards, and jurisdictional conflicts. Visionary ideas in mobility, such as high-speed rail, hyperloop, and more recently electric vertical takeoff and landing vehicles or flying taxis, can all play a role in improved mobility, congestion management, emissions reduction, and new economic output.

For us, the bottom line is this: To promote innovative modes of transportation, we need to remove some of the obstacles that prevent investment in thinking beyond the status quo.

In summary, pursuing climate solutions that advance electrification, build a resilient infrastructure, and unlock innovation can yield significant benefits. And what is more, it plays to American ingenuity and a bipartisan spirit in supporting transportation infrastructure; it keeps our country moving forward.

I thank you again for the opportunity to speak to you today and look forward to your questions.

[Mr. Rudd's prepared statement follows:]

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#### **Prepared Statement of Troy Rudd, Chief Executive Officer, AECOM**

##### AECOM INTRODUCTION

Good morning Chairman DeFazio, Ranking Member Graves and distinguished members of the committee.

Thank you for the opportunity to testify today on this important issue. My name is Troy Rudd and I am the Chief Executive Officer of AECOM.

Our 47,000 professionals—including 19,000 US-based employees—are engineers, architects, scientists, software programmers, urban and transportation planners, program and construction managers, and economists who plan, design and deliver infrastructure.

Globally, we are consistently ranked No. 1 in transportation engineering and design, and we are the No. 1 provider of environmental services.<sup>1</sup>

AECOM has earned a reputation as an industry leader through the critical and essential support we provide our clients, and because the work and infrastructure solutions we deliver uplift communities, advance economic growth and improve health, safety and overall quality of life.

Today, our clients are focused on emerging challenges. At the center of this is ESG, or environmental, social and governance concerns. Our clients are acutely aware of the need to address and prepare for change, whether it is electrification of transit systems, creating access to mass transit for all, or preparing for natural disasters that disrupt commerce and our way of living.

At AECOM, we are leading by example through our own practices, including setting approved science-based targets in alignment with the Paris Agreement. We are

<sup>1</sup>“Engineering News—Record Top Lists.” *Engineering News Record RSS*, 2020, [www.enr.com/toplists](http://www.enr.com/toplists).

already exceeding our 2025 targets in reducing Scope 1 and 2 emissions and are committed to being net-zero for Scopes 1, 2 and 3 by 2030.

We are a proud partner to the federal government, state and municipal agencies, and the private sector, working together in both urban centers and rural communities across America.

Drawing from our global experience working on every continent, we hope to be a resource for this Committee as it seeks to consider climate responsive and resilient solutions for new and rehabilitated infrastructure and to unlock the full economic, environmental and mobility benefits of a modern transportation system.

The work of this Committee is essential to keeping our nation moving forward, and I thank all of the members of the Committee for your efforts.

#### FOCUS OF TESTIMONY

Transportation is crucial in ensuring prosperity and well-being today, tomorrow and long into the future.

As the Committee considers the right approach to create lasting benefits, the business case for climate solutions in transportation is predicated on delivering the following outcomes for all Americans:

- Creating jobs and more importantly, lasting careers.
- Accelerating innovation and giving rise to fresh thinking in transportation so that our systems of mobility meet the needs of the future.
- Enhancing quality of life through the health benefits of reduced emissions and social benefits through equitable access, improved mobility and public safety.
- Ensuring infrastructure resiliency, continuity and extended lifecycles against both natural and human-made impacts.
- Stimulating economic growth that drives prosperity.

Additionally, we believe we all share the goal of ensuring that the benefits of a modern US transportation system elevate all communities, especially disadvantaged and vulnerable populations and areas that have been underserved in the past.

In my testimony today, I want to focus on three areas where government leadership can help achieve the outcomes I have described.

- Advancing Electrification
- Building Resilient Infrastructure
- Unlocking Innovation

#### ADVANCING ELECTRIFICATION

AECOM has guided more than 20 public-sector agencies and many private-sector clients with early adoption of transportation electrification.

In Los Angeles, AECOM is helping the city's Department of Transportation convert their existing bus facilities to support a full fleet conversion to battery electric buses. This fleet is anticipated to be one of the earliest fully converted electric bus fleets in the nation.

In Fresno, a primarily rural county in California, AECOM recently completed a study on the impacts of electrification on the grid and how the rural transit agencies can best convert to and leverage electric vehicles to support resilience during events like grid outages.

For the Washington Metropolitan Area Transit Authority (WMATA) in Washington, D.C., AECOM developed the strategy for an initial bus pilot with a path forward to electrify the full fleet over two decades.

In partnership with our clients, we have identified numerous potential benefits of advancing electrification, including emissions reductions in disadvantaged communities, creation of new high-quality jobs and careers, innovation and resiliency.

Based on real world examples, AECOM believes that significant opportunities exist to revisit and strengthen existing federal Department of Transportation (USDOT) programs that advance strategic national deployment of a reliable and accessible national electric charging network.

We also believe that such a charging network could provide a potential future revenue stream to replace or supplement current user fees that fund the maintenance and operation of roads and transit, while fostering continuing investment in community priorities.

With nearly 30% of emissions in the US arising from the transportation sector<sup>2</sup>, the connection between infrastructure and public health, equity and justice are more urgent today than they have ever been. The transportation sector is the greatest contributor to these air pollutants and therefore presents the greatest opportunity to deliver impactful solutions.

AECOM is taking an active role in changing our transportation infrastructure and how we use it to reduce emissions that have an adverse impact on human health. Low-income communities are disproportionately impacted given their increased exposure to environmental hazards, particularly related to our highways and other transportation facilities that reduce local air quality in those communities.

A widespread transition to zero-emissions transportation technologies could produce emissions reductions that by 2050, could total up to \$72 billion in avoided health harms including 6,300 premature deaths, 93,000 asthma attacks, and 416,000 lost workdays annually. In addition, the benefits to our environment in the form of avoided climate change impacts could surpass \$113 billion in 2050 as the transportation systems combust far less fuel and our power system comes to rely on cleaner, non-combustion renewable energy.<sup>3</sup>

Shifting to zero emissions vehicles can also create jobs—and even new careers. In California, a 2020 study showed that transportation electrification has created more than 275,000 direct EV industry jobs, and that number is expected to rise. These jobs are typically higher paying, with a salary average of over \$91,000, which is well above the state average of \$68,500.<sup>4</sup>

This Committee's work on the FAST Act, which created corridors with alternative fueling and charging infrastructure, has directly contributed to significant reduction in harmful mobile source emission pollutants. It has also created an exciting new landscape in which our public agency clients routinely engage our expertise in designing systemwide EV charging infrastructure for new projects.

*Recommendations:*

To foster a more integrated and resilient approach to transportation electrification, we encourage the Committee to consider the following:

1. Working with the private sector in setting design standards to encourage interoperability of charging infrastructure and advancing the use of electric vehicles.
2. Prioritizing pilot projects to convert large state/municipal and private sector fleets (as a precursor to broader community transition).
3. Investing in charging innovations, including dynamic charging embedded in roads and freeways.
4. Positioning the federal government as a leader in advancing the use of electric vehicles by electrifying the US Postal Service fleet and deploying regional and rural charging infrastructure.

Additionally, we suggest that deployment of new electrification corridors could be enhanced by exploring new rules that facilitate the use, transfer and disposition of under-optimized transportation rights-of-way for EV charging transmission, broadband and telematics.

#### BUILDING RESILIENT INFRASTRUCTURE

Pursuing infrastructure improvements to minimize disruption risks, and to extend the performance, safety and longevity of their transport infrastructure are prevailing—and immediate—concerns of our public- and private-sector clients.

This leads to the second area where government can accelerate the benefits of climate solutions in transportation: building resilient infrastructure.

Presently, AECOM is developing a flood mitigation study for BNSF Railway to understand the potential of flood impacts with more specificity, as well as a cost-benefit analysis of risk reduction strategies. The intent of the project with BNSF Railway is to minimize annual damage repairs and losses from out-of-service delays by developing a flood risk prioritization tool and impact assessment.

<sup>2</sup>“Fast Facts on Transportation Greenhouse Gas Emissions.” *EPA*, Environmental Protection Agency, 29 July 2020, [www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions](http://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions).

<sup>3</sup>“Road to Clean Air—Electric Vehicle Report.” *Road to Clean Air—Electric Vehicle Report / American Lung Association*, American Lung Association, [www.lung.org/clean-air/electric-vehicle-report](http://www.lung.org/clean-air/electric-vehicle-report).

<sup>4</sup>“LAEDC Report: California and SoCal EV Industry Is Growing, Giving Region Global Competitive Advantage.” *Los Angeles County Economic Development Corporation*, 8 Mar. 2020, [laedc.org/2020/03/01/laedc-ev-industry-report/](http://laedc.org/2020/03/01/laedc-ev-industry-report/).

In the San Francisco Bay area, AECOM carried out a resilience study for the region's Metropolitan Transportation Commission to address future flood impacts on the Bay Bridge touch down area and adjacent disadvantaged communities.

As lead consultant for the Lower Manhattan Coastal Resiliency Study, AECOM's comprehensive climate risk analysis of Lower Manhattan included an economic analysis that accounted for potential transportation disruption. Similar analyses, including a regional economic assessment for Southeast Florida investment in resilience, all share the same conclusions: that billions of dollars in potential losses due to disruption posed by natural or man-made events can be offset by smaller investments today.

In the case of Southeast Florida, daily tidal inundation under 2070 conditions could affect over 100 miles of major roadways, expose \$53.6 billion worth of property value, affect 17,800 jobs, and cause \$384 million in fiscal losses in a single year (2019 dollars).

Investing in regional adaptation solutions would have positive returns on investment and provide job opportunities. The analysis showed that every \$1 invested in community-level adaptation would drive \$2 in economic benefits. Overall, community-level adaptation investment could support 85,000 job-years (a job year is one year of work for one person).<sup>5</sup>

In 2020, the United States experienced 22 natural disaster events with losses exceeding \$1 billion each—the most ever. It was also the sixth consecutive year in which 10 or more billion-dollar disaster events occurred in the US.<sup>6</sup> Factoring in the human toll as well, we believe the business case for investing in prioritizing and mitigating the impacts on transportation is profound.

*Recommendations:*

1. AECOM is supportive of reauthorization reforms that incorporate methodologies that better incentivize investments in projects by taking into account economic, environmental, social and safety benefits, in addition to traditional life-cycle cost assessments.
2. A grant pilot program that offsets the additional cost of new resilient infrastructure in a market that prioritizes low bids, would incentivize and capitalize on the opportunity to build truly resilient and long-lasting infrastructure, and realize a range of associated benefits.

#### UNLOCKING INNOVATION

In our most recent fiscal year, AECOM worked on more than 29,000 projects for transportation clients in the United States.

Many innovative solutions do ultimately advance to project delivery and operation. However, in some instances, the ability to advance innovation is stymied as a result of commercial models, dated standards, jurisdictional conflicts and more.

Advances in new modes of mobility can play a critical role in congestion management, emissions reduction, economic output and innovation.

AECOM has been supporting clients to explore visionary, new forms of mobility ranging from High Speed Rail to Hyperloop, and more recently Electric Vertical Take-Off and Landing (eVTOL).

AECOM led the environmental process to support federal decision making for the high-speed rail project between Dallas and Houston.

The project would create direct employment and earnings of \$14.5 billion during construction; direct and indirect annual employment and earnings of \$232 million for the State of Texas during operations; and at full operations, reduce vehicles miles traveled by 1.35 billion.

AECOM has also conducted preliminary studies of hyperloop systems to understand the economic and social benefits for both industry and citizens. We have found opportunity to increase intermodal connectivity, reduce vehicles miles traveled and provide environmental benefits.

In addition to new modes of mobility, AECOM sees merit in encouraging greater use of innovative mobility options to address first mile and last mile needs and expand access to existing systems.

This is aligned with the growing equitable interest in supporting populations across the country that cannot drive. These vulnerable populations may be elderly, disabled or low-income workers that can benefit significantly from intermodal solutions that may encompass ride sharing for the last section of their trip.

<sup>5</sup>“The Business Case for Resilience in Southeast Florida.” *ULI Knowledge Platform*, knowledge.uli.org/reports/research-reports/2020/the-business-case-for-resilience-in-southeast-florida.

<sup>6</sup>*Hurricane Costs*, coast.noaa.gov/states/fast-facts/hurricane-costs.html.

Bronzeville, a neighborhood on the southside of Chicago, is a perfect example of integrated planning and innovation.

AECOM is working with Commonwealth Edison and the Chicago Housing Authority to address transportation, electrification and broader community benefits such as jobs and education. AECOM is developing the first renewable powered microgrid for the utility in this underserved community. At the same time, energy saving programs are helping residents and businesses reduce their utility bills. Additional initiatives focus on job creation, technical training in support of clean energy jobs leading to expertise that is transferable to projects around the country and preparing low-income high school students for STEM careers. My hope is this would change the beliefs and opportunities for the future families of these students for generations.

A first- and last-mile EV shuttle service is being provided to three senior centers providing connection to Chicago Transit Authority train and bus stops with the intent of adding similar shuttles to the local academic community in partnership with the Illinois Institute of Technology. Additionally, shared electric vehicles are being piloted in the community.

Among other innovations, there are advances in construction strategies and materials that can deliver real benefits to sustainability, costs and resilience. Examples include low noise asphalt (resulting in reduction of noise abatement structures), low carbon concrete (emissions), cost effective use of artificial intelligence to detect wildlife hazards rural areas and innovative use of energy storage and stormwater management. A more adaptive regulatory environment would help firms like AECOM to specify these solutions in the design and accelerate their deployment.

*Recommendations:*

1. We believe opportunities exist to address these challenges through changes to USDOT programs, revisions to contracting rules and greater flexibility in standards to accelerate the adoption of innovation in transportation.
2. We believe the fundamental goal should be to encourage agencies at the state and local level to adopt alternative investment methodologies that foster innovation and engagement of the private sector.

SUMMARY AND CLOSE

AECOM stands ready to assist this Committee and our public and private clients throughout the US to adopt and operationalize a paradigm shift in infrastructure.

To build projects that will last for generations, this Committee has an excellent opportunity to alter the project investment paradigm, one that that will foster incubation at all levels of government, champion new design and performance methodologies that harness cutting-edge technologies, and inspire and incentivize our clients to build next generation, long-lasting infrastructure.

Historically, the infrastructure industry has been a powerful jobs creator. It has also helped soften the impact of the coronavirus pandemic by engineering solutions to social distancing and virus detection, aid policymakers in planning for the future, and designing for a more equitable and resilient tomorrow.

The incorporation of climate solutions that help (i) Advance Electrification, (ii) Build Resilient Infrastructure and (iii) Unlock Innovation will yield significant benefits across America.

As I noted in my introduction, the business case for these climate solutions is strong in terms of (1) creating jobs and lasting careers, (2) accelerating innovation, (3) enhancing quality of life, (4) ensuring resiliency in our infrastructure for future generations, and (5) stimulating economic growth that drives prosperity.

Thank you again for the opportunity to testify.

I look forward to your questions and to working with the Committee to craft solutions to these pressing challenges.

Mr. DEFAZIO. Thank you, Mr. Rudd.

Mr. Rafael Santana.

Mr. SANTANA. Chairman DeFazio, Ranking Member Graves, and committee members, I appreciate the opportunity to testify on the business case for climate solutions. This is an important topic for the future of the rail industry and the future of our Nation.

My name is Rafael Santana. I am the president and CEO of Wabtec Corporation, a global leader in rail technologies for over 150 years.

We are based in Pittsburgh. Wabtec has over 27,000 employees in more than 50 countries. We are the largest freight locomotive manufacturer.

We move more than 20 percent of the world's freight, and we are a proud American company at the forefront of freight rail innovation.

Wabtec embraces Congress' commitment to clean energy and the creation of jobs. We believe the freight rail sector is in a unique position to accelerate these efforts, and Wabtec is prepared to contribute its resources to help meet the clean energy challenge.

In that regard, I want to introduce you to a bold vision for transforming the future of freight rail known as Freight 2030. This is a public-private partnership that will accelerate our Nation towards a better and a cleaner tomorrow.

Joining Wabtec in this vision, we have Carnegie Mellon University, the Nation's leading university in artificial intelligence and robotics, and we have Genesee & Wyoming, the Nation's largest short line and regional freight railroad.

Rail is, without question, the most sustainable, the safest, and the most efficient way to move both people and goods over land. But we cannot stop there.

At Wabtec, we innovate. We help our customers leverage rail to increase efficiency, to reduce costs, and to reduce their carbon footprint.

A great example is Trip Optimizer. This is a cruise control technology for trains that has saved over 400 million gallons of fuel and has reduced CO2 by half a million tons per year.

Wabtec is also leading the way toward clean freight with the world's first heavy-haul, 100 percent battery-electric locomotive. This is called FLXdrive. This locomotive is being tested in California with BNSF and with the California Air Resources Board.

We are also leading the way in rail utilization and safety, having implemented Positive Train Control systems with both Class I railroads and also with short lines. This is a safety overlay that covers all mainline tracks in the U.S.

Wabtec strongly believes that by increasing capacity and better utilizing our world-class freight rail network, coupled with developing zero-emission locomotives, we can reduce greenhouse gas emissions by up to 120 million tons per year.

We can also create up to 250,000 jobs.

For context, 120 million tons of greenhouse gases is the equivalent of 26 million passenger cars.

The time for rail is now, and Freight 2030 is the critical path to our Nation's continued success. At the heart of Freight 2030, we have three core principles.

The first one is decarbonization, and we are going to get there through zero-emission battery and hydrogen hybrid locomotives.

The second piece is technology. We are going to use technology that will increase freight rail utilization and will improve safety.

Third is the creation of direct, indirect, and induced jobs, roughly 80 percent of which will be blue-collar jobs.

This vision would also enable better data sharing and increased visibility to the movement of goods from ports to rail to yards.

We propose to create the Freight Rail Innovation Institute at Carnegie Mellon, the first of its kind, to drive action towards significantly increasing freight rail utilization and decarbonization, while spurring jobs and economic growth.

This institute will allow the U.S. to lead ahead of others, including China, including Europe, in zero-emission solutions for rail, as well as become an exporter for the world.

Wabtec and our partners, we are prepared to invest in the Freight Rail Innovation Institute alongside the U.S. Government, and ask for your support in creating a clean energy future.

Thank you for the opportunity to testify, and I welcome any questions you may have.

[Mr. Santana’s prepared statement follows:]

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**Prepared Statement of Rafael Santana, President and Chief Executive Officer, Wabtec Corporation**

INTRODUCTION

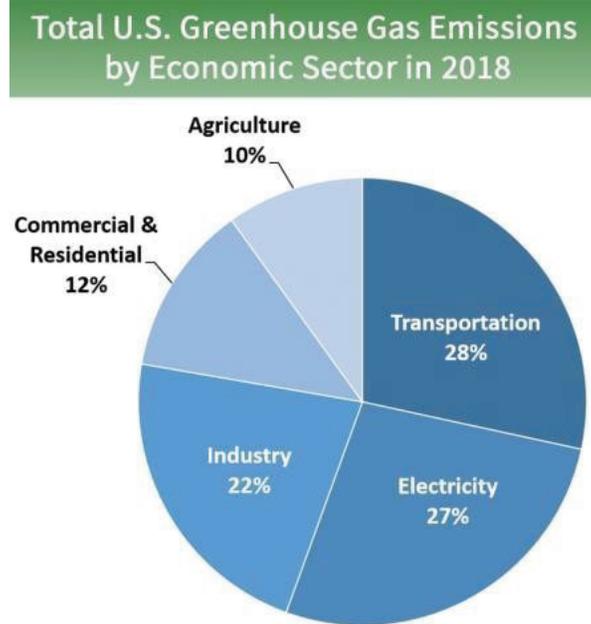
Chairman DeFazio, Ranking Member Graves, and members of the Committee, I appreciate the opportunity to testify on the critical topic of transportation and climate change. My name is Rafael Santana, and I am the President and CEO of Wabtec Corporation—a global leader in rail technologies for over 150 years.

President Biden and Congress have pledged to build a clean energy economy. The “Build Back Better” plan is committed to address climate change, significantly reduce carbon emissions and spur job growth. The transportation sector is a critical piece of building back better. Across the globe, transportation accounts for nearly one quarter of all greenhouse gas (GHG) emissions.<sup>1</sup> Current trends indicate that freight and passenger rail activity will more than double by 2050.<sup>2</sup> Therefore, the United States will require even cleaner and more energy-efficient transportation solutions if it is to continue being a leader in addressing climate change.

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<sup>1</sup>The World Resources Institute

<sup>2</sup>IEA (2019), The Future of Rail: Opportunities for energy and the environment, IEA, Paris, <https://doi.org/10.1787/9789264312821-en>.



The freight rail sector, in addition to being the most sustainable way to move people and goods over land, is in a unique position to contribute to this endeavor. By increasing utilization of our world-class freight rail network and developing zero-emission locomotives; together, we can reduce emissions by up to 120 million tons of GHG per year.<sup>3</sup> This is the equivalent of removing 26 million cars from the road or planting nearly 2 billion trees.<sup>4</sup> By pursuing increased rail utilization and zero-emission locomotives, we can create up to 250,000 jobs, all while increasing safety.

With this mind, I'm delighted to have the opportunity to introduce you to the "Freight 2030" vision for transforming the rail industry. Within the next nine years, we are committed to developing the technology to enable the expansion of freight rail utilization, accelerating the reduction of GHG emissions with battery and hydrogen-powered locomotives, and enabling safer trains through a public-private partnership between industry, academia, and the federal government.

Partnering on the "Freight 2030" vision for the future are Carnegie Mellon University (CMU), the nation's leading university in artificial intelligence and robotics, Genesee & Wyoming (G&W), the nation's largest short line and regional freight railroad, and Wabtec. By working together, we can establish a research institute committed to developing and deploying advanced rail propulsion, logistics, and safety technologies.

#### WABTEC CORPORATION

Wabtec was founded in 1869 by George Westinghouse and, today, is a leader in freight rail, manufacturing advanced locomotives, freight rail parts and components, as well as advanced network logistics and digital solutions. In addition to our freight rail division, we also develop transit products and have components or parts on virtually every transit train globally.

Based in Pittsburgh, Wabtec is a proud American company at the forefront of freight rail innovation with over 27,000 employees in more than 50 countries. The company is the largest freight locomotive manufacturer, moving more than 20% of the world's freight.

At Wabtec, we innovate and help our customers leverage rail to increase efficiency, reduce costs, and their carbon footprint. We are currently leading the way

<sup>3</sup> Wabtec Internal Documents

<sup>4</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

in developing battery-electric locomotives and other low-to-zero emissions technologies. BSNF Railway and California Air Resources Board are testing our newly developed FLXdrive locomotive in revenue service today on track between Barstow and Stockton, California. The FLXdrive is the world's first heavy-haul, 100-percent battery-electric locomotive (BEL).<sup>5</sup> The locomotive features an overall train energy management system powering approximately 20,000 battery cells and delivering 2.4 MWhrs of energy. To date, FLXdrive has run over 10,000 miles and delivered an average of 10% reduction in fuel consumption across the train. This is the equivalent of 5,000 gallons of diesel fuel saved and approximately 50 tons of CO2 emissions reduced. At 6 MWhrs, we have an opportunity to further reduce fuel consumption and emissions by up to 30%.<sup>6</sup>

Wabtec also leads the way in rail utilization, safety and logistics optimization technology. In 2008, Congress passed the Rail Safety Improvement Act, which mandated the implementation of Positive Train Control (PTC) systems on most of America's railroads.<sup>7</sup> PTC systems are designed to prevent train-to-train collisions, overspeed derailments, unauthorized movements into established work zones, and accidents that occur if trains are routed down an incorrect track. Since 2008, Wabtec has supplied over 24,000 locomotives with PTC computers and software.<sup>8</sup> Over the past decade, PTC technology has revolutionized rail safety in the US and helped make the rail sector more efficient and effective. Wabtec is currently developing advanced PTC systems that will enable virtual and moving block signaling instead of the traditional fixed block signaling used today.

These new, advanced PTC systems will significantly increase the efficiency of our railways by reducing headways between trains while maintaining stringent safety standards. Similarly, our Trip Optimizer and Movement Planner solutions optimize both locomotive fuel efficiency and real-time network planning, respectively. This enables freight to move more efficiently using existing rail networks, thereby reducing energy use, emissions, and waste. As a reference, our Trip Optimizer solution is already installed on over 11,000 locomotives globally, saving 400 million gallons of fuel.<sup>9</sup> It also reduced carbon emissions by over 500,000 tons per year—the equivalent of removing 100,000 cars from the road.

Following the great American tradition of leadership in innovation and industry, Wabtec is on the cutting edge of freight rail technology. We have the experience and know-how to lead rail's charge into a cleaner and more sustainable future.

#### FREIGHT RAIL'S ROLE IN THE CLEAN ENERGY ECONOMY

The United States has the most extensive freight rail infrastructure network in the world. Our 140,000 miles of track are unparalleled—long enough to stretch around the globe over five times.<sup>10</sup> This allows quick and efficient shipment of goods across our nation.

Freight rail is a critical component of today's clean energy economy. Rail can more efficiently and cleanly deliver goods than any other mode of transportation.

While freight rail leads the transportation sector in reducing emissions today, there are many more opportunities before us. For example, current trends indicate that freight activity in America will more than double in the next thirty years, with freight tonnage increasing significantly.<sup>11</sup> The U.S. will require cleaner, more energy-efficient transportation solutions. Technology adoption across rail will be an indispensable driver for the modernization of the entire transportation system, making it cleaner, safer, and more efficient, and reliable.

Trucking is an essential component of the freight shipping network, and rail must work hand-in-hand with our nation's truckers to reduce emissions, increase efficiency and safety, and more economically move goods from coast-to-coast. The U.S. will always rely on trucking to move goods, especially in first-and-last mile situations where goods are moved to warehouses, businesses, or homes. However, when moving goods longer distances, trucking is less efficient than freight rail. Compared to trucking, rail produces five times less carbon emissions per ton-mile.<sup>12</sup>

<sup>5</sup> <https://www.wabteccorp.com/sustainability-report>

<sup>6</sup> <https://www.wabteccorp.com/sustainability-report>

<sup>7</sup> <https://railroads.dot.gov/train-control/ptc/positive-train-control-ptc>

<sup>8</sup> <https://www.wabteccorp.com/about-wabtec>

<sup>9</sup> <https://www.wabteccorp.com/sustainability-report>

<sup>10</sup> <https://www.aar.org/wp-content/uploads/2020/08/AAR-Railroad-101-Freight-Railroads-Fact-Sheet.pdf>

<sup>11</sup> <https://data.bts.gov/stories/s/Moving-Goods-in-the-United-States/bcyt-rqmu>

<sup>12</sup> Average from AAR Climate Change Report and EDF Green Freight Handbook

## Weight of Shipments by Transportation Mode

Tons (millions)

| Mode                 | 2012   |          |        |        | 2018   |          |        |        | 2045   |          |        |        |
|----------------------|--------|----------|--------|--------|--------|----------|--------|--------|--------|----------|--------|--------|
|                      | Total  | Domestic | Export | Import | Total  | Domestic | Export | Import | Total  | Domestic | Export | Import |
| Grand Total          | 16,952 | 14,895   | 889    | 1,169  | 18,616 | 16,474   | 1,037  | 1,104  | 25,472 | 20,932   | 2,282  | 2,259  |
| Truck                | 10,098 | 9,893    | 115    | 90     | 11,320 | 11,108   | 101    | 111    | 14,836 | 14,226   | 304    | 306    |
| Rail                 | 1,625  | 1,481    | 57     | 87     | 1,580  | 1,404    | 67     | 108    | 1,926  | 1,588    | 112    | 226    |
| Water                | 959    | 502      | 76     | 380    | 1,020  | 542      | 218    | 261    | 1,183  | 609      | 201    | 373    |
| Air (including tru.. | 11     | 2        | 5      | 4      | 12     | 2        | 5      | 5      | 41     | 4        | 19     | 18     |
| Multiple modes a..   | 1,318  | 309      | 584    | 425    | 1,370  | 328      | 601    | 441    | 2,895  | 431      | 1,435  | 1,029  |
| Pipeline             | 2,901  | 2,672    | 50     | 179    | 3,277  | 3,061    | 39     | 177    | 4,559  | 4,058    | 205    | 296    |
| Other and unkno..    | 41     | 37       | 2      | 3      | 37     | 30       | 7      | 1      | 31     | 16       | 5      | 11     |

**Notes:** Data do not include imports and exports that pass through the United States from a foreign origin to a foreign destination by any mode. Numbers may not add to totals due to rounding. Data in this version are not comparable to similar data in previous years because of updates to the Freight Analysis Framework. All truck, rail, water, and pipeline movements that involve more than one mode, including exports and imports that change mode at international gateways, are included in multiple modes & mail to avoid double counting. As a consequence, rail and water totals in this table are less than other published sources.  
Source: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, Freight Analysis Framework, version 4.5.1, 2019, <https://www.bts.gov/faf>.

With climate change as one of our nation's greatest challenges, the time to shift to rail is now. For example, if we increased utilization of rail by 50% for the movement of freight over 500 miles, we can reduce 60 million tons of GHG emissions per year.<sup>13</sup> That is like taking 13 million cars off the road.<sup>14</sup> If the U.S. wants to lead the world in decarbonizing the transportation sector, it should look no further than freight rail technologies and innovation.

## FREIGHT 2030

Our plan to accelerate the future of freight rail, the "Freight 2030" vision, is to expand freight rail utilization, accelerate the reduction of GHG emissions, reduce road congestion and traffic, and make transportation in the U.S. safer for everyone. The "Freight 2030" vision seeks to reinvent U.S. freight rail by developing the technology to accelerate:

- Decarbonization through the creation of zero-emission locomotives.
- Technology that enables a 50% increase in freight rail utilization and up to 50% reduction in safety incidents, while at the same time making rail faster and more efficient.
- Job creation that enables 250,000 direct, indirect and induced jobs spurred by the transportation and manufacturing sectors.

Wabtec's goal is to develop the next generation of zero-emission locomotives. Wabtec has a clear path to power new locomotives—and repower existing locomotives—with batteries, hydrogen internal combustion engines, and hydrogen fuel cells. As discussed earlier, we are testing and deploying our battery-electric locomotive and plan to commercialize it in the near future. We are currently researching applicability of battery-hybrid and hydrogen combustion engines and hope to begin development and testing of those technologies quickly. These new technologies need to be retrofittable to the current fleet of locomotives. Each diesel-powered locomotive converted to alternative energy sources can save up to 3,000 tons of CO<sub>2</sub> per year.<sup>15</sup>

Increasing rail utilization will reduce emissions across the board. Studies have highlighted that while improvement to infrastructure is important, there is significant opportunity to extract more useful capacity from the existing network.<sup>16</sup> Advancements to current signaling systems and other utilization technologies can increase network capacity by 50%. Through next-gen technology such as dynamic net-

<sup>13</sup> Estimated based on AAR Report: The Positive Environmental Effects of Increased Freight by Rail Movements in America, at <https://www.aar.org/data/the-positive-environmental-effects-of-increased-freight-by-rail-movements-in-america/aar-positive-environmental-effects-of-freight-rail-white-paper-62020/>

<sup>14</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

<sup>15</sup> Based on 300k gallons of fuel consumed per locomotive per year

<sup>16</sup> "National Rail Freight Infrastructure Capacity and Investment Study. Presented to Rail-road Energy Transportation Advisory Committee" by Cambridge Systematics; Sept 2008; U.S. Freight System Modernization Necessary to Reduce Bottlenecks, Improve Security; RAND Corporation. Jun 2009.

work and on-demand logistics planning, we can optimize heavy haul operations, increase yard capacity and cargo visibility, and grow “first & last” mile operations.

As a key partner to the railroad industry, safety is at the core of all that we do at Wabtec and will be the number one focus of our “Freight 2030” vision. Already, rail is safer than other modes of transport. For instance, there are 22 times fewer deaths and injuries per year in rail than trucking.<sup>17</sup> We estimate an increase in freight rail utilization will result in 14,000 fewer injuries or deaths per year.<sup>18</sup>

Finally, “Freight 2030” is a bold vision for job creation. Within the next three years, we estimate this initiative will create over 30,000 new jobs. In the longer term, the initiative will create 250,000 new jobs. By increasing the amount of freight trains on the railroad, we increase the need for yard, maintenance and manufacturing workers. Therefore, we believe 80% of the jobs created through our program will be blue collar jobs. This is alongside the jobs created to construct a research institute, as well as build and maintain hydrogen fueling pipelines and stations around the country.

#### THE FREIGHT RAIL INNOVATION INSTITUTE

To accelerate the future of rail within the next decade and at scale, we ask Congress to collaborate with Wabtec, CMU and G&W to create, coordinate, and co-fund the Freight Rail Innovation Institute (FRII). This will send a message to the entire transportation industry that together, the private and public sectors can help achieve the nation’s vision of a competitive and sustainable American freight transportation network.

Moreover, this collaboration will create and fund technology research, demonstration, and commercialization initiatives that drive measurable action toward significantly increasing freight rail utilization and decarbonization of the rail network, while spurring hundreds of thousands of jobs. To that end, Wabtec proposes establishing centers of excellence in Green Power, Advanced Network Logistics, and Capacity at the FRII to bring rail into a new age of optimization and lead the world in freight rail innovation.

A public-private partnership will create new manufacturing capabilities to supply “Made in America” technologies, such as zero emission locomotives powered by battery and hydrogen fuel cells, as well as on-site hydrogen generation solutions. In addition, it will further develop research priorities, conduct research, development, and testing, and foster collaboration and action between stakeholders to ensure the U.S. maintains its competitive edge and global leadership in creating the freight rail network of the future.

#### CONCLUSION

Maximizing the freight rail network and shifting to clean power requires upfront intellectual firepower and capital investment. Wabtec and our partners are prepared to invest in the Freight Rail Innovation Institute alongside the U.S. government and ask for your support in creating a clean energy future together. Let’s start building America’s freight rail of tomorrow today.

I greatly appreciate the Committee’s attention on this matter. Thank you again for the opportunity to testify, and I look forward to answering any questions members may have.

Mr. DEFAZIO. Thank you, Mr. Santana.

I now recognize Representative Cohen, who would like to briefly introduce our next witness.

Mr. COHEN. Thank you, Mr. Chairman.

Memphis is kind of a one-name town. There is Elvis, there is Cybill, and there is Fred. He has been responsible for so much in Memphis, and it would not be the great 21st-century city without him.

And his employees have done a great job in delivering the vaccine to America and making it safer from this pandemic.

<sup>17</sup> Wabtec calculation based on: [Bts.gov](https://www.bts.gov), [injuryfacts.nsc.org](https://www.injuryfacts.nsc.org), [nhtsa.dot.gov](https://www.nhtsa.dot.gov)

<sup>18</sup> Wabtec calculation based on: Federal Motor Carrier Safety Administration—Large Truck and Bus Crash Facts 2018 and Bureau of Transportation Statistics

FedEx has been the number one carrier, along with UPS—I guess it may be a tie there—for helping get that vaccine to people around the country.

There is not a cultural institution or athletic group that does not have a FedEx employee involved in a major way. Employees of FedEx contribute to our communities in a phenomenal fashion.

And FedEx is ahead of the game in every single area. Just as it was ahead of the game in bringing air cargo business as it has to the world, it has been ahead in climate and innovative activities with electric vehicles and forward thinking.

Just this past week, FedEx became one of 50 countries to sign the climate challenge to reduce and have zero net carbon emissions by 2040, 10 years ahead of the Paris Accords.

It is my honor to represent the city, and FedEx has made a great city in America.

Mr. Fred Smith.

Mr. SMITH. Chairman DeFazio, Ranking Member Graves, and members of the committee, thank you for inviting me to testify today on the business case for climate solutions.

I would like to also thank Congressman Cohen for that kind introduction. He represents Tennessee's Ninth Congressional District, home of FedEx's headquarters where we have over 30,000 team members employed.

Addressing climate change is bigger than one business, and this committee recognizes for the United States to remain a global economic leader, we must work together on sound policy and innovative solutions for our planet. The health of our planet is at stake.

FedEx has a long history of keeping sustainability at the center of our business, and we know the future of our operations is tied to the future of our environment.

Building on that longstanding commitment, earlier this month, as Congressman Cohen mentioned, FedEx announced an enterprisewide ambitious new goal to achieve carbon-neutral operations by 2040.

As part of this mission, we will accelerate progress already underway in the following areas:

Electrification of our global parcel pickup and delivery vehicle fleet;

Sustainable customer solutions;

Sustainable fuels;

Modernization of our aircraft;

And continuing fuel conservation endeavors.

Alongside the many key steps outlined in my written testimony, by 2040 the entire FedEx parcel pickup and delivery fleet will be zero-emissions electric vehicles.

FedEx has also announced substantial support to help establish the Yale Center for Natural Carbon Capture, to accelerate research into methods of carbon sequestration and scale.

The center's first focus will be helping to develop strategies that offset greenhouse gas emissions equivalent to current emissions produced by aircraft. From there, the Yale Center will address additional global sources of emissions, publishing its findings so other businesses, industries, and governments can benefit.

In addition to our work with Yale, FedEx has a number of other future-focused sustainability strategies underway. Roxo, the all-electric same-day bot, and our drone delivery pilot program operated by Wing Aviation, are just two of the innovative, environmentally friendly, same-day, last-mile delivery solutions we are working on.

As seen during the pandemic, the U.S. trucking industry is a critical link in maintaining supply chains, yet remains stuck with aging infrastructure and dated Federal equipment standards for twin 28-foot trailers, unchanged since 1982.

One step with immediate environmental benefits would be a modest 5-foot increase to twin 28-foot trailers, which would reduce annual fuel use by 225 million gallons per year at no cost to road safety or to the taxpayers.

Last year, this committee and this Chamber drafted an infrastructure package that incorporated important climate solutions. This included incentivizing commercial electric vehicles and zero-emission vehicle charging infrastructure, as well as advancing research into low emissions and alternative aviation fuel.

There was also significant work done to modernize the electric grid for more renewable energy and prepare it for the large-scale deployment of electric vehicles.

This is a good start, indeed, but more needs to be done, including modernizing our air traffic control system and updating air traffic management policies and guidance.

Our ambitious agenda at FedEx shows that businesses can and will lead in creating a sustainable future for us all. Our company has been at this for a very long time, however, and we cannot do it alone.

Government, industry stakeholders, and academia must continue to work together on policies and regulations to help ensure the U.S. maintains its status as a global leader in climate change policy, while also stimulating economic growth and job development.

These are just a few of the priorities we must focus on to address our global climate challenges. I look forward to discussing those shared goals with you today.

Thank you for inviting me.

[Mr. Smith's prepared statement follows:]

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**Prepared Statement of Frederick W. Smith, Chairman and Chief Executive Officer, FedEx Corporation**

Chairman DeFazio, Ranking Member Graves and members of the committee, thank you for inviting me to testify before the committee today on "The Business Case for Climate Solutions." Addressing climate change is bigger than one business, and this committee recognizes for the United States to remain a global economic leader we must work together on responsible policy and innovative solutions for the health of our planet.

For FedEx, sustainability is a relatively simple concept: to connect the world responsibly and resourcefully. FedEx has a long history of keeping sustainability at the center of our business, and we know the future of our operations is tied to the future of our environment. Building on that longstanding commitment, earlier this month FedEx announced an enterprise-wide ambitious new goal to achieve carbon-neutral operations globally by 2040, which I look forward to discussing in detail today.

## FEDEX CORPORATION

FedEx has grown tremendously since its first night of operations in April of 1973. FedEx Corporation now consists of six independent operating companies that work collaboratively to provide our customers and communities we serve with innovative business solutions to meet their emerging needs. We have a fleet of over 680 aircraft including the new Boeing 777 freighter model, one of the most efficient freighter aircraft in the world. We serve over 650 airports in the U.S. and abroad. On the ground, we operate 200,000 motorized vehicles. Across all FedEx operating companies, we cover over 2.5 billion highway miles per year. Our fleet also includes the latest in all-electric and hybrid trucks, some of which traverse the streets of Washington, D.C., each day. Together, our 600,000 team members operate one of the largest logistics and transportation companies in the world, serving more than 220 countries and territories.

- Our global FedEx Express integrated air-ground network offers time-definite air express shipping for parcels and freight shipping and links the American economy to more than 99 percent of the world's GDP. As one illustration of the power of this network, since January 2020, FedEx Express has transported nearly 80 kilotons of personal protective equipment—including more than 2 billion masks—around the world as part of our response to the COVID-19 pandemic. We are now shipping approved COVID-19 vaccines, related ingredients, and supplies throughout the U.S., Canada, and to more than 20 other countries around the world. We are prepared to ship vaccines to more than 220 countries and territories for as long as necessary to help eradicate COVID-19.
- Our FedEx Ground and FedEx Freight networks use both road and rail to transport products from business-to-business as well as business-to-consumer services, which have proven to be essential services as communities work to combat the spread of COVID-19.
- Our FedEx Logistics business provides a suite of supply chain solutions, including heavy air and ocean cargo services, customs brokerage, and trade management tools and data.

Connecting people with goods, services, ideas, and technologies creates opportunities that fuel innovation, energize businesses and lift communities to higher standards of living. At FedEx, we believe that a connected world is a better world, and that belief guides everything we do. And we recognize that with the privilege of connecting the world also comes the responsibility of being good stewards of the planet.

## REDUCE, REPLACE, REVOLUTIONIZE

The topic of today's hearing, climate solutions, has been a central focus at FedEx for a very long time. For example, nearly 20 years ago, FedEx was the first delivery company to use hybrid vehicles for pickup and delivery. In 2006, I joined with General P.X. Kelley (Ret.), 28th Commandant of the U.S. Marine Corps, and a group of business and former military leaders to form the Energy Security Leadership Council. Later that year, we released a plan to improve U.S. energy security as well as crucial follow-up reports and policy briefs. The council continues to support mitigating oil dependence through fuel efficiency standards, increased domestic oil production, and deployment of alternatives in transportation through technologies such as electric vehicles. That plan was instrumental in advancing the FedEx sustainability strategy: Reduce, Replace, Revolutionize.

This three-pronged approach has the following goals:

- Specific to *Reduce*, this includes minimizing or eliminating the effects of our activities and operations.
- For *Replace*, we apply the right solutions in the right applications across our business.
- And within *Revolutionize*, we are continuously discovering and adopting cutting-edge technologies and solutions to drive impact.

Since 2012, this strategy has helped us save 1.43 billion gallons of jet fuel and avoid over 13.5 million metric tons of CO<sub>2</sub>. In fiscal year 2019, we avoided more than 3 million metric tons of CO<sub>2</sub> emissions as a result of our enterprise-wide fuel and energy saving initiatives. That's equivalent to the carbon sequestered by more than 4 million acres of U.S. forests in one year. Over a 10-year period from 2009 to 2019 these efforts contributed to an approximately 40% reduction in CO<sub>2</sub> emissions intensity on a revenue basis across the enterprise while package volume increased 99%.

Building on this longstanding commitment to sustainability, as I mentioned, earlier this month, we set a goal to achieve carbon neutrality for our global operations by 2040. To get there, we will invest in solutions and make necessary changes

across our enterprise—from our packaging to our fleet and more—to deliver lasting benefits for our industry and our planet.

#### CARBON NEUTRAL BY 2040

To help us achieve this goal, FedEx is designating more than \$2 billion of initial investment in three key areas: vehicle electrification, sustainable energy, and carbon sequestration, as outlined below.

- *Vehicle Electrification:* By 2040, the entire FedEx parcel pickup and delivery (PUD) fleet will be zero-emission electric vehicles. This will be accomplished through phased programs to replace existing vehicles. For example, by 2025, 50% of FedEx Express global PUD vehicle purchases will be electric, rising to 100% of all purchases by 2030. Our work with General Motors will be key in helping us achieve this objective. As the first customer of their new commercial electric vehicle brand, BrightDrop, we look forward to taking delivery of 500 vehicles this year alone.
- *Sustainable Customer Solutions:* FedEx will work with customers to offer end-to-end sustainability options for their supply chains through carbon-neutral shipping offerings and sustainable packaging solutions.
- *Sustainable Fuels (SAFs):* FedEx will continue to work with industry, government agencies, academia, and alternative fuel suppliers to seek development and invest in cost-effective alternative fuels to reduce aircraft and vehicle emissions. These investments build on our work in 2018 with Boeing, when FedEx supplied a B777 to Boeing for the 2018 ecoDemonstrator program, testing 35 separate technologies, some of which focused on achieving greater fuel savings. In addition, the aircraft flew on 100 percent biofuel. More investment and development are needed if we are to see the benefits of SAFs. Given the consumption rate of conventional aviation fuel as demonstrated in the attached chart, more investment and development are needed if we are to see the true benefits of SAFs.
- *Fuel Conservation and Aircraft Modernization:* FedEx will build on its successful FedEx Fuel Sense initiatives designed to reduce fuel consumption in its aircraft and continue to invest in new aircraft. For example, by the end of 2022, we plan to retire our fleet of MD-10s while continuing to acquire cleaner and more fuel efficient aircraft. We also will continue working with the U.S. Federal Aviation Administration to advance and modernize the National Airspace System.
- *Facilities:* FedEx will continue efforts to make its more than 5,000 facilities worldwide more sustainable through continued investments in efficient facilities, renewable energy, and other energy management programs. Across our FedEx Ground network, we have solar installations in service at 16 facilities and a number of projects in progress or in the planning phase at additional U.S. locations. Significant efforts are already underway as well to modernize major Express hubs in Memphis, Tenn., and Indianapolis, Ind.
- *Natural Carbon Sequestration:* FedEx will commit \$100M over five years to help establish the Yale Center for Natural Carbon Capture to support applied research into natural carbon sequestration solutions.

The path toward sustainability requires new strategies for removing and storing Earth's excess carbon. The Yale Center for Natural Carbon Capture will catalyze interdisciplinary research across the natural sciences and engineering to accelerate this work.

Center researchers will develop methods that build on natural carbon storage systems, including biological ecosystems and the geological carbon cycle, improving, where possible, how quickly carbon can be absorbed, how much can be contained, and how long it can be stored. The center's first focus will be helping to develop strategies that offset greenhouse gas emissions equivalent to current emissions produced by aircraft. This effort is critical as we look forward and plan for the growth of this dynamic industry.

The growth of aviation is essential to our collective future. Airplanes enable humanity's innate historical desire to travel and trade and have uniquely helped create a more connected, prosperous world. It was only 118 years ago that the Wright brothers took flight in their homemade machine. Today, global air services now comprise an industry with nearly 88 million jobs<sup>1</sup>. In 2019, airplanes transported over 4.5 billion passengers around the world<sup>2</sup> and were responsible for over 30% of the

<sup>1</sup> International Air Transport Association

<sup>2</sup> International Civil Aviation Organization

value of all international trade<sup>3</sup>. And while COVID-19 has temporarily disrupted passenger travel, international air cargo services have proven essential to helping the world combat this crisis, by keeping critical supply chains open to ensure the timely delivery of much needed supplies and goods.

Unlike other transport activities that can be powered by batteries or other low-carbon fuels, achieving true sustainability in aviation has proven to be an intractable problem as there are few viable alternatives on the horizon to replace carbon-based jet fuels. Along with investing in the modernization of aircraft, the aviation industry will continue research and development of sustainable plant and waste-based biofuels, synthetic carbon-based fuels, “electrofuels,” and “green hydrogen.” However, the massive costs of new sustainable aircraft fuels, suitable new aircraft designs to use them, and associated infrastructure make the prospects for carbon-neutral aviation challenging. As Bill Gates documents in his new book “How to Avoid a Climate Disaster,” absent scientific breakthroughs in chemistry, flying would necessarily revert to a “premium” mode of transport—significantly decelerating future global prosperity and improvements in health.

Developing a portfolio of natural solutions for carbon sequestration is an ambitious but realistic approach to this problem. Building upon initial successes in the aviation sector, the Yale center will broaden its scope to address additional global sources of emissions—publishing and sharing its findings so that other businesses, industries, and governments can benefit from work that will accelerate the adoption and implementation of natural carbon capture strategies around the world.

#### FUTURE-FOCUSED STRATEGIES

This partnership with Yale University is only one of many future-focused sustainability strategies underway at FedEx. As we maintain a market-leading portfolio for e-commerce—the fastest growing segment of our business—we do so with a sharp focus on customer needs and the environment as we explore and develop emerging technologies that will help create a safer, efficient, and sustainable operation for the future. Roxo™, the FedEx SameDay Bot holds promise for deliveries in congested or difficult delivery locations and is all electric—using only batteries that produce zero localized emissions. In 2019, FedEx launched its participation in a small package, small drone delivery pilot program operated by Wing Aviation LLC, a subsidiary of Alphabet Inc. The pilot program is being conducted in Christiansburg, Va., as part of the U.S. Department of Transportation’s Unmanned Aircraft Systems Integration Pilot Program. Working to meet customer needs in an ever-changing marketplace, the collaboration was designed to evaluate enhancing last-mile delivery for same-day delivery of urgent shipments and other exceptional delivery needs.

Regarding surface transportation, we must focus on creating sound and efficient trucking policies while also investing in infrastructure. As seen during the COVID-19 pandemic, the U.S. trucking industry is a critical link in maintaining supply chains, accommodating rapid growth in e-commerce and meeting fast changing consumer demands. Yet the industry remains stuck with aging infrastructure and dated federal equipment standards for twin 28-foot trailers that have not been changed since 1982. We must continue to advocate for common sense, environmentally friendly solutions to maximize trucking efficiency and increase environmental gains. One such common sense approach with immediate environmental benefits would be a modest 5-foot increase to twin 28’ trailers—not an increase to the weight limits. This increased capacity in our nation’s transportation system could reduce annual fuel use by 225 million gallons per year and reduce carbon emissions by 3 million tons per year, all at no cost to road safety or taxpayers.

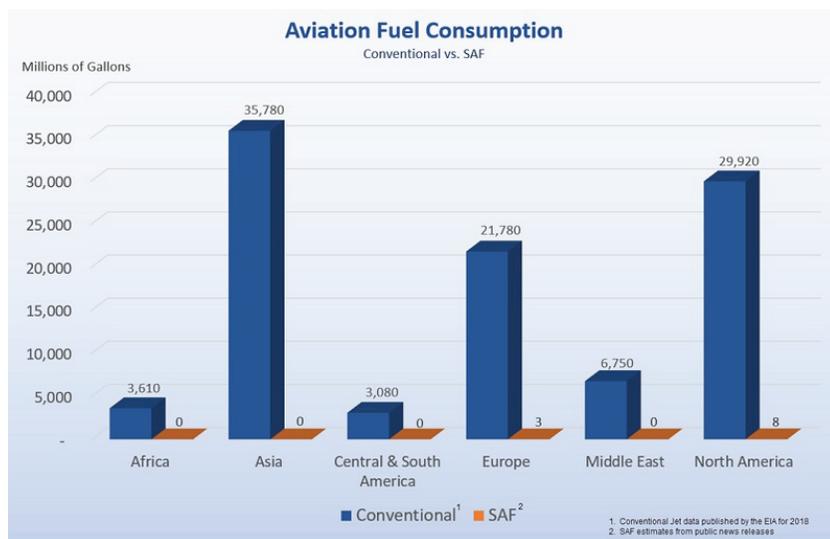
Last year, this committee and this chamber did important work in drafting an infrastructure package that incorporated climate solutions. This included incentivizing commercial electric vehicles, promoting the building of zero emission vehicle charging infrastructure, and advancing research into low-emission and alternative aviation fuels. There was also significant work done to modernize the electric grid to accommodate more renewable energy and prepare the grid for the largescale deployment of electric vehicles. This is a good start, but there is more that needs to be done. As noted earlier, if we want to see the full benefit of SAFs, we need to invest in a manner that will facilitate development and create a sufficient supply of SAFs that can meet and adjust to operator demand. We also need to prioritize modernizing our air traffic control system. Beyond technology updates and staffing, we need to focus on updating air traffic management policies and guidance in a way that balances sustainability and efficiency objectives, with community impact.

<sup>3</sup>Bernstein research

Our ambitious agenda at FedEx shows that businesses can and will lead in the effort to create a sustainable future for us all. However, we cannot do this alone. Government, industry stakeholders, and academia must continue to work together to adopt policies and regulations that help create a performance-based path that will foster and promote innovation in this field, ensuring that the U.S. maintains its status as a global leader in climate change policy, while also stimulating economic growth and job development.

These are just a few of the priorities we must focus on as we work together to drive innovation and develop solutions to address our climate crisis. I look forward to discussing those shared goals with you today.

ATTACHMENT



Mr. DEFAZIO. Thank you, Mr. Smith.

We now move to Ms. Laurie Giammona.

Ms. GIAMMONA. Good morning, and thank you, Chairman DeFazio and Ranking Member Graves, for the opportunity to testify.

I am Laurie Giammona, senior vice president of customer care for Pacific Gas and Electric Company in California. I appreciate the committee's interest in how business plays a role in addressing climate change and commend the committee for examining ways that Federal policy can complement this activity.

PG&E's commitment to mitigating and adapting to climate change in a way that leaves no one behind is as strong as ever and fundamental to delivering on the triple bottom line: people, planet, and prosperity, underscored by strong operational performance.

California has some of the Nation's most ambitious climate and clean energy goals, including reaching carbon neutrality by 2045. PG&E is proud to be a committed partner in implementation of the State's vision.

We provide some of the cleanest energy in the Nation with 88 percent of electricity delivered from carbon-free sources. We are focused on meeting our customers' desires to adopt clean energy solutions, including energy efficiency, rooftop solar, battery storage, and electric vehicles or EVs.

At the same time, California is experiencing the impact of climate change, from record wildfires to yearslong drought and unprecedented heat waves. As infrastructure operators and planners, PG&E is doing everything we can to adapt to this reality and increase the resilience of our energy system.

Our industry is at a remarkable crossroads. For PG&E, we see electric transportation as a vital opportunity to make more efficient use and resilient use of our electric grid, keep costs affordable for all customers, and enable emissions reductions in the transportation sector, which in California accounts for 40 percent of emissions and is a major contributor to poor air quality.

It is hard to understate the benefits of electric vehicles. EVs powered by PG&E's low-emission electricity will lower transportation emissions.

Since EVs produce no tailpipe pollutants, air quality will also improve, ideally, for those disproportionately impacted living near highways, ports, and rail yards.

EVs provide direct benefits to consumers in terms of lower, more predictable fuel and maintenance costs. For a PG&E residential customer, an equivalent gallon of gasoline costs just \$1.60. Annually, an electric vehicle driver in PG&E service territory can save \$1,200 in fuel and maintenance costs.

Declining costs and increased variety of vehicle models has accelerated EV adoption in California, and already one in five EVs in the Nation plugs into PG&E's grid.

It is not just EV adopters benefitting from lower costs. As EVs add more demand to the grid, the fixed cost of maintaining and operating the grid are spread amongst more kilowatthours, leading to lower electricity costs for all.

Our grid will see other benefits and greater EV adoption since this load is flexible and geographically distributed. Utilities can optimize their grid benefits in using EVs to soak up excess solar power and exploring ways to use EVs as resilient assets.

Of note, PG&E has more than \$400 million in approved EV infrastructure programs to support fleet electrification for medium- and heavy-duty vehicles, public fast charging, and light-duty charging at workplaces and residential complexes. These programs include incentives for and deployment targets in disadvantaged communities, helping to ensure everyone can equitably access the benefits of EVs.

PG&E also offers low and simplified EV charging rates and rebates to help lower the cost of ownership.

Finally, through research and pilot programs, we are optimizing charging infrastructure siting and usage to maximize grid benefits and support customer affordability.

We believe Federal policies can complement actions at the State level and help provide benefits to all customers. Specifically, we support Federal investment in policies to accelerate deployment of charging infrastructure, particularly in ways that will address range anxiety and deployment in disadvantaged communities.

We further support Federal investment to encourage fleet electrification by transit agencies; Federal, State, and local governments; Tribes, and school districts.

For other customers, incentives such as expanded tax credits can help accelerate adoption and drive down overall costs.

Finally, increased Federal research and development in technology innovations can help reduce costs of EVs and ensure their successful integration to the grid.

We appreciate the opportunity to testify, and we look forward to continuing to partner with the Federal Government to realize the benefit of EVs.

Thank you.

[Ms. Giammona's prepared statement follows:]

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**Prepared Statement of Laurie M. Giammona, Senior Vice President for  
Customer Care, Pacific Gas and Electric Company**

Chairman DeFazio, Ranking Member Graves, and members of the Committee, thank you for inviting me to testify today. My name is Laurie Giammona, and I am the Senior Vice President for Customer Care at Pacific Gas and Electric Company (PG&E). PG&E is California's largest energy provider, with more than 23,000 employees providing gas and electric service to an area that is home to 16 million people.

PG&E'S CLIMATE VISION

PG&E's commitment to mitigating and adapting to climate change, in a way that leaves no one behind, is as strong as ever, and it is what our customers expect and deserve. California's climate and clean energy goals are some of the most ambitious in the nation, with a goal to reach economy-wide carbon neutrality in the state by 2045. Clean electricity plays a foundational role in decarbonizing our economy, which is consistent with science-based reduction targets to avoid the worst effects of climate change. As such, PG&E's mission and vision are aligned with California's commitment to climate policy leadership, and we remain a committed partner in implementing the state's climate policies.

In California, the electricity sector accounts for just 15 percent of greenhouse gas (GHG) emissions and state legislation requires us to have 100 percent of retail electricity sales from renewable and zero-carbon resources by 2045.<sup>1</sup> Part of California's comprehensive program to reduce carbon emissions is its Renewables Portfolio Standard (RPS), one of the most progressive clean energy mandates in the country, requiring 60% of energy delivered to retail customers to be from qualifying renewable resources by 2030. As a result, PG&E has one of the cleanest electricity portfolios in the nation, with 35% of our delivered energy from qualified renewable resources in 2020, and 88% of electricity we deliver is carbon-free.<sup>2</sup> Given the low emissions profile of electricity in the state, electrification of other sectors, particularly transportation, will be key to decarbonizing California's economy. PG&E is well positioned to enable this transition.

PG&E customers are also embracing clean energy solutions. We are working closely with our customers to provide options that allow them to have more control over the energy that powers their lives. Of note, PG&E has more than 535,000 interconnected rooftop solar system customers—more than any other utility in the U.S.; we provide incentives to customers adopting battery storage systems; we offer a wide range of programs to help customers reduce their energy use and save money; and we provide some of the nation's leading programs to encourage electric vehicle (EV) adoption for both residential and commercial customers. Today, approximately one in five EVs in the United States plugs into PG&E's grid.<sup>3</sup>

At the same time, California is already experiencing the impacts of climate change, and we are doing everything we can to adapt to that reality. Through our

<sup>1</sup> California Air Resources Board, "Current California GHG Emission Inventory Data," <https://ww2.arb.ca.gov/ghg-inventory-data>.

<sup>2</sup> Pacific Gas and Electric Company, "PG&E Surpasses California's 2020 Renewable Energy Goal; Electricity Among Cleanest in Nation" (March 2021), <https://www.pgecurrents.com/2021/03/09/pg-electricity-delivered-to-customers-is-more-than-88-greenhouse-gas-free-and-among-the-cleanest-in-the-nation/>.

<sup>3</sup> Pacific Gas and Electric Company, "2020 Annual Corporate Responsibility and Sustainability Report" (August 2020), <https://www.pgecorp.com/corp/responsibility-sustainability/corporate-responsibility-sustainability.page>

Community Wildfire Safety Program, we are bolstering wildfire prevention and emergency response efforts, putting in place new and enhanced safety measures, and doing more over the long term to harden our electric system to help reduce wildfire risks and keep our customers safe.

We're also integrating climate science into key company functions and creating tools to support planning and decision-making that considers the physical risks that extreme weather and climate change pose for our infrastructure. And, because resilience requires a community-wide approach, we're supporting climate resilience efforts at the state and local levels including through PG&E's Better Together Resilient Communities grants program.

For PG&E, corporate sustainability and addressing climate change isn't just a nice-to-have; it's a core part of our business strategy to meet the triple bottom line of people, planet and prosperity of California, underscored by strong operational performance. Our customers and communities rely on PG&E to deliver safe, reliable, affordable and clean energy, and we must meet their needs today in a way that creates a better tomorrow. It's what our customers, investors, regulators, community leaders and employees want and deserve.

#### BENEFITS OF TRANSPORTATION ELECTRIFICATION

Electrification of the transportation sector will provide tremendous benefits for our environment, our economy and our energy system. In California, transportation is the largest single contributor of GHG emissions, accounting for 41% of GHG emissions—higher than the national average of 28% for the sector, while electricity accounts for just 15% of statewide GHG emissions.<sup>4</sup> Nationally, emissions from the power sector are at their lowest level since 1987,<sup>5</sup> while transportation is now the leading source of GHG emissions.<sup>6</sup> As the electricity sector continues to reduce its GHG footprint in California and across the nation, electrifying transportation presents one of the greatest opportunities to address climate change.

Transportation electrification will also improve air quality and public health as EVs do not produce any tailpipe emissions. In California, motorists drive more than a billion miles each day, producing 1,000 tons of smog-forming pollutants.<sup>7</sup> High levels of air pollution can lead to asthma and other respiratory illnesses that especially affect children and seniors, and those living in communities adjacent to highways, ports and rail yards can suffer disproportionate effects. In California's San Joaquin Valley, for instance, communities suffer from some of the nation's worst air quality, due to the area's topography, local industries and heavy traffic. Communities in the region are promoting clean vehicles to help reduce pollution and improve public health. In fact, a recent study showed that a shift to electric trucks and buses in urban areas could prevent more than 57,000 premature deaths by 2050.<sup>8</sup>

The transition to electric vehicles isn't just an environmental priority, it's also a generational and transformational opportunity for the United States to generate new jobs and drive economic output. As our nation seeks to recover from the COVID-19 pandemic and economic downturn, EV manufacturing and charging infrastructure buildout could create thousands of domestic jobs, adding to the more than 266,000 American jobs already supported by the alternative fuel vehicle industry.<sup>9</sup> For PG&E, installing charging infrastructure and preparing the grid for greater electrification creates new job opportunities for our workers. For instance, PG&E has partnered with IBEW Local 1245, which represents about 12,000 PG&E employees, to build out charging ports, and we look forward to continuing to partner with IBEW 1245 as we seek opportunities to upgrade the grid and expand charging infrastructure.

Overall affordability is also driving greater EV adoption in our service area. Increased variety and number of vehicle models, improved battery capacity and declining costs have made EVs more attractive to consumers. EVs are less expensive to

<sup>4</sup> California Air Resources Board, "Current California GHG Emission Inventory Data," <https://ww2.arb.ca.gov/ghg-inventory-data>.

<sup>5</sup> U.S. Energy Information Administration, "Carbon dioxide emission from the U.S. power sector have declined 28% since 2005" (October 2018), <https://www.eia.gov/todayinenergy/detail.php?id=37392#:~:text=EIA%20has%20calculated%20that%20CO2,the%20lowest%20level%20since%201987>.

<sup>6</sup> U.S. Environmental Protection Agency, "Sources of Greenhouse Gas Emissions," <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.

<sup>7</sup> California Air Resources Board, "Drive Clean CA.Gov," <https://driveclean.ca.gov/why-drive-clean>.

<sup>8</sup> Environmental Defense Fund, "Clean Trucks, Clean Air, American Jobs" (March 2021), [https://www.edf.org/sites/default/files/2021-03/HD\\_ZEV\\_White\\_Paper.pdf](https://www.edf.org/sites/default/files/2021-03/HD_ZEV_White_Paper.pdf).

<sup>9</sup> National Association of State Energy Officials and Energy Futures Initiative, "2020 U.S. Energy & Employment Report," <https://www.usenergyjobs.org/>.

operate than gasoline-powered vehicles, primarily due to fuel cost savings because electricity is less expensive than gasoline on an equivalent cost basis. Customers using one of PG&E's residential EV rate plans pay as low as \$1.60 per gasoline gallon equivalent—nearly 60% less than today's average price of \$3.84 per gallon of gasoline in California.<sup>10</sup> These are fuel prices Californians haven't seen since in decades. For the typical Californian who drives about 14,000 miles a year in a car that averages 35 miles per gallon, this represents a savings of about \$900 annually.<sup>11</sup> EV owners also benefit from lower annual maintenance costs, averaging \$330 less per year than gas-powered cars.<sup>12</sup>

EVs will even provide economic benefit to our customers who do not choose to adopt them—namely through more affordable electric rates. As additional demand is added to our grid, the fixed costs of upgrading and maintaining the grid will be spread over more kilowatt hours, which will help lower costs for all customers. This is particularly true when EV users are incentivized to charge during off-peak periods. Even with the modest load that EVs have added to PG&E's grid to date, we're seeing benefits for all customers. A recent study by Synapse Energy examined the contribution of EV charging to PG&E revenues from 2012–2018 in comparison to the investments PG&E made in distribution upgrades and PG&E programs. The study found that EVs contributed around \$350 million more than the cost of upgrades and incentives—a number likely to grow as adoption increases in future years.<sup>13</sup>

Greater EV adoption will provide us more flexibility to manage the grid in a way that promotes better resilience and reliability. In our service area, there is an increasing penetration of solar resources available in the morning hours—when demand is lower—and an increase in electricity demand in the afternoon and evening hours when the sun is down. Smart charging and incentives to EV owners to recharge during those peak solar hours will allow us to utilize more renewable energy and shift demand in a way that benefits all grid users. For example, electric companies can send price signals to encourage customers to charge their EVs at certain times of day. PG&E's electric rates for EV owners send price signals encouraging residential and commercial EV customers to charge their vehicles overnight or during the sunny morning hours. And PG&E has proposed a dynamic electric rate for commercial customers that would encourage customers to charge at the lowest cost times of day by providing a day-ahead, hourly price signal. Beyond rates, PG&E has piloted various incentives to encourage customers to flexibly charge. Notably, we are completing a pilot with Pittsburg Unified School District that tested the ability of school buses to charge during the middle of the day, when there is excess solar generation on the grid.

#### SUPPORTING CUSTOMER ADOPTION OF ELECTRIC VEHICLES

For all these reasons, PG&E supports California's efforts to build a low-carbon and clean energy future through the adoption of zero-emission vehicles, and we believe the utility sector can play an important role in advancing clean transportation options for our customers.

The role played by electric utilities is only one of many in the broader transportation electrification ecosystem. This ecosystem includes entities such as policy makers, automakers, EV charging companies, battery and component manufacturers, technology providers, and utilities. None of these entities can work in isolation and they all rely upon one another. But primarily, they all rely upon customers to purchase electric vehicles and install charging infrastructure. As part of this ecosystem, PG&E focuses on four areas in which we leverage our core competencies to thoughtfully expand transportation electrification, generate economically beneficial load growth and support hard-to-serve segments: 1) expand access to charging infrastructure; 2) reduce the total cost of ownership; 3) engage and educate our customers about the benefits of electric vehicles; and 4) optimize use of the electric grid.

On charging infrastructure, PG&E is actively collaborating with automakers, charging equipment providers and state agencies to support the large-scale electric infrastructure needed to incorporate EV charging systems into the energy grid.

<sup>10</sup> AAA, "California Average Gas Prices: March 11, 2021," <https://gasprices.aaa.com/?state=CA>.

<sup>11</sup> Car and Driver, "What is the Average Mileage Per Year," <https://www.caranddriver.com/research/a32880477/average-mileage-per-year/#:~:text=The%20residents%20of%20both%20states,Florida%3A%2011%2C836%20miles>.

<sup>12</sup> AAA, "Owning an Electric Vehicle is the Cure for Most Consumer Concerns" (January 2020), <https://newsroom.aaa.com/2020/01/aaa-owning-an-electric-vehicle-is-the-cure-for-most-consumer-concerns/>.

<sup>13</sup> Synapse Energy Economics, Inc, "EV Rate Impacts in California" (June 2019), <https://www.synapse-energy.com/sites/default/files/EV-Impacts-June-2019-18-122.pdf>.

These investments total more than \$400 million in approved infrastructure investments through 2025—one of the largest utility-EV investments in the nation—which includes these programs:

- EV Charge Network: \$130 million to install 4,500+ level-2 charging ports to support light-duty vehicle charging at workplaces and multi-unit dwellings;
- EV Fleet: \$236 million to help 700+ organizations including school districts, transit agencies and small businesses electrify their fleet operations by supporting infrastructure for 6,500 medium- and heavy-duty EVs;
- EV Fast Charge: \$22 million to install infrastructure to support public Direct Current Fast Charging (DCFC); and
- EV Schools and Parks: \$12 million in charging infrastructure at schools and state parks.

Charging programs include incentives for and deployment targets in disadvantaged communities, helping to ensure customers can equitably access the benefits of EVs, and PG&E seeks to install up to 2,000 level-1 and level-2 home chargers for low-income customers by 2023. For example, Madera Unified School District, located in a disadvantaged community in California's Central Valley, received support from PG&E's EV Fleet Program in the form of rebates, infrastructure, and technical assistance which enabled them to install 10 EV charging stations, electrify five electric busses in 2020, and support their plans for additional electric busses in the coming years. School districts across the state have begun to embrace electrification to reduce vehicle emissions that are especially harmful to children and are often more pronounced in disadvantaged communities. In addition, fleet electrification can reduce major expenses such as maintenance and fueling costs, especially for fleets with fixed routes and charging locations. For its EV Charge Network and EV Fast Charge programs, PG&E has received applications that far exceed resources available, demonstrating the strong demand from our customers for EV charging and the continued need for utility support. PG&E is working now on the next generation of programs, including a 10-year strategic plan on electric transportation investments that we will file with the California Public Utilities Commission (CPUC) in 2022.

For our customers, PG&E is also working to reduce the total cost of EV ownership through rebates and specialized electric rates that ensure owning and operating an EV can be cheaper than a gasoline-fueled alternative. In addition to federal tax credits, Californians are eligible for a point-of-sale price reduction of up to \$1,500 for the purchase or lease of a new EV through the California Clean Fuel Reward program. PG&E also offers residential and commercial EV charging rates, that provide predictable, simplified and affordable rates for customers. To help customers estimate the full costs of EV ownership, PG&E offers an online EV Savings Calculator for both residential and fleet customers where customers can browse EV models, discover incentives, compare rate plans, and locate charging stations.

Finally, through research and pilot programs, PG&E is optimizing charging infrastructure siting and usage to maximize grid benefits and support customer affordability. For example, PG&E is testing how smart charging and battery storage can lower operating costs and maximize efficiencies for San Joaquin Regional Transit District. PG&E is testing, analyzing, and comparing the economics for charging at various times of the day using different models with and without battery storage. As part of the pilot, PG&E funded five new electric bus chargers and a battery energy storage system and funded and built the infrastructure from the electric grid to the chargers and storage system.

#### FEDERAL POLICY CAN COMPLEMENT AND ACCELERATE PROGRESS

Like the current pandemic, climate change is a global challenge that requires urgent and decisive action, including leadership by the federal government to provide businesses clear, durable policies and market-based incentives to act. PG&E believes federal policies can complement actions at the state level and help provide benefits to all customers who wish to electrify their transportation.

As we have witnessed through our own experience, customers are eager to adopt EVs and enjoy their benefits, but much more is needed to build out charging infrastructure, drive down the upfront costs of electric vehicles, particularly for disadvantaged communities, encourage fleet conversion, and promote the research and innovation needed to make further progress. While PG&E has made significant investments to accelerate EV adoption, our customers cannot alone shoulder all costs needed to advance transportation electrification. Given the economy-wide benefits of EVs, we believe there are key roles the federal government should play to support this transition, including:

*Infrastructure Deployment:*

- Provide grant funding for public EV and other clean fuel infrastructure, including for deployment along the national highway system and in disadvantaged communities, and ensure electric utilities are eligible to partner with grant recipients given their critical role in infrastructure deployment.
- Provide rebates for EV charging infrastructure in workplaces and multi-unit dwellings, and ensure electric utilities are eligible to partner with grant recipients given their critical role in infrastructure deployment.
- Update and extend the federal tax credit for alternative fuel infrastructure to encourage commercial and consumer investments in charging infrastructure.

*Customer Adoption:*

- Modernize existing federal transportation programs to encourage investments in electric transportation and charging infrastructure.
- Expand funding for zero- and low-emission school buses.
- Provide grants and other incentives for electrification at ports, airports and rail yards and for public transit agencies and state, local and tribal governments to electrify their fleets.
- Provide incentives for adoption of light-duty EVs through extension of the EV tax credit and examine opportunities to provide point-of-sale rebates and used EV incentives to promote greater equity and lower the upfront cost for all customers including those with limited tax liability.
- Accelerate electrification of medium- and heavy-duty vehicles by providing tax incentives for manufacturing and adoption of these vehicle classes.
- Expand federal procurement of electric vehicles.

*Research, Development & Demonstration:*

- Expand federal funding for research, development, and demonstration efforts to accelerate innovations necessary to continue reducing costs of light-, medium- and heavy-duty EVs and ensure successful integration with the electric grid.

## ESSENTIAL PARTNERS IN AMERICA'S TRANSPORTATION FUTURE

The nation's energy sector is in the midst of a profound transformation. PG&E is continuing to make investments in smarter, more resilient energy infrastructure, providing even cleaner energy, and expanding the choices and energy solutions available to meet the changing needs of our customers. Electrifying the transportation sector is the gateway to a sustainable, clean energy future and an opportunity to collectively make progress to achieve extraordinary benefits for all Americans in the decades ahead.

PG&E is fully committed to working together with policymakers, customers and all stakeholders to make this opportunity a reality. Thank you again for having me here today. I look forward to your questions.

Mr. DEFAZIO. Thank you, Ms. Giammona.

Mr. Tom Lewis.

Mr. LEWIS. Mr. Chairman and committee members, thank you for your time today.

My name is Tom Lewis, and I am a licensed civil engineer, a founding board member of the International Coalition for Sustainable Infrastructure, and the executive leader of the climate, resilience, and sustainability business at WSP USA.

WSP USA is one of the largest engineering consultancies in the Nation. We have more than 11,000 employees in roughly 140 offices across the United States. We deliver infrastructure solutions for hundreds of communities, including many in your own congressional districts.

At WSP USA, we understand that our country and our planet are at a critical moment that demands focused and effective climate solutions. Based on our work across all types of infrastructure and all phases of its life cycle, we embrace our role as a force multiplier for positive change and believe that the business case for climate-oriented infrastructure solutions is very clear.

The business case is reinforced every day as we provide services to reduce the depletion of natural resources, limit life-cycle greenhouse gas emissions, and make infrastructure more resilient to disaster.

This work includes the increased use of nature-based solutions, renewable energy, transportation system electrification, and equitable community engagement.

Climate solutions for infrastructure need to be rooted in the quantification and consideration of future risk on a project-by-project basis. Unfortunately, proactive investment in risk mitigation has been absent from the vast majority of infrastructure programs and project selections across the country.

As my fellow witness Troy Rudd mentioned, and according to the National Oceanic and Atmospheric Administration, 2020 saw an all-time record of 22 weather-related disasters that yielded economic losses in excess of \$1 billion, in addition to the tragic loss of 262 human lives.

This effectively highlights the extremely disruptive, expensive, and dangerous consequences of not funding and building smartly so that we are protecting against the risk of infrastructure failures, casualties, and loss of community lifelines and other essential services.

Experience has taught us that increasing project capital costs by just a few percentage points to better future-proof our Nation's infrastructure is a very wise investment. In fact, FEMA statistics show that each dollar spent on pre-disaster mitigation measures saved an average of \$4 over an infrastructure element's lifespan.

This noteworthy return on investment is especially compelling when you consider that capital construction and long-term budget planning almost always underestimates the cost and national resource impacts of long-term operation, maintenance, and repeated post-disaster repairs.

Smart investment in life-cycle resilience and sustainability must be prioritized to build better infrastructure going forward that, in turn, lowers life-cycle greenhouse gas emissions.

The good news is that WSP USA has recently supported emerging project success stories in multiple States where sustainability, resilience, and risk considerations were central to infrastructure planning, engineering, and investment decisions on a project-by-project basis.

These include projects in Massachusetts, using a resilience-centric approach; in Florida and New York, using nature-based solutions for coastal protection; and in California, using a sustainability-centric approach for urban transit and for high-speed rail.

Projects like these use a risk-based framework for assessing and protecting assets, natural resources, vulnerable communities, and the climate. This is the essence of applying a sustainability approach toward infrastructure and makes real the goal of achieving a favorable economic, environmental, and social equity triple bottom line.

More frequent extreme weather events continue to endanger and impact vulnerable and underresourced communities more than any others in both rural and urban areas.

Therefore, in addition to creating physical resilience, climate solutions for infrastructure must establish increased economic opportunity and stakeholder buy-in through strategic engagement and meeting vulnerable communities where they are.

To achieve equitable outcomes and maximize stakeholder buy-in, Federal policies and funding decisions around infrastructure need to place the perspectives of all impacted communities at the center of the process.

In closing, we believe that case-by-case, climate-based infrastructure solutions can and will meet this critical moment for our Nation and our planet if the following business case performance objectives are promoted through good legislation, funding decisions, and policymaking.

First, incentivize the selection, design, and construction of infrastructure projects that draw from and impact fewer natural resources, including the increased use of nature-based solutions, renewable energy, and transportation system electrification.

Second, reduce life-cycle greenhouse gas emissions and adverse climate and biodiversity impacts.

Third, require that infrastructure be more resilient to future extreme weather events and climate.

And fourth, prioritize the protection of the most vulnerable and disadvantaged communities.

Thank you for the opportunity to give this testimony.

[Mr. Lewis' prepared statement follows:]

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**Prepared Statement of Tom Lewis, P.E., J.D., National Business Line  
Executive for Climate, Resilience, and Sustainability, WSP USA**

INTRODUCTION: MEETING THE MOMENT AND BEING A POSITIVE FORCE MULTIPLIER

Mr. Chairman and Committee Members, my name is Tom Lewis and I am a licensed civil engineer and the Climate, Resilience and Sustainability (CRS) Executive Leader for WSP USA. My position at WSP USA was recently created to meet this critical moment in history by coalescing our many like-minded, multidisciplinary climate, resilience and sustainability professionals.

The primary objective of the new business line is to enable WSP USA to be a force multiplier for positive organizational and infrastructure systems change. Our team recognizes that our country and planet are at a critical inflection point that demands focused and effective climate impact mitigation and adaptation. I enthusiastically accepted the opportunity to transition out of my role as WSP USA Federal Programs sector president to lead our CRS team, because the role builds on my personal passions, and benefits from my career-long advocacy for infrastructure sustainability, resilience and environmental stewardship, and my leadership on multiple industry boards. The vision and mission of CRS directly aligns with the goals of this hearing.

WSP USA is the U.S. operating company of WSP Global, one of the world's leading engineering and professional services firms with more 50,000 employees worldwide. Dedicated to serving communities, governments and the commercial sector, the firm comprises engineers, planners, environmental specialists, strategic advisors, project and program managers, and construction and operations management professionals. With more 10,000 employees across the country, WSP USA provides solutions in the transportation, buildings, energy, water and environment markets. The CRS business line is the ideal platform to support climate action and resilient infrastructure in communities nationwide.

THE QUESTION AT HAND

The foundational question being discussed in the hearing today is the appropriateness of incorporating considerations of climate change into investment decisions, or

the business case for such action. Do investments in sustainability, emissions reductions and resilience make sense, and how should they be considered by this body? Stated simply, the business case from my perspective is:

- Designing, operating and maintaining infrastructure that draws fewer natural resources is an efficiency measure, and more reliance on sustainable energy sources extends the natural resources of the U.S. to future generations.
- Requiring construction of infrastructure that is resilient to current and future events ensures:
  - the federal government won't have to go back into communities to provide duplicative repair on impacted assets after an event; and
  - the long-term maintenance and repair of the system once turned over to state and local agencies won't place a heavier burden on them, as state budgets are stretched to the extreme.
- Communities and businesses can more quickly be brought back online after a disaster event with energy, water and transportation systems operating to facilitate recovery.

#### A VALUE-ADDED HOLISTIC PERSPECTIVE: INFRASTRUCTURE FOR THE FUTURE

At WSP USA, we assess, plan, design and manage Future Ready™ infrastructure for our U.S. clients and partners that more effectively anticipates forthcoming needs and conditions, and therefore provides a high level of sustainable and environmentally sound service for many generations.<sup>1</sup>

During the lifespan of infrastructure, technologies and societal needs will radically change. Likewise, the climate will continue to change, bringing more extreme weather and the inevitable phase-down of fossil fuels. We recognize that design codes and standards are often slow to change, and in many cases do not consider current and future conditions, which are materially different than the existing conditions at the time of the asset's development. For example, in many cases we have found the design of infrastructure still reflects design parameters based on outdated relationships between asset performance, user demands, climatological trends, environmental influences, and other conditions that could affect the useful life and the level of performance of that asset.

As a firm that works across all types of infrastructure and all phases of its lifecycle for government and non-government clients, WSP USA has a clear view on the state of infrastructure and a unique multi-dimensional perspective on the business case for climate solutions in infrastructure development. We provide services that support both climate mitigation through greenhouse gas (GHG) reduction and climate adaptation through infrastructure resilience and nature-based solutions. From that educated perspective, it seems clear that we as a society need to make the case for justifying funding and investment decisions on the technical and benefit-cost merits that result in our infrastructure being more adaptive, sustainable and resilient to future climatological, environmental, technological and societal trends.

WSP USA has worked on many of our country's largest and most important government and public-private-partnership (P3) infrastructure projects supporting road, bridge and tunnel improvements, rail and transit expansion, airport upgrades, renewal of ports, and water and power network modernization in a way that makes a positive impact on communities and the environment. These projects often include considering multiple aspects of potential climate disruptions, including preparing for resilience, improving efficiency and sustainability, and ensuring social justice in new designs and development.

At the same time, WSP USA also works for some of the most innovative and climate-focused private companies in the U.S. and worldwide. These companies include investors funding highly progressive projects and technologies, airlines looking to fly using biofuels today and hydrogen tomorrow, information technology providers finding new ways to store data in ways that reduce demands for water and cooling, and financial institutions looking to make their portfolios more reflective of the "green transition" and with due consideration of the social cost of carbon. Often, the solutions developed for and employed by these innovative private clients can be, and are, adapted for use by our government clients.

#### CREDIBILITY: WALKING THE TALK AS A COMPANY

As an example of how a more adaptive and flexible approach to future climate conditions can be formalized as part of engineering decision-making, WSP USA

<sup>1</sup> <https://www.wsp.com/en-CA/who-we-are/future-ready>

trains all its hires in its Future Ready program to inspire and empower our employees to design for future resilience, adaptability and sustainability. By considering current, emerging and anticipated trends in future climatological and environmental conditions, the Future Ready approach helps our employees develop infrastructure solutions and organizational improvements for the benefit of the communities in which they live, work and serve.

To show how this can be done for greenhouse gas emissions reductions, WSP USA became carbon neutral across our operations in 2019. As a result of this and other progressive improvements within our organization, we were recognized by World Finance Magazine as the most sustainable company in the engineering industry for both 2019 and 2020. Further, in February 2020 WSP became the first professional services firm to sign onto a recently created sustainability-linked credit facility in the Americas. The agreement applies to a \$1.2 billion credit facility and includes three key performance metrics to document our ongoing commitment to be a sustainable leader in the infrastructure industry and society more broadly, including:

- Reduction in operational greenhouse emissions between 2018 and 2021;
- The percentage of our services having a positive effect on the environment; and
- The percentage of women in management positions.

As further described in the following section, in 2020 WSP USA—in collaboration with the American Society of Civil Engineers (ASCE) and others—launched the International Coalition for Sustainable Infrastructure (ICSI). The company is also a founding organizer of [www.pledgetonetzero.org](http://www.pledgetonetzero.org), a program designed to galvanize our consulting industry to take on climate action even more directly, while we guide our clients on their own net zero carbon progress. Pledge to net zero is now one of the United Nation’s (UN) Race To Zero partners ahead of the pivotal 26th UN Climate Change Conference of the Parties (COP26), scheduled for November 1–12, 2021 in Glasgow Scotland. Pledge to net zero requires three commitments:

1. Commit to at least a ‘well below 2° Celsius’ science-based target under the SBTi (Science Based Targets initiative—a non-profit facilitated collaboration involving the UN Global Compact, World Resources Institute (WRI) and the World-Wide Fund for Nature (WWF),
2. Publicly report emissions; and
3. Publish at least one piece of thought leadership each year.

#### A COALITION OF ENGINEERING ORGANIZATIONS: BRIDGING THE GAPS WITH PRACTICAL ACTION

For thousands of years, civil engineers have been imagining, designing and building infrastructure that has allowed humans to congregate and interact, explore and thrive. Their ingenuity propelled the growth of human civilization and paved the way to the present. Yet advancement has come at a high cost, economically and environmentally.

In order to fuel our modern lifestyles, we are unsustainably expending the resources of our natural environment. The rate of non-renewable natural resource extraction such as minerals, precious metals and fossil fuels, as well as post-extraction manufacturing and combustion, have led to unprecedented impacts on the world’s climate and ecosystems. Based on the latest global scientific consensus from the Intergovernmental Panel on Climate Change (IPCC), the world’s global average temperature has risen 1.1o Celsius since the industrial revolution. This trend will have major ramifications for our nation’s and the world’s infrastructure under any scenario, but if left unchecked it could be catastrophic to civilization and natural habitats as we know them.

Transportation is the lifeblood of our economies and is also the leading contributor to greenhouse gas emissions in the U.S., accounting for approximately 30 percent of the nation’s total emissions including cars, trucks, airplanes and other transit modes. Our national approach to repairing and maintaining roads, bridges and other transportation infrastructure must urgently consider new assumptions to accelerate how we design, measure, manage and invest in infrastructure to achieve both resilient and adapted standards and the transition to a low or net zero carbon economy that fully considers the physical and social impacts of carbon and other GHG emissions.

Given this urgency, I along with Seth Schultz (currently the Executive Director of The Resilience Shift), envisaged a “Future World Vision Leadership Summit” hosted in late 2019 by the ASCE and its non-profit ASCE Foundation. The idea was realized in November 2019 as a highly successful summit attended by leadership from WSP USA, the Resilience Shift, ASCE and more than 35 other infrastructure stakeholders from around the U.S. and the world—five other major engineering firms and two major infrastructure construction firms, two major transportation/

transit agencies, six major municipal/county infrastructure agencies, the U.S. Army Corps of Engineers, three top universities and three leading non-governmental organizations (NGOs).

As a direct outcome of the leadership summit, more than 100 individuals from dozens of organizations signed an open letter of commitment to action that in turn led to the 2020 launching of ICSI, with the letter of commitment stating:

“The global population will face unprecedented challenges over the next 50 years, from rising seas to more frequent extreme weather events, all of which will happen against a backdrop of significant demographic changes and technology advances. These global trends are already posing well-documented challenges,

Practical solutions are needed in order to adapt our infrastructure, close the resilience gap and breakdown barriers to action. While there has been some progress in developing favorable environmental, economic and social policy to lessen the impacts of the changing climate, we need a larger scale commitment among all stakeholders, especially engineers, to:

- Identify, prioritize and better understand the gaps and barriers for the planning, designing, building, maintaining and operating sustainable and resilient infrastructure now and in the future;
- Cultivate and unlock the full potential of untapped partnerships and funding investments designed to reduce the impacts of extreme weather events, create sustainable and resilient infrastructure, and effect social change; and
- Understand and identify practical plans of action and resources for implementing strategies that influence realistic short-term goals and have measured, long-term effects.

We the undersigned commit to unite forces and bring our relevant expertise and resources to a Coalition for Sustainable Infrastructure.”

I am extremely proud to be one of the five founding board members for ICSI as WSP USA’s representative, along with representatives from the ASCE and its Foundation (Chair), the Resilience Shift (Host), the Global Covenant of Mayors for Climate and Energy (GCoM), and the Institute for Civil Engineers (ICE). ICSI’s vision (“Engineering a more sustainable, just and resilient future”) and mission (“Mobilizing an engineering-led coalition to make resilience and sustainability a cornerstone of every decision in the infrastructure lifecycle in every community around the globe”) and is perfectly on topic for this hearing, and so I am happy to add the ICSI perspective into my further testimony below.

#### MAKING THE BUSINESS CASE FOR CLIMATE-FOCUSED INFRASTRUCTURE SOLUTIONS

If we are serious as a society about future proofing our essential structures and infrastructure systems, we must employ a risk-based and community-engaged framework, while considering both the public and private sectors as partners providing integrated and complementary solutions. Much of the risk that private entities face from climate-related events is the result of dependencies on public infrastructure that support community functions, such as transportation systems, parks and water supply. Likewise, many governmental functions depend on the reliable and consistent provision of primarily privately provided networks such as the electrical grid, fuel supply, mobile communications networks and internet fiber.

Meanwhile, the evidence in the U.S. from FEMA, and globally from the UN, is very clear and compelling that a dollar spent proactively on infrastructure risk mitigation and better climate adaptation pays itself back four or more times over in the form of greatly reduced, or even wholly avoided, response and recovery costs retroactively spent in the wake of future extreme weather disasters and chronic sea level rise.

We are all interconnected and are likewise at risk of interrupted service. In resilience parlance, there are potential cascading effects of weather-related disruptions to service. Disruptions of the power grid, for example, cause disruptions to electrified systems (e.g., traffic signals) that in turn negatively impact the orderly movement of people and vehicles on the road network that then negatively impacts public health, safety, and well-being. This interdependency was recently illustrated with the extreme cold weather event in Texas that caused the gas supply networks and electrical grid to largely fail, resulting in serious water shortages and other negative public service impacts (including the shut-down of COVID-19 testing and vaccine sites) throughout the State.

I consider “making the case” for climate solutions as the most important and pressing challenge of our time for infrastructure-related industries. Considering fu-

ture uncertainty and risks have been part of investment decision-making for decades, but now it needs to be taken even further.

Engineers, for example, have developed methodologies and technical approaches that reflect uncertain futures with respect to the physical forces that assets might face in the future. The concept of future year conditions, e.g., the 100-year flood, have been an important input for infrastructure design for generations. However, never has there been such high levels of risk to uncertain environmental futures. Over the past 15 years, we have seen unprecedented and evermore frequent extreme weather events that have significantly affected our nation's infrastructure and the use of this infrastructure, and credible projections of future climate and weather conditions suggest that such events will be more and more common.

The ability for the economy in general and our infrastructure budgets in particular to recover from major disasters (including the ongoing pandemic) is increasingly strained. According to the National Oceanic and Atmospheric Administration (NOAA), 2020 saw 22 weather/climate disasters that yielded economic losses in excess of \$1 billion. This is the highest number of such events recorded over the last 41 years and resulted in total costs in excess of \$100 billion and the tragic deaths of some 262 people. The National Flood Insurance Program and other private insurance products have been further strained and are ill-equipped to handle all these disruptions.

In fact, the world's largest reinsurance company (Swiss Re) believes that economic and insured losses resulting from severe weather events pose a major threat to global resilience. They state that the insurability of weather risks could ultimately be jeopardized, particularly in the most vulnerable, high-exposure accumulation areas. The resultant cost of near-term disaster response and long-term recovery to taxpayers continues to rise as we repeatedly repair damages and often rebuild to past design standards that are shown to be inadequate.

The engineering community has learned many lessons from the aftermath of these weather events, and how one can better "climate proof" future designs through lower carbon "gray infrastructure" (e.g., roads, bridges, tunnels, ports, airports) and with more use of "green infrastructure" (nature-based solutions and other cost-effective, resilient approaches to provide functional, climatological and community benefits). However, as is common in infrastructure decision-making, many trade-offs are considered within funding decisions tied to design options. In the context of future-proofing built assets, we have often found that the additional costs are traded off against focusing investment on today's needs. One of the important messages from my testimony is that this trade-off does not have to be and should not be mutually exclusive.

Our experience is that in many cases an added increment to a project budget for future proofing will provide protection against possible disruptions due to extreme weather events. There are many examples of where this has been done for a variety of reasons in infrastructure engineering. For example, the Oregon Department of Transportation (ODOT) in the early years of seismic retrofits for bridges (before Federal funds were available to support such projects) allocated additional funds for bridge rehabilitation projects in order to make incremental design changes that would provide better protection against an earthquake. A State-funded study had shown that a major earthquake in Oregon would likely damage many State highway bridges to such an extent that supply and recovery efforts via highways would be severely constrained, resulting potentially in additional lives lost and substantial costs to the State's economy. For an average of about five percent of the original project cost, incremental design changes were made to add more protection against such a possibility. In other words, ODOT officials had successfully made the business case through tangible benefits for this type of incremental investment.

Other public agencies and programs are adopting a similar approach to create infrastructure with the vision that it will provide a greater public good now and for future generations and in order to preserve existing assets against changing future conditions. The Massachusetts Department of Transportation is creating inland and coastal flood modeling that incorporates future climate change and changing precipitation patterns into a predictive physical risk model that will enable better planning and design for decades to come. Miami-Dade County is planning a major capital program to address changing conditions, including installing pumps to deal with street flooding, and working to remove septic tanks which are being made ineffective by rising groundwater. North Carolina DOT has developed a rainfall warning system that predicts areas of flooding and washouts so that they can have advanced coordination with state police on road closures due to safety concerns. Communities in coastal Louisiana and Alaska have started planning for inland migration away from flooding that is occurring more and more regularly and damaging communities. These agencies and others are expanding their planning and decision-making to con-

sider future changes in order to provide long-term and transformative benefits for their residents.

I recognize that the title of this hearing is “The Business Case for Climate Solutions.” We have shown in our work that such a business case can be made where the financial benefits over the long run of protecting assets exceeds the near-term costs of adaptive designs. However, in the public sector, other non-monetary benefits or societal costs are often part of the decision. For example, technical studies of the potential disruptions to the road network assign dollar estimates to the replacement costs of the disrupted asset, the cost of additional travel time and vehicle operations for detours around the blockage, and the cost of associated fatalities and injuries. A broader perspective has sometimes been used to more fully understand the economic costs to surrounding communities of loss of connectivity or to the delays in supply chains dependent on the road that cannot in the short term after a disaster event handle trucks delivering goods. An even broader perspective would include non-monetary considerations relating to loss in quality of life, public health and social impacts, and concerns relating to providing equitable governmental response to the disruption.

This broader perspective is at its core a key sustainability concept, which fundamentally views today’s decisions in the context of how they affect the quality of life of future generations. Sustainability does not rely on a cost-centered, design for capital projects and budgets process. Instead, it views such decisions from the holistic, life-cycle perspective in consideration of both monetary and non-monetary factors. Sustainability is not only applicable to public decisions; many corporations that WSP USA advises have adopted it as a central principle in their business model and our government institutions and agencies can learn from and leverage the positive experiences and approaches from such corporations.

#### MORE FUTURE FOCUSED CODES, STANDARDS, TOOLS AND DECISION-MAKING

The future will continue to bring stark new realities when it comes to climate change and impacts on our Nation’s infrastructure. The engineering community that WSP USA is a part of is critical for developing practical solutions as part of a path forward that recognizes future uncertainty. Engineers are critical for creating and employing more fitting and forward-looking codes, standards and tools, which in turn will help establish more modern and effective frameworks for achieving better funding and project selection decisions that ensure projects are not just “shovel ready” but are also “shovel worthy.” Specifically, these codes, standards and tools relate to the capacities, locations, design, construction and operation of roads, bridges, tunnels, water treatment plants, power plants, ports, airports, railways, transit and other community infrastructure systems. In the U.S., an excellent example of this is the evolution and ever-expanding use of a tool like Envision from the Institute for Sustainable Infrastructure (ISI) that WSP USA employs. ISI is an educational nonprofit that was established in 2010 by ASCE, the American Public Works Association (APWA), and the American Council of Engineering Companies (ACEC), who collaborated with the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design (ZPH) to develop Envision (also noting that I am an active, long-time Advisory Board member for ZPH). Envision provides a consistent, consensus-based framework for assessing sustainability and resilience in infrastructure. Envision:

- Sets the standard for what constitutes sustainable infrastructure;
- Incentivizes higher performance goals beyond minimum requirements;
- Gives recognition to projects that make significant contributions to sustainability; and
- Provides a common language for collaboration and clear communication both internally and externally.

Fundamentally, Envision is about supporting higher performance through more sustainable and resilient project choices and designs so that we “build the right projects” in addition to “building projects right.”

An excellent example of a project that fully incorporates the policies and perspectives of sustainability/resilience nationally is the California High Speed Rail project, a project that WSP USA is supporting and just received a Platinum rating through Envision. This project can serve as a national example to other agencies working to make better decisions around infrastructure investing. Specifically, this project:

- Creates a rail/transportation system powered by electricity, generated primarily by renewable energy.
- Weaves consideration of effective use of natural resources into all policies—planning, design, construction, maintained, etc.—and has developed practices which analyze energy expenditures for the lifecycle of construction—from the

extraction of base material (aggregate, etc.), to transport, to use in construction efforts.

- Considers future weather risks (wildfires, flooding and temperature) in design to ensure that the facility is built to withstand those events in the future and can be returned to service more efficiently.
- Better links the state’s rural areas more effectively and efficiently to the state’s economic engines through a faster and more efficient travel option, a capability that does not exist today.

Envision is just one such tool that we and others in the engineering and consulting business utilize. Regardless of which one is used, these types of sustainability and resilience tools allow our decisions to be more informed by future-focused science, demographics, socioeconomic, and best management practices—specifically including the risk-based frameworks that we have developed to not only plan and execute infrastructure projects better, but also to pick the better projects to pursue. This “better” project selection should be based on a holistic, life-cycle, long-term impact perspective versus a short-term capital cost assessment. The first perspective specifically takes into account the negative impacts of emitted and embodied carbon as well as the positive physical and social benefits of climate adaptation and infrastructure resilience. Most of these decisions are currently driven by upfront costs, operational expediency, and worrying about the next quarterly report, election, or budgeting cycle. This in turn leads to a false narrative where infrastructure capital improvement budget-making is based on what money is available after “locked-in” operations and maintenance budget items are accounted for.

#### INCORPORATING EQUITY AND SOCIAL JUSTICE REALITIES

Equity and social justice, which have been increasingly highlighted over the past year, are critically important considerations from the sustainability perspective. In the context of a changing climate, studies have indicated that disasters and critical events disproportionately impact underserved and frontline populations—a notable ongoing example being the COVID-19 pandemic, which is underscored by our past experiences with extreme natural disasters such as major hurricanes, droughts and earthquakes. Frontline round-the-clock workers (including in essential transportation and infrastructure services) are disproportionately women, representing two-thirds of the frontline worker population, and minority populations, including Black, Hispanic, and Asian-American/Pacific Islanders.<sup>2</sup> Over the long term, climate change will thus affect some groups more than others. Transportation infrastructure, including how transportation is powered and where transportation and transit systems are accessible, underscore these challenges. Equity and improved economic opportunity need to be central tenants of Federal climate action, especially as it relates to transportation and infrastructure.

The current and future impacts of climate change, including sea level rise and other flood risk hazards, higher temperature, and wildfires have time-and-time-again placed an uneven burden on our less protected frontline communities—whether they be urban or rural. Further, each event comes with long-term economic and social costs. There are immediate effects to livelihood following events, such as disrupted and suspended transit service following Hurricane Sandy, limiting mobility for transit-dependent populations. There are also long-term effects due to these events, including social and financial insecurity for populations that were already socially vulnerable. Resilient infrastructure is at the heart of limiting the effects of these events and enabling agencies and communities to rebound more quickly to continue to provide needed services to their communities.

Amidst this social backdrop, climate change poses both an opportunity to expand upon the role of infrastructure to provide social benefits and opportunities for our communities and simultaneously poses a challenge to ensure that infrastructure is resilient to future conditions. In order to ensure that our communities are prosperous and equitable now and into the future, we need to expeditiously address both of these challenges. To inform Federal policies, frontline communities will need to be engaged where they are and truly listened to in order to gain their buy-in and achieve equitable outcomes. WSP works hand-in-hand with these communities and populations, working to hear and address their challenges at the local scale by providing the analytics and data needed to inform equitable decisions and the engineering solutions needed to holistically address climate change.

<sup>2</sup>A Basic Demographic Profile of Workers in Frontline Industries. April 2020. Center for Economic and Policy Research. <https://cepr.net/wp-content/uploads/2020/04/2020-04-Frontline-Workers.pdf>

Especially as it relates to infrastructure and the built environment as it supports communities, we have an opportunity to make positive changes through an equity lens in helping people imagine and realize their own futures. In our business, we strive to create more dialogue, inclusion, and empowerment to increase trust in our work. WSP's own "walk the talk" performance measures provide an illustration of how this can be incorporated into the business ethic of a major company, which in many cases can also apply to governmental institutions and agencies. WSP USA's equity lens for our three key performance metrics specifically looks at:

1. Reduction in operational GHG emissions between 2018 and 2021
  - a. Acknowledge the documented frequency and impacts of racism in America along with the disparate impacts of air quality and climate change issues.
  - b. Engage and listen to communities and their accounts and experiences of inequity and harm caused by environmental and racial injustices and group outcomes.
  - c. Provide feedback to stakeholders and focus on programmatic reform ideas.
  - d. Take action to address climate change with regard to equity, social justice, and economic outcomes.
2. The percentage of our services having a positive effect on the environment
  - a. Develop a process to measure Green Revenue.
  - b. Focus on how this impacts our shareholders, employees, partners, environments, and the communities we serve.
  - c. Educate communities on implementing solutions to reduce energy use, water consumption, GHG emissions, supply chain disruptions, enhance Green Revenue, and to minimize impacts to underserved communities.
3. The percentage of women in management positions
  - a. Ask all leaders to be role-models for our commitment to inclusion, diversity, equity, and social justice.
  - b. Actively sponsor rising women.
  - c. Ensure the infrastructure is in place to support a more inclusive and flexible workplace.

With this type of mindset, investment in transportation and infrastructure today has the potential to use our abundance of available data, best practices from across the globe, and American ingenuity to tailor technical solutions to the needs and priorities from constituents on the ground-level to ensure our most vulnerable realize benefits of infrastructure upgrades while society at large continues to benefit from the additional positive externalities from design excellence in infrastructure.

#### BETTER STRATEGIES FOR BOTH URBAN AND RURAL AREAS

Sustainability and resilience considerations make sense everywhere in the country—in urban and rural areas. Specific to rural communities, these practices make sense for all investments—particularly regarding resilience, where periods of loss of service can be devastating in these communities. There are plenty of examples over the past years where impacts were very impactful in rural areas, including recent power loss in Texas and the Gulf Coast from both winter and coastal storm events, loss of water treatment facilities requiring residents to boil water throughout the southeast, and in road washouts and landslides in Vermont, North Carolina, Colorado, Michigan and Puerto Rico which severed access to communities for extended periods, or required lengthy and costly detours to reach services. Often recovery times in rural areas can be extended as the systems span larger geographies and resources may be limited. These past examples underscore the need to build more resilient systems to minimize potential weather-related impacts in rural as well as urban areas.

#### LEADING THE WAY THROUGH EXAMPLE AS AN INDUSTRY

The engineering community needs to lead, and has in many cases taken the lead, in changing the way we think about infrastructure investments and decisions. Of course, in the consulting industry, companies such as mine work with and on behalf of government and private sector clients. Many of these clients have made extraordinary commitments to address the cause of and respond to climate change. The field has been transforming itself over the past few years in ways that I personally have not seen before. Specifically, we have recently seen:

- Major companies take on the role of continually refining business operations so as to reduce the emissions impact of their operations, supply chains, and product life cycles while enhancing the resilience and equity of their business.

- Communities adopting policies that enable traditionally underrepresented communities to understand and develop strategies for targeted investments aimed at reducing climate change-related impacts on their citizens.
- Agencies overseeing major construction projects analyzing all of the processes and procedures from point of source origin to the point of construction and end of useful life to reduce to the extent possible GHG emissions.
- Government leaders (for example, in Hawaii, California, Colorado, Minnesota, New York, Michigan and Massachusetts) among others requiring the consideration of future environmental conditions (not past conditions) as an element of major capital expenditures (in some cases, including such a consideration in State environmental laws).
- Ongoing dialogue among risk professionals who are starting to recognize that the unquantifiable factors of equity, environment quality, and community resilience need to carry a new, and heavier, weight in decision-making.
- Public bonding firms requiring a risk assessment on potential bond-funded actions as it relates to climate change.

#### RECOMMENDATIONS

Moving forward we have an opportunity to make further progress and take steps to ensure that the Nation's built environment and critical infrastructure is more resilient and secure as conditions continue to change. There are many recommendations for action that would help to secure a more adaptive future. Some of the more important ones include:

- Elevate climate change and extreme weather impacts on resilient infrastructure as a National concern. Federally-supported infrastructure programs such as that for transportation often include as an enabling statement that certain factors or issues are of National concern. For example, transportation legislation requires the consideration of numerous planning factors in the development of transportation plans, including transportation system resilience. All Federally-funded infrastructure programs should be reviewed from the perspective of how extreme weather and climate change considerations factor into planning and decision-making.
- Encourage and enable communities and agencies to define and quantify the risks they face with respect to climate change. It is critical that the technical approaches be available for making the case on the rationale for reducing GHG emissions and enhancing infrastructure resilience. This can only be done through methods which include quantitative consideration of risks. One of the major advancements in engineering decision-making occurred decades ago when the U.S. Army Corps of Engineers developed a benefit/cost methodology in response to Federal water resources legislation. The benefit/cost methodology has been a mainstay of engineering analysis since. A similar introduction of risk-based assessment approaches is now warranted. This assessment needs to compare real dollar costs to associated weighted risks of future damages and loss of service from climate change and extreme weather.
- Include in this assessment approach the use of a life cycle perspective that considers all possible points of future failure. Unfortunately, this is very seldom considered in today's life cycle assessments. The assessment should recognize that some of the data and tools used today as part of engineering decision-making are very limited (such as 100-year flood plain maps).
- Support the consideration of equity and social justice in climate change and adaptation decisions. This should result in a shift from traditional measures of disproportionate impacts like those outlined in the National Environmental Policy Act (NEPA) to ones that instead seek to overcome inequities in the distribution of infrastructure benefits and negative environmental impacts (e.g., degraded air and water quality).
- Provide incentives (for example, grants or tax incentives) for incorporating future proofing actions and social equity into project designs. Such incentives could motivate innovation and creativity in the development of adaptation strategies. This would include the provision of funding as part of Federally-mandated planning processes to consider climate change as part of the planning process (for example, U.S. Code Title 23 for transportation planning).
- Encourage a multi-jurisdictional, multi-sectoral, and multi-disciplinary structure for assessing climate change-related risks among States and communities. Such a structure would facilitate efforts to combine the interests of communities, businesses, infrastructure and environmental stakeholder agencies who all recognize the concern, but have no guide for how to address policies that assume conditions will not change. This would also include the dissemination and

sharing of information on the institutional structures and program components that permit such collaboration.

- Adopt policies that encourage the rebuilding of extreme weather- or climate change-related failed or disrupted infrastructure that ensures the causes of such failures are understood and future protections are incorporated into new designs. Similar policies should continue to be adopted that reduce GHG emissions as our understanding of the contribution of such emissions to climate change and degraded air quality.
- Develop performance metrics that allow agencies to monitor changes in underlying conditions or contributing factors to climate change. The Federal government has encouraged the use of performance-based planning and programming for Federally-funded investments. Our experience is that traditional measures such as impact on road congestion or emissions have been the most-used metrics. Measures relating to the outcomes of public policies, for example, those relating to public health and system resilience, have in contrast been sparse. Illustrative measures for such types of outcomes should be developed and disseminated among the agencies responsible for infrastructure. This could include metrics relating to the social cost of carbon and the risks to infrastructure and communities resulting from a continuing growth in GHG emissions.
- Support research on the continuing and evolving science and technology phenomena that exacerbate climate change impacts or that conversely can help mitigate and/or adapt to such changes. Climate science has made major strides over the past decade as improved data and analysis techniques have provided the tools for advancing our understanding of climate/Earth relationships. By the very nature of the uncertainty associated with future environmental conditions, continuing to collect data and revise our understandings based on the new evidence will be fundamental to an effective National resilience and adaptation strategy.

#### CLOSING

As a company, WSP is committed to its responsibilities for helping to lead the way by reducing its own emissions footprint and facilitating more resilient and sustainable infrastructure in a way that also advances equity. The clients we advise and serve have challenged us to develop and implement more future focused, sustainable and resilient strategies for them as well. This makes sense from a business perspective; from a good governance perspective; and from a sustainability perspective. I have no doubt that this is the future of infrastructure development in our Nation. National policies that encourage the development of this approach to infrastructure development would provide a catalyst for reaching this future sooner.

Thank you for the opportunity to provide you this testimony.

Mr. DEFAZIO. Thank you, Mr. Lewis.

And the final witness, Mr. Charles Hernick.

Mr. HERNICK. Thank you, Chairman DeFazio, Ranking Member Graves, and members of the committee.

My name is Charles Hernick. I am the vice president for policy and advocacy with an organization called Citizens for Responsible Energy Solutions.

We are a 501(c)(4) nonprofit that engages policy makers and the public about responsible, conservative solutions to address our Nation's energy, economic, and environmental security, while also increasing America's competitive edge.

My hope is that you will take away three things from my testimony today:

First, that Federal policy must harness the power of free markets;

Second, to make strategic investments in research and development and infrastructure;

And third, and perhaps most importantly, reduce or eliminate barriers to infrastructure deployment.

We live in unprecedented times, and 2020 was remarkable for a lot of different reasons, but specifically in terms of business and cli-

mate, 2020 was a record-breaking year for the number of companies that made voluntary pledges to reduce their greenhouse gas emissions and get to carbon neutrality by mid-century; a record year for the number of power purchase agreements that were made by companies to reduce their emissions through the power that they are purchasing; a record year for the deployment of solar and wind.

During 2020, under the most extreme economic headwinds that I have ever seen in my lifetime, that we have seen in many generations, solar and wind grew at 11 percent—11 percent growth during an economic recession, and that is because demand for clean energy is at unprecedented heights.

The free market can deliver the solutions that we are looking for and are needed.

The types of companies that are making these voluntary commitments and pledges are in finance. They are some of the biggest banks that we can recognize. They are in transportation.

I appreciate the comments and the goals set by FedEx. It is important to see that kind of leadership.

But also in retail, from the folks that are selling us products, whether that be Amazon, Walmart, Target, other companies that are looking to reduce the environmental footprint of their products and their supply chains.

The Federal Government can do more to help normalize this race to the top in terms of environmental performance. Mechanisms for transparency and accountability for these voluntary actions would be popular.

A recent poll, and my organization does a lot of different types of polling, but a recent poll in January showed that 70 percent of voters of all political stripes would support these types of mechanisms to help assure that the voluntary commitments that companies are making are followed through upon, and I think that that is a reasonable course of action.

When it comes to making strategic investments in research and development and infrastructure, it is paramount that Congress pursues an all-of-the-above approach. That includes efficiency, new fuels, and electric vehicles.

For a long time, fuel efficiency has focused on how we squeeze more miles per gallon out of a car, but a new era of carbon capture utilization and storage technologies and deployment make it possible and make the proclamations that oil and gas companies have been making to achieve net zero emissions and their Scope 1, Scope 2, and Scope 3 categories a reality. It is important to look at that.

It is also important to look at the new fuels that are coming onto the horizon. Looking at the hydrogen economies is important, as has been mentioned already, but also electric vehicles.

Electric vehicles are a small but rapidly growing part of the American fleet, and it is something that Congress should include in its all-of-the-above portfolio.

Finally, in terms of reducing or eliminating barriers to infrastructure deployment, too many of the big types of projects that we need to reduce greenhouse gas emissions and improve our environment take up to 7 years or over a decade to permit. Congress should act immediately to codify One Federal Decision and reduce

the timeline to 2 years so that we can put online all of the types of infrastructure in transportation, in clean energy writ large, to reduce greenhouse gas emissions at the pace that we need to achieve the voluntary goals that companies have set and the goals that we know we need to achieve globally.

Finally, that type of action would be popular, too. Seventy-three percent of voters, again, of all political stripes, want to see reductions in redtape and limits to regulation that slow down unnecessary project delays.

With that I will thank you, and I look forward to questions.

[Mr. Hernick's prepared statement follows:]

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**Prepared Statement of Charles Hernick, Vice President of Policy and Advocacy, Citizens for Responsible Energy Solutions**

Chairman DeFazio, Ranking Member Graves, and Members of the Committee, thank you for the opportunity to testify today on "The Business Case for Climate Solutions."

My name is Charles Hernick, and I am the Vice President of Policy and Advocacy for Citizens for Responsible Energy Solution (CRES). We are a 501(c)(4) non-profit that engages policymakers and the public about responsible, conservative solutions to address our nation's energy, economic, and environmental security while increasing America's competitive edge.

I hope you will remember *three approaches for how to reduce emissions* from my testimony:

1. So there is no confusion, it is worth stating that the time for *additional* climate action is now. I say *additional* because the federal government is not the only entity interested or capable of tackling the climate challenge. Indeed, many companies, states, and municipalities have been hard at work for decades. And Congress must remember that we live in an era where even in the depths of a pandemic, companies large and small have voluntarily committed to carbon neutrality by definitive dates. Therefore, the federal policy playbook should first and foremost harness the power of free markets—by encouraging transparency and accountability—and empower companies to achieve their self-set goals, not pursue heavy-handed, top-down mandates that drive up costs or reduce options.
2. There is a meaningful role for the federal government in reducing greenhouse gas emissions from the transportation sector. But rather than picking winners and losers, federal policy is better positioned to make strategic investments in research and development (R&D) and infrastructure that serves an *all-of-the-above* approach including fuel efficiency, new clean fuels like hydrogen, and electrification (i.e., electric vehicles). The federal government should focus on backbone infrastructure for the economy and leave room for states to innovate on policies that are locally appropriate.
3. Finally, and perhaps most importantly, if we are to tackle the climate challenge quickly, Congress will need to reduce or eliminate barriers to infrastructure development. It should take two years, not ten years, to permit infrastructure projects. Red tape is not the price of good government; it is the enemy of good government. America could modernize its infrastructure, reduce costs, while dramatically enhancing environmental benefits, with a two-year approval process for large construction projects. Among other regulatory reforms, a single permitting timetable and timely environmental reviews and authorization decisions must be a first-order priority, specifically codifying One Federal Decision. The public agrees. Our polling shows that a significant percent of voters (73 percent) support streamlining and reforming government regulations that hamper the transition to clean energy.<sup>1</sup>

*The Surface Transportation Advanced through Reform, Technology & Efficient Review Act, or STARTER Act*, introduced in the 116th Congress, was an important effort towards reducing barriers and making targeted investments. Thank you, Rank-

<sup>1</sup>Citizens for Responsible Energy Solutions (CRES). *Poll: Republican, Democratic Voters Support Commonsense, "All-of-the-Above" Climate Solutions*. <https://citizensfor.com/pressreleases/poll-republican-democratic-voters-support-commonsense-all-of-the-above-climate-solutions/>.

ing Member Graves, for your leadership to ensure state flexibility by preserving state decision-making and rejecting new federal mandates that would dictate funding priorities regardless of actual local needs. My hope is that Congress can build on your effort and pass bipartisan infrastructure legislation to put transportation sector emissions on the right trajectory.

*Framing: Big Government Is Not a Pre-Requisite for Successful Climate Policy*

Before we can develop an actionable business case for climate solutions, we must first determine how success will be defined.

Another multi-trillion dollar bill out of Congress will not be a sign of success. Capital markets—driven by large investors and common stockholders alike—are trained on delivering a low-carbon future. Investors like Wells Fargo, Goldman Sachs, Bank of America, HSBC, Morgan Stanley, and Barclays have all committed to net-zero portfolios by mid-century.<sup>2</sup> More investors are factoring climate change into their portfolios, and it is easier than ever for Americans to align their 401(k) plans with a carbon-free future. There is no shortage of finance for mature clean energy technologies. Trillions in scattershot federal spending could crowd-out private sector investment. First and foremost, we should measure the success of our climate policy based on how well it encourages, not competes, with investment from America's financial industry.

Second, we know that low-cost, low-emissions technologies and goods will be critical to successful climate policy.<sup>3</sup> Anything short of widespread adoption will fail to address this global issue, and American innovation will be the key driver. Inexpensive climate solutions are needed for global uptake in developing countries in Africa, Latin America, and Asia, where too many people still lack basic services. Our geopolitical adversaries are willing to undercut American interests no matter what the implications are for climate change. That is why the bipartisan *Energy Act of 2020* was such an important down payment on energy innovation. Affordability also matters here at home. The impacts of the pandemic-induced recession have not been evenly distributed across America, nor are historic environmental burdens or the likely economic and health impacts of effects of climate change. Price increases make life even harder for these Americans. We can measure the success of our climate policy based on the availability of new energy innovations and whether they are priced for easy and widespread adoption.

Third, effective climate policy will rely on the power of free markets. Big government mandates favor incumbent technologies and large companies and are blind to what the free market can do. Additional bureaucracy is disproportionately threatening to small businesses and start-ups. Appetite for clean energy—by people and companies—has been growing steadily for decades and as a result, the private sector and effective state-level policies have achieved the goals of President Obama's Clean Power Plan carbon reductions 10 years ahead of time.<sup>4</sup> Indeed, it is a favorable American business environment that gives space for a record number of companies to put themselves on a path to net zero and differentiate themselves on "clean." Congress should encourage more of that race to the top, and successful climate policy can be measured based on whether the free market is incentivizing behavior and activities that support our climate goals.

And finally, America's interests and American jobs should be our number one priority when developing a clean transportation infrastructure for the next century. The U.S. is more energy independent than we have been in decades and we should not lose that in the race to reduce emissions. This means that we need to address the entire supply chain of materials and technologies. Domestically sourced critical minerals and metals utilized by domestic manufacturing facilities could supply the development of a clean transportation sector at home and abroad. It is encouraging that new battery plants are being built in the U.S. to align vehicle supply chains with the domestic market. After a generation of hemorrhaging industrial jobs overseas, this realignment will take some time. We can directly measure the effectiveness of our climate policy in our job numbers, manufacturing metrics, the security of our supply chain, and our Gross Domestic Product.

<sup>2</sup>American University. *Carbon Removal Corporate Action Tracker*. <https://docs.google.com/spreadsheets/d/1vf-uXsf6fo7MuNpPya2Kz82Dxte0hHgtOXimgpRA3c/edit#gid=0>.

<sup>3</sup>See more about CRES Forum's Climate Policy Directives at: <https://cresforum.org/climate-policy-directives/>.

<sup>4</sup>Bloomberg NEF and Business Council for Sustainable Energy (BCSE). *Sustainable Energy in America 2021 Factbook*. <https://bcse.org/factbook/>.

## 1. HARNESS THE POWER OF FREE MARKETS

When history books are written about how we solved the climate problem, these years of the global COVID-19 pandemic will be a surprising turning point.

At the close of 2020, the COVID relief and year-end omnibus also included a broad modernization of our nation's energy policies. The *Energy Act of 2020* was the culmination of many years of significant bipartisan effort and marks the first comprehensive energy legislation passed in over a decade. It combined bipartisan provisions from the Senate (*S. 2657 American Energy Innovation Act*) and House (*H.R. 4447 Clean Energy Jobs and Innovation Act*) bills and reflects the priorities of many members of Congress to accelerate the development of technologies needed to meet our environmental and economic challenges. The Act provides a timely and critical investment in the advancements in energy efficiency, energy storage, advanced nuclear, carbon capture, carbon removal, renewable energy, and other approaches needed to decarbonize our economy. Importantly, it brought bipartisan compromise on the phaseout of hydrofluorocarbons, which are greenhouse gases with extremely high warming potential.

The \$900-billion package could inject at least \$34 billion in low-carbon spending into the country's economy over the next decade.<sup>5</sup> It contains more than \$19 billion in the form of new authorizations on clean energy research, development, and demonstration by the Department of Energy, including \$6.8 billion for nuclear, \$5.3 billion for carbon capture, use and storage, and \$1 billion for energy storage. Congress should fully appropriate these funds. The package also added an estimated \$15 billion over 10 years in new federal tax credit enhancements on top of existing credits.

As COVID-19 is brought more under control over the course of 2021, the economy will further rebound. The case for additional stimulus is limited, and overspending risks overheating the economy.

*Leading businesses are making important commitments and strides to reduce emissions: there is a new, encouraging baseline.*

There are three basic ways to reduce emissions from the transportation sector: increase (fuel) efficiency, better utilize low- or zero-emissions fuels, and pursue electric vehicles. Companies across the U.S. economy voluntarily committed to renewable energy, as evidenced by more than 10.6 GW of corporate renewable energy purchases occurring in 2020, according to the Renewable Energy Buyers Alliance.<sup>6</sup> Companies across retail, big tech, and hospitality, among other sectors, have stepped up and made voluntary commitments to decarbonize their operations, and that is also translating to a transportation or fleet electrification strategy.

Traditionally, fuel economy has focused on increasing the miles per gallon (mpg) of the internal combustion engine. Internal combustion engines will always emit carbon emissions as a product of the combustion process. But with current technologies, it is possible to reduce, and perhaps someday fully decarbonize, the sector. Oil and gas companies are focused on reducing upstream emissions, as well as sequestering and offsetting carbon. Despite incredible economic challenges this past year, oil and gas majors Total and Royal Dutch Shell announced ambitious plans to reach net zero greenhouse gas emissions by 2050, echoing similar announcements made by BP and Repsol in 2019. Total, for example, aims to achieve net-zero Scope 1 and 2 emissions by 2050 and it is targeting carbon neutrality for all its Scope 3 production and energy products sold in Europe by 2050.<sup>7</sup> Oxy Low Carbon Ventures, a subsidiary of Houston based Occidental Petroleum, delivered its first batch of "carbon-neutral oil" this past January.<sup>8</sup> Fueling up with carbon-neutral gasoline can only be part of the future through an all-of-the-above approach that is open to innovation in all sectors.

Government does not need to mandate this behavior; companies are adopting it themselves to meet consumer demand. Zero-emission fossil fuels can be an important tool for climate policy as we transition to cleaner energy sources, but only if

<sup>5</sup> Bloomberg NEF and Business Council for Sustainable Energy (BCSE). *Sustainable Energy in America 2021 Factbook*. <https://bcse.org/factbook/>.

<sup>6</sup> Ben German. "Ranking 2020's corporate clean energy deals." *Axios*, February 11, 2020. <https://www.axios.com/renewable-energy-companies-amazon-google-18db639c-e1e5-416f-8887-848e601131c6.html>.

<sup>7</sup> Francois De Beaupuy. "Oil Giant Total Targets Carbon Neutrality in 2050." *Bloomberg Green*, May 5, 2020. [https://www.bloomberg.com/news/articles/2020-05-05/total-targets-carbon-neutrality-in-2050-as-profit-plunges-35?cmpid=BBD051220\\_GREENDAILY&utm\\_medium=email&utm\\_source=newsletter&utm\\_term=200512&utm\\_campaign=greendaily](https://www.bloomberg.com/news/articles/2020-05-05/total-targets-carbon-neutrality-in-2050-as-profit-plunges-35?cmpid=BBD051220_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=200512&utm_campaign=greendaily)

<sup>8</sup> Eklavya Gupte and Paula VanLaningham. "US' Occidental supplies first cargo of 'carbon-neutral crude' to India's Reliance." *S&P Global*, January 29, 2021. <https://www.spglobal.com/platts/en/market-insights/latest-news/oil/012921-us-occidental-supplies-first-cargo-of-carbon-neutral-crude-to-indias-reliance>.

we make it possible for oil and gas companies to deliver on those promises. Government can do that by removing barriers that currently inhibit transparency, certainty, and trust in carbon offset markets—no mandate is required.

Another cost-efficient way to significantly reduce emissions in vehicle fleets is by switching to low-emissions fuels such as natural gas or propane. Propane is a promising alternative fuel in the transportation sector for a number of reasons:

- *Cost savings.* While the energy content of propane is lower than that of gasoline or diesel,<sup>9</sup> propane has a lower fuel cost per mile, given its lower cost of the fuel itself and the lower maintenance costs for propane-fueled vehicles.<sup>10</sup> The Propane Research and Education Council estimates that propane vehicle fleets can represent between 30 and 50 percent in cost savings, compared with their gasoline and diesel counterparts.<sup>11</sup> For example, when the Oak Harbor Public School District in Washington state replaced its diesel and gasoline school buses in 2010 with a propane fleet, it achieved an estimated annual savings of \$35,000 in fuel costs and an additional \$700 in reduced vehicle maintenance and service time.<sup>12</sup>
- *Emissions reductions.* In 2019, a study from West Virginia University found that propane school buses reduce emissions of nitrogen oxide by 96 percent, and of carbon dioxide by 13 percent, compared to diesel-fueled buses.<sup>13</sup>
- *Energy security.* Around 90 percent of the propane and natural gas used in the United States is produced domestically,<sup>14</sup> so it is a fuel source that does not imply dependence on foreign nations.

Outside of fossil fuels, electric vehicles make more sense than ever before and continue to be key to a cost-effective, consumer-driven approach to reducing emissions from transportation. Even though they are still a small percentage of cars on U.S. roads, widespread adoption may not be far off thanks to heightened innovation and more favorable federal and state policies. Costs for electric vehicles are coming down each year, charging at home is less expensive, recharging options and locations are growing, and limited lifetime maintenance costs are appealing. Many drivers are already saving money in the long run, with approximately \$800–\$1,000 in savings per year on fuel alone.<sup>15</sup> The best role for government is to simply allow the market to match transportation options with consumer needs. Steady federal policy, innovative state programs and more choices for consumers will keep pressure on lowering prices while also lowering emissions.

*There are lessons to learn from the electric power sector for transportation: the clean energy business is unstoppable.*

For over a decade, electric power sector emissions have steadily decreased. This is not the case for the transportation sector, which has been the largest source of U.S. greenhouse gas emissions since 2016. Except for 2020, due to the pandemic, transportation emissions have been steadily rising. So as attention focuses on decarbonizing transportation, we should consider lessons learned from the power sector.

<sup>9</sup> 84,250 Btu/gal for propane, versus 112,114–116,090 Btu/gal for gasoline and 128,488 Btu/gal for diesel. Alternative Fuels Data Center. “Fuel Properties Comparison.” Department of Energy, January 2021. [https://afdc.energy.gov/files/u/publication/fuel\\_comparison\\_chart.pdf](https://afdc.energy.gov/files/u/publication/fuel_comparison_chart.pdf).

<sup>10</sup> Propane Research and Education Council. “Driving down costs.” 2020. <https://propane.com/wp-content/uploads/2020/08/Superior-Plus-Propane-Case-Study.pdf>. See also National Propane Gas Association. “Today’s Propane.” 2020. <https://www.npga.org/wp-content/uploads/2020/12/NPGA-Todays-Propane-2019.pdf>.

<sup>11</sup> Propane Research and Education Council. “Top 10 Facts About Propane Autogas for Fleet Managers.” September 16, 2018. <https://propane.com/2018/09/16/top-10-facts-about-propane-autogas-for-fleet-managers/>.

<sup>12</sup> Alternative Fuels Data Center. “Washington School District Cuts Costs and Improves Air Quality with Propane Buses.” April 09, 2019. <https://afdc.energy.gov/case/3075>.

<sup>13</sup> Propane Research and Education Council. “West Virginia University study finds propane school buses dramatically decrease harmful emissions.” August 5, 2019. <https://propane.com/environment/stories/west-virginia-university-study-finds-propane-school-buses-dramatically-decrease-harmful-emissions/>.

<sup>14</sup> Propane Research and Education Council. “Top 10 Facts About Propane Autogas for Fleet Managers.” September 16, 2018. <https://propane.com/2018/09/16/top-10-facts-about-propane-autogas-for-fleet-managers/>. See also U.S. Energy Information Administration. “In 2018, 90% of the natural gas used in the United States was produced domestically.” July 09, 2019. <https://www.eia.gov/todayinenergy/detail.php?id=40052>.

<sup>15</sup> Benjamin Preston. “EVs Offer Big Savings Over Traditional Gas-Powered Cars.” *Consumer Reports*, October 08, 2020. <https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/#:~:text=Fuel%20savings%3A%20The%20study%20shows,an%20equivalent%20gasoline%20powered%20car.>

In 2020, the U.S. renewable energy sector grew 11 percent and added 27.8 gigawatts of capacity to meet this surging demand for clean energy.<sup>16</sup> Solar and wind power had record years, respectively, and now Americans receive 20 percent of their electricity from renewable sources, including hydropower. These remarkable trends are due to abundant options for low-cost, low- or zero-emissions power generation available to the private sector. And they are the result of decades-long federal support for innovation and early-stage deployment, tax incentives for nascent industries, and complementary state policy.

As targeted federal investments continue to pay off in transportation, we should expect free-market forces to continue to drive transformation in the sector. Americans are interested in low-carbon solutions and empowering them to make those decisions would be popular. A recent CRES poll found that over 60 percent of Americans—including nearly half of Republicans—support a federal consumer-oriented system that would help make transparent which companies have followed through on their commitments to report and reduce emissions.<sup>17</sup>

*Normalizing transparency and reporting for sustainability markets such as voluntary carbon trading will help drive competition and investment.*

America's private and public sectors have made great strides in deploying clean energy and reducing emissions, but there is currently no way for these accomplishments to be documented and organized so that their collective impact can be better understood by investors and consumers.

Normalizing systems for carbon reporting will increase transparency and accountability, increase investment in clean energy and offsets, and further decrease U.S. greenhouse gas emissions without imposing unnecessary mandates, costs, or bureaucracy.

This type of limited federal effort could help protect investors and maintain fair and orderly functioning of voluntary carbon markets. State compliance markets would still need their own enforcement mechanisms. But for private actors in the voluntary carbon space, following federal transparency and reporting guidance could crowd-in investment the way that Energy Star mainstreamed energy efficiency in the early 1990s through a voluntary program. Perhaps most importantly, government can facilitate certainty and trust in voluntary, industry-established greenhouse gas emissions registries and bring greater definition to tradable carbon offsets without inventing a new federal system that attempts to supersede state progress.

In addition to helping industry meet climate change goals, this framework for carbon transparency would help U.S. companies outcompete foreign rivals, particularly Chinese companies that depend on high-carbon sources of energy for industry. Indeed, our polling shows that 72 percent of all voters, and 61 percent of Republicans, support requiring both foreign and domestic companies to label their products based on the type of energy used in production, and equal numbers support requiring government contractors to disclose carbon emissions in the production of their goods and materials.<sup>18</sup> Consumers want to know that their hard-earned dollars support companies that do not harm the planet. Providing easy access to that information will drive business back to American industry, boosting American jobs, our economy, and our national security.

## 2. MAKE STRATEGIC INVESTMENTS

Transportation infrastructure is central to our economy, our way of life, and our standard of living. However, much of our nation's infrastructure is in disrepair and in need of massive re-investment. Modernizing America's infrastructure should include investments in more efficient technologies, smart and reliable "clean energy-ready" power grids, and cleaner, more efficient transportation systems. When planning infrastructure investments, the federal government should help accelerate emissions reductions by prioritizing clean energy projects, including those that reduce highway-related emissions, and promoting public-private partnerships to build out alternative fuel infrastructure. Notable legislation that accomplishes these goals includes but is not limited to:

<sup>16</sup> Bloomberg NEF and Business Council for Sustainable Energy (BCSE). *Sustainable Energy in America 2021 Factbook*. <https://bcse.org/factbook/>.

<sup>17</sup> Citizens for Responsible Energy Solutions (CRES). *Poll: Republican, Democratic Voters Support Commonsense, "All-of-the-Above" Climate Solutions*. <https://citizensfor.com/pressreleases/poll-republican-democratic-voters-support-commonsense-all-of-the-above-climate-solutions/>.

<sup>18</sup> Citizens for Responsible Energy Solutions (CRES). *Poll: Republican, Democratic Voters Support Commonsense, "All-of-the-Above" Climate Solutions*. <https://citizensfor.com/pressreleases/poll-republican-democratic-voters-support-commonsense-all-of-the-above-climate-solutions/>.

- Provisions on *cost-effective deployment of resilient infrastructure and mitigation strategies (Title VII) and accelerated project delivery (Title I—Subtitle B)*, included in the Surface Transportation Advanced through Reform, Technology & Efficient Review Act, or STARTER Act (H.R. 7248).
- *Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Grant Program (Sec. 7001 of H.R. 7248 STARTER Act; Sec. 1407 of S. 2302 ATIA)* that would allow states to make resiliency improvements and help protect roads and bridges from natural disasters such as wildfires, hurricanes, floods, and mudslides.
- *Electric Vehicle Mobility Area Planning Act (EV MAP Act)*. The EV MAP Act would create a grant program to map optimal locations for electric vehicle charging stations, giving private developers and consumers the information necessary to strategically invest in new charging infrastructure.
- *Other Emissions Reduction Provisions (S. 2302 ATIA Subtitle D—Climate Change, Sec. 1404, 1402, 1406 & 1408)*. Supports the development of a suite of options to reduce emissions across the transportation sector. These multifaceted solutions can include the authorization of a new program to help states reduce truck idling at ports (ATIA Sec. 1402; H.R. 2 Sec. 33191), the creation of a grant to support innovative, multimodal solutions to congestion relief (ATIA Sec. 1404), and the reauthorization of the Diesel Emissions Reduction Program (ATIA Sec. 1408; H.R. 2 Sec. 33301).
- *Competitive Grants for Alternative Fuel Infrastructure (Sec. 1303 of H.R. 2; Sec. 1401 of S. 2302 ATIA)* would help states and localities to build hydrogen, natural gas, and electric vehicle fueling infrastructure along designated highway corridors, which lack such infrastructure.
- *Carbon Reduction Incentive Programs (Sec. 1213 of H.R. 2; Sec. 1403 of S. 2302 ATIA)* would distribute funds to states for projects that will yield significant reductions in greenhouse gas emissions from surface transportation and will help states meet emissions reductions goals.

### 3. STREAMLINE REGULATION AND THE PERMITTING PROCESS

Minimizing administrative burdens and duplicative regulations promotes better environmental decision-making in a much more cost- and time-efficient manner. The complexity of current U.S. permitting processes leaves substantial opportunities for improvement that would increase predictability, shorten the time to project delivery, and reduce costs while still providing for robust consideration of public and environmental concerns. Historically, there has been strong bipartisan support for incremental and common-sense improvements to the environmental review and permitting process, and we encourage the following initiatives to promote better environmental policy decision-making. The permitting process must be reformed to ensure effective stewardship of taxpayer resources—to scale clean energy rapidly and to create good-paying American jobs.

As introduced by Representative Davis, codifying the “One Federal Decision” (Executive Order 13807) through the One Federal Decision Act would consolidate permitting decisions for major infrastructure projects into a single environmental document, completed within two years, with a review schedule set by the federal lead agency. The National Environmental Policy Act (NEPA) could be further modernized through proposals such as the Building U.S. Infrastructure through Limited Delays & Efficient Reviews (BUILDER) Act (H.R. 8333) (Rep. Graves (R-LA)). This legislation’s overriding goal is to provide better environmental decisions in a cost- and time-efficient manner. Codifying this careful NEPA modernization will bring a higher level of certainty to critical infrastructure projects, enabling planned clean energy construction to move forward while continuing to adhere to important environmental standards.

Additionally, legislative proposals such as Rep. Kelly Armstrong and Sen. Portman’s Federal Permitting Reform and Jobs Act should be included in any infrastructure proposal.

*Fast 41 is a model of how permitting should be done, scheduled to expire in December 2022.*

As an example of how a voluntary mechanism for streamlining the federal permitting process can yield promising results, I will briefly mention Title 41 of the Fixing America’s Surface Transportation Act (FAST-41) of 2015, or FAST-41. It created the Federal Permitting Improvement Steering Council (FPISC), to provide a one-stop shop in the federal government and coordinate a single schedule for projects

across permitting agencies. As stated in the Permitting Council's FY2020 Report to Congress:<sup>19</sup>

- The four voluntary, large-scale projects<sup>20</sup> that completed the federal permitting process in FY 2020 and that voluntarily applied for FAST-41 coverage represent an average of more than 10 years in time savings, 20,000 permanent and temporary jobs in construction, and more than \$45 billion in economic investment.
- For one of these projects, Gemini Solar, the cost of the Environmental Impact Statement (EIS) alone (\$6.2 million), represented an estimated cost savings of \$12.6 million from these time savings.
- The average completion time of an EIS between 2010 and 2018 was 4.5 years. Projects that voluntarily applied for FAST-41 and that completed the NEPA process during FY 2020 finalized an EIS in only 2.5 years—a 45 percent time reduction.
- For the Cardinal-Hickory Creek 345 kV Transmission Line Project, 50 percent of the federal reviews and authorizations were completed ahead of schedule and the NEPA process was completed in 3.3 years, or 27 percent faster than the Council on Environmental Quality (CEQ) average timeline for projects.

#### CONCLUSION

Over the past decade, America has reduced its carbon emissions more than any other country. This was achieved through an all-of-the-above energy policy combined with public and private sector investments in American innovation. There is no need to reinvent this wheel.

Fortunately, the business case for climate solutions also illustrates the best business practices for climate solutions. Future climate policy, including modernizing the transportation sector to further reduce U.S. emissions, can build upon our past success by harnessing instead of hampering the power of free markets; maintaining American leadership through strategic R&D and infrastructure investments, and prioritizing reforms to reduce or eliminate regulatory barriers—particularly those that inhibit infrastructure development, domestic manufacturing, and American jobs.

Mr. DEFAZIO. I thank the gentleman.

That concludes the testimony. We will now proceed to questions.

Mr. Konar, in your testimony you said that in order to achieve the Biden administration's goal of adding 500,000 new EV charging stations over the next 10 years—and I don't even know if that is enough—that the Federal Government should be the bridge.

And then, Mr. Rudd, you also mentioned the importance of interoperability of charging infrastructure. As we all know, Tesla is proprietary, and has a great network, but no one else can charge there. And I think it is essential that we have an interoperable charging network.

So could the two of you address the appropriate role for the Government in these areas, quickly?

Mr. KONAR. Sure. Go ahead, Mr. Rudd.

Mr. RUDD. Yes, as I said in my prepared comments, we believe that, ultimately, charging infrastructure needs to be universally available throughout the country, and especially in rural areas.

At the same time, we also believe that there needs to be an investment in innovation, in terms of defining those standards and allowing for various forms of charging. So not necessarily charging stations, but perhaps things like dynamic charging. So as you are

<sup>19</sup>Federal Permitting Improvement Steering Council. *Annual Report to Congress*. Fiscal Year 2020. <https://www.permits.performance.gov/sites/permits.dot.gov/files/2021-01/FY%2020%20FPISC%20Annual%20Report%20to%20Congress.pdf>.

<sup>20</sup>The four projects are the Alaska LNG pipeline, Borderlands Wind, Cardinal-Hickory Creek Transmission Line, and Gemini Solar. Gemini Solar and Alaska LNG are some of the largest of their kind in the country.

driving over large freeways or highways that are frequently used, you have the ability to charge your vehicles as you move.

Those standards will lead to the opportunity for innovation and, at the same time, will create the opportunity for forward thinking, like smaller batteries in vehicles, if you have things like dynamic charging. So we think, before we embark on this journey and significant investment is made, that we spend some time to think about defining those standards so that we can all work together to achieve a common outcome, whether it is private, or whether it is public agencies.

Mr. DEFAZIO. OK. Mr. Konar?

Mr. KONAR. Congressman DeFazio, the two points I would like to make is, first, that we have done this before, right? So I feel very comfortable that the retail sector in this industry can actually respond to bring chargers in.

When you look at renewable fuels and biofuels, which 10 years ago nobody wanted to use, with the right Government policy, which was some tax credits and incentive structures for people like us to adopt this, we have been able to bring biofuels in a big way into the transportation infrastructure and significantly reduce the carbon footprint. Just the amount of biofuels Pilot sells, we have taken the equivalent of 1 million cars off the road. So I think this is possible with good Government policy.

But we need to be bridged. At this point in time, the economics of standalone chargers and investing in chargers is very challenging, just because there is so much range anxiety, and not enough people are using electric vehicles. So what would be very helpful, from a policy perspective, is if the Government allows us to bridge, through help either from tax credits like we have done on wind and solar energy, or through grants in developing chargers, so that companies like us can go out and provide a ubiquitous network throughout the country so that there is adoption of EVs.

Mr. DEFAZIO. OK.

Mr. KONAR. And if you do that over some period of time, we will get to a good solution. Thank you.

Mr. DEFAZIO. Great, thank you.

Mr. Smith, it is a very ambitious goal to be carbon neutral by 2040. Is this purely a business decision, or is your objective also centered around concern about and a need to reduce carbon pollution?

Mr. SMITH. Well, it is some of both, Mr. Chairman. Our customers are increasingly focused on this issue. They want to do business with transportation providers who are environmentally responsible.

But we also, as a commercial enterprise, have to produce for our shareholders. And we are convinced—in the vehicle sector we have about 200,000 vehicles in operation. Three-quarters of them are pickup and delivery vehicles. A little less than one-quarter of them are over-the-road tractors, which drive, in this country, 2.5 billion miles per day.

So battery-powered vehicles for pickup and delivery, which we began to pioneer over 10 years ago—and I strongly advocated the Government support for the acquisition of electric vehicles—have now reached the point where the positive profit accretion from

about 24 or 25, you will get both the environmental benefits, and you will get better economics.

The operating cost of an electric pickup and delivery vehicle, like the new BrightDrop, electric pickup and delivery vehicles that General Motors just introduced, will have an operating cost that is about 44 percent of what an internal combustion-powered equivalent vehicle would be. So it is really just the acquisition cost, and that is coming down because of battery production efficiencies, and then the charging infrastructure. So we think there will be a positive return on that.

Over-the-road vehicles, that is harder, but electric vehicles are on the way. We have some on order.

In aviation, that is the most intractable problem because of the difficulty and scaling up sustainable aircraft fuels. And that is why we made this big push to come up with scalable carbon sequestration methodologies led by the premier environmental university establishment in the world, the Yale School of the Environment.

Mr. DEFAZIO. OK, thank you, Mr. Smith. My time has expired.

Mr. Graves? No, sorry. I had a list.

Mr. Crawford?

Mr. CRAWFORD. Thank you, Mr. Chairman.

Mr. DEFAZIO. You are recognized for 5 minutes.

Mr. CRAWFORD. I appreciate that. Thank you to the witnesses for being here. I just got a couple of quick questions. I will start with Mr. Hernick.

America's greenhouse gas emissions are now below 1990 levels. How do we ensure that our good work here isn't sabotaged by China's increased use of polluting materials and activities?

Mr. HERNICK. Congressman Crawford, I appreciate the question, and it is a very important one for us to think about.

China is the number-one greenhouse gas emitter in the world, and we have no reason to believe that they will be honest or transparent about their carbon emissions and what they are doing to reduce their emissions, if they do anything. Transparency is their enemy. And we know that China will do anything to undercut us, from an economic standpoint.

So I think that what we need to be able to do is to pursue an all-of-the-above approach that focuses on cost reduction, so that American solutions that are clean are among the least expensive in the world. The climate challenge is a global one, and we need folks to be able to uptake American-made solutions in parts of the developing world, including Africa and Latin America, where folks are still looking to turn on the light switch, or get their first car.

And so that is why focus on cost reduction for customers, instead of heavy-handed Government approaches is going to be the way to go.

Mr. CRAWFORD. Thank you, Mr. Hernick. I have a question for Mr. Allen.

China heavily subsidizes its national industry. Sometimes they even own the companies that are building their infrastructure. How do cheaper prices abroad affect your business model?

Mr. ALLEN. Thank you, Congressman. That is a great question. And clearly, there are numerous published reports now about foreign state-owned enterprises and foreign governments, and the way

they provide subsidies to lower prices. That is absolutely happening every day in America right now on the battery system front.

I agree with Charles' comment. The way around this is to produce these products in the United States. We could use Federal help on the investment side for Buy America.

But today most of the actual battery cells are not produced in the United States. They are produced in China, Korea, Japan. Now, this is something that I hope the committee addresses quickly, by providing incentives to bring that technology to the United States that would bring intellectual property here, and create numerous wonderful manufacturing jobs if we could produce the actual cells here, in the United States.

Mr. CRAWFORD. Thank you for the response.

Mr. Chairman, I will yield back the balance of my time.

Mr. DEFAZIO. Thank you, Mr. Crawford.

Ms. Norton?

Ms. NORTON. Thank you, Mr. Chairman, and I really appreciate this hearing. I regard climate change as the most important issue facing our country and, for that matter, the entire world. My questions first are for Mr. Allen and Mr. Rudd.

The Washington Metropolitan Area Transit Authority, if it closes down, the concourse closes down. They are prepared to move, apparently, on electric buses, but they're finding issues with the manufacturing industry's ability to meet demand for battery-electric buses. And I am concerned and wonder what you believe could be done to support the scaling up of manufacturing to meet what is now a growing demand.

And at the same time I want to ask Mr. Rudd—because you also mentioned the Washington Metropolitan Area Transit Authority, and that you were beginning on a strategy for an initial bus pilot.

So I would ask you, as well, what are the biggest challenges to electrification, and how do you think the process could be sped up to meet the urgency of climate change?

So first, Mr. Allen of Proterra?

Mr. ALLEN. Yes, we do have Proterra buses running in Washington, DC, right now. We are very grateful for that.

I think the way to continue the acceleration of this is really on two fronts. One is for the Government to continue the funding for zero-emission buses and for charging. This is done today through the FAST Act Low or No Emission Vehicle program. That program was funded last year at \$130 million, this year \$180 million. We would love to see this program enhanced, and further investment in here. This allows agencies to really kickstart their adoption of electrification in their transit business.

The second is really around incentivizing the domestic supply chain. A little bit about my comments earlier about the battery cells, but if the—as the Federal Government makes a commitment that they are behind electrification, and it is not going away, and this is the trend of the future, this will provide comfort to the supply base to be able to make the investments necessary to ramp up production in a much faster manner.

Ms. NORTON. Thank you.

Mr. Rudd?

Mr. RUDD. Yes.

Ms. NORTON. Go ahead.

Mr. RUDD. Yes, thank you, Congresswoman. With respect to the pilot program, I think what a lot of agencies are running into is recognizing how much capital is actually required for the transition, because it is not necessarily the acquisition of the vehicles or the electric buses, it really is delivering the power and the infrastructure to support those buses that is capital intensive.

So, in terms of the pilot, part of this is understanding how we can most effectively deliver power, whether it is using a portfolio of opportunities through natural gas, the normal power grid, or through green sources of electricity. And in facing the challenges of bringing capital to those projects, we see that there is an opportunity for a private-public partnership.

Certainly, there is private capital in the world that would be willing to invest in the future of America and in the future of electrification. And as you have heard, is that there is an economic efficiency through electrification compared to combustion. So I believe that there is an opportunity for private capital to get involved, to fund some of the significant expenditures that it takes to get these electrification projects off the ground and running in these larger communities.

Ms. NORTON. One last question for Mr. Santana.

Mr. Santana, in your testimony you focused on zero-emission freight trains. Now, in my district, here in the Nation's Capital, we have one of the biggest rail hubs in the country, leading to the Northeast and the Southeast. Is your company looking to apply that technology to passenger railroads, as well?

That is Mr. Santana.

Mr. SANTANA. If you could—

Mr. DEFAZIO. Respond briefly, the gentlelady has run out of time. Just respond briefly.

Mr. SANTANA. This technology is very much applicable to passenger trains, as well. The reason we have really focused on freight is just the impact and the amount of, really, emissions that we could eliminate by doing so.

Ms. NORTON. Thank you, Mr. Chairman.

Mr. DEFAZIO. Mr. Gibbs?

Mr. GIBBS. Thank you—

Mr. DEFAZIO. You are—

Mr. GIBBS. Pardon? Oh, yes, OK, thank you. I just want to reiterate the progress we are making in this country. The U.S. has already reduced emissions from 2005 by 17 percent, and we are on track to reduce our emissions from the 2005 levels by 25 percent in the next 4 years, so that is good to know. And also I hear from companies that are working to do their part.

One of my biggest concerns I have is that, Government, we don't pick winners or losers by our policy [inaudible] the market function. And with technology changing as fast as it is changing, and new technology coming on, you never know what is going to be next. And that is why I think the role of policymakers is maybe to have incentives, tax incentives, and let the private sector make the determination what technology to adopt and use.

And to go on, we talked about in this hearing the business case for climate solutions. I would hope that this committee would push policymakers to adopt those kind of—

[Audio malfunction.]

Mr. GIBBS [continuing]. To make sure that we don't have regulatory hurdles and redtape and bureaucracy that stifles the innovation and technology, because we are in an area here where it is so important to have the R&D and adopt technologies, as—economically at work.

And with that thought in mind, there has been a little bit of mention about hydrogen—

[Audio malfunction.]

Mr. GIBBS [continuing]. And fuel cells. And I would like to have someone—whichever wants to, chip in on that.

We all know—or should know—that fuel cell technology, I think, is improving pretty fast, and that it creates two products. One is electricity to run those electric motors in our vehicles, and the other is actual H<sub>2</sub>O, or water, that is actually drinkable water. And so if anybody wants to comment on where they see what is happening in the hydrogen fuel cell technology.

I would also say that anything we do, policywise, we should include everything that is on the table, and not prioritize a certain sector of energy.

So if anybody wants to chip in, like Mr. Allen on the buses, what is going on there with their fuel cells—

Mr. ALLEN. Certainly. Certainly, thank you, Congressman.

So Proterra today is exclusively focused on battery-electric vehicles. We have studied hydrogen, but today we make a transit bus that provides over 300 miles of range within 1 day. And we find that that matches up with over 95 percent of all the routes in North America today. So we believe that, as energy costs come down and as the range goes up, we believe that, at least in the transit bus world, the need for a hydrogen infrastructure won't be necessary. The battery-electric vehicles could handle that.

I don't think the same is true, as Mr. Smith said, for over-the-road class A vehicles. I think today that is probably the best application for hydrogen. But I think time will tell, as batteries themselves get lighter and have greater range, whether they will be able to satisfy the needs of the over-the-road truck, along with dynamic charging for the infrastructure.

Mr. GIBBS. Let me ask you a question on the current lifespan of batteries, what is that?

And then, do we have an issue with disposing used batteries? How big of an issue is that?

Mr. ALLEN. Yes, that is a great question. So today the Federal Transportation Authority requires our buses to last 12 years. So our battery system that we put on there will last 12 years, and will have a state of health acceptable at the end of that, as required to be able to sell. So at the end of that period of time, or during that period of time, we will swap out batteries into those vehicles.

Then the batteries still have 70 percent of their life left, state of health. So we will put them into secondary storage. This is a fleet battery system that can provide backup energy to the fleets and to the grid.

And then, ultimately, the batteries that we use are able to be taken apart. The components are able to be recycled.

Mr. GIBBS. Thank you. I just got 40 seconds. I don't know if anyone else wants to chip in on my hydrogen question. Comments?

Mr. KONAR. Congressman Gibbs, if I may, this is Shameek Konar from Pilot.

We have been looking at hydrogen quite a bit. And there have been a number of OEMs that are focused on hydrogen. The real question becomes for our over-the-road customers that are coming from, you know, L.A. to Jacksonville, the EV—the range associated with batteries and the energy density doesn't seem to do it.

So there definitely seems to be a lot of traction on the hydrogen side, especially for over-the-road vehicles, where your weight you carry has to do with how much you get paid. And we do see a lot of interest on that. And we have been exploring alternatives to provide hydrogen at our sites, if this does move forward.

Mr. GIBBS. OK, thank you. I am out of time. I yield back.

Mr. DEFAZIO. I thank the gentleman. I will just comment. I have looked into hydrogen. We have got a number of very difficult problems.

You can't put hydrogen in existing pipelines. It causes brittleness and failure. So you would have to have a totally new distribution network for hydrogen.

And secondly, of course, the question is green hydrogen. And at the moment, producing non-fossil-fuel hydrogen is not particularly cost effective, given the cost of the electrolysis and the hydrolyzers. But they are working on that technology.

With that I would recognize Mr. Larsen.

Mr. LARSEN. Thank you, Mr. Chairman. My first question is for Mr. Smith, and it is with regards to airframe or airplane modernization.

You have got two OEMs available to you. How do you consider the life cycle of an airframe, versus getting the fuel efficiency from a new airframe when you make a calculation about purchases?

And do you get caught up at some point during the life cycle of that airframe, where you are not getting the savings out of it any longer?

Mr. SMITH. Well, we have been in the midst of a major aircraft fleet modernization program for over a decade, and we have bought—I believe I am correct—187 Boeing 767s and Boeing 777s. And they were justified on the basis of substantially improved economics and operational capability. And we are confident in the aviation sector we will be able to continue to do that, where we justify new airplanes based on their life-cycle cost or their improved operating capabilities for our customers.

What we can't do, though, is to make those airplanes zero-emissions the way we can with our pickup and delivery fleet, with electrification or some of the other technologies we have been discussing for over-the-road, including electrification. So that is why we have focused a lot on both sustainable aviation fuels and natural carbon sequestration.

Mr. LARSEN. Yes, can you talk—as well, have you done any estimated fuel savings looking at the last-mile drone delivery, and is that scalable?

Mr. SMITH. The drone delivery, both vehicular and aviation, really only makes sense for same-day deliveries. The vast majority of parcels delivered in the United States—and that market, by 2023, we estimate will be about 130 million per day—the vast majority of them are moved overnight, and then delivered in a loop route during the day. So drones really only make sense for same-day delivery.

And we have an extensive effort, as I mentioned in my testimony, on a same-day surface delivery bot, which we call Roxo. You can look it up on the internet.

Mr. LARSEN. Yes, I will do that.

Mr. Rudd from AECOM, can you tell me a little bit more about the role you play in eVTOL and, specifically with regards to the subject matter today, about how eVTOL could play in congestion reduction or fuel emission reduction?

Mr. RUDD. Certainly, thank you for the question. So the work that we are doing today is working on piloting some of the programs around electric aviation. But again, these are for short haul, or what you might describe as last-mile. And the work that we are doing at the moment is looking at the infrastructure that would be necessary to build out and support a system, and then looking at the implications on the environment, the social networks, and our communities around that.

So it is really a broader study and a pilot to see how that infrastructure could be built to serve a smaller community in southern Florida.

Mr. LARSEN. All right, yes, thank you. I may follow up with you a little bit more on that.

For the gentleman from Proterra, are you making the case that, at least for bus—for transit and for schoolbuses, to leapfrog to electric and sort of skip propane and natural gas as a fuel?

Mr. ALLEN. Yes, we are. We believe that propane and natural gas are really just a bridge to electrification. Certainly, both of those technologies provide environmental improvements over diesel. But the Holy Grail is zero-emission vehicles that we get with electrification. And we believe that the technology is there today for transit agencies and school districts to move to 100 percent electrification.

Mr. LARSEN. Yes, yes. Thank you, Mr. Chair, I yield back.

Mr. DEFAZIO. I thank the gentleman. Mr. Perry is scheduled to be next. He is not back yet, so we will go to Mr. Babin.

Dr. BABIN. Thank you, Mr. Chairman, I appreciate it, and Ranking Member Graves. I want to say thank you to our witnesses for giving us your time today.

When we debate about carbon emissions of greenhouse gases, we must consider the issue from a global perspective. In order to actually decrease worldwide pollution, countries like China and India have got to be held accountable for their emissions, especially when regulations become so burdensome here in the United States that our companies are forced to outsource production to these major offenders because they have very little regulatory oversight.

So I would like to address my question to Mr. Hernick. How do we make sure that overly burdensome regulations are not forcing our domestic businesses abroad to other countries that are not playing by the same rules as we are?

And if you would answer that, I have a couple more for you.

Mr. HERNICK. Sure thing, Congressman Babin, I appreciate the question. And I think that the most important takeaway is that it is a robust and positive business environment that is attractive for American companies, and robust competition that makes possible the types of emissions reductions that we have seen, and that we need to see in the near future to be able to achieve our goals, but also maintain a competitive economy against other global interests that don't have our same interests in mind.

Very specifically, Congressman Graves, at the onset of this hearing, mentioned how the free market was able to reduce carbon emissions in the electric power sector faster than the Obama Clean Power Plan. We should remember that for the transportation sector, and assure that we are not drowning in redtape. And that is why, in the written testimony focusing on One Federal Decision, to allow businesses to get a firm up or down on whether or not their project is able to proceed, and not get caught up in years of reviews.

I spent almost 6 years doing environmental and social impact assessments. There are a lot of good people in the field. And these are experts that, given a timeline, can meet it. And we should expect that, American businesses should expect that, and the U.S. Government should be able to deliver.

Dr. BABIN. Well, we just want to ensure—and how would we—that our reduced emissions here do not just simply transfer to increased emissions around the globe to other countries that don't live by these same rules.

And do you think countries like China would implement or retrofit their industries with newer, more costly technology?

Mr. HERNICK. I can't speak for what China will or won't do. I know that the example that we had at the last Olympic Games that were in China was that they needed to turn off industry to meet the standards that athletes required, and that they were willing to lie to the globe about what their emissions were until the U.S. Embassy put air monitors on the Embassy.

So we should remember that when dealing with China. That is why we do need to focus on low-cost and a competitive environment, and we need to not foreclose on any of the options. Natural gas is a vital one.

Russia is the number-four emitter of greenhouse gases. And to the extent that we walk away from an international oil and natural gas market, that is a direct transfer of power to our geopolitical adversaries in Russia. And we should not—that shouldn't be part—we should focus on that as a part of the strategy to figure out how to deal with these foreign threats.

Dr. BABIN. Absolutely. I think in my remaining time—time and again we see the ingenuity and technological innovations that come from our private sector. I have the privilege of representing southeast Texas, which includes the Johnson Space Center in Houston. It is here that we have seen so much success in leading the global pursuit of space by teaming up with the private sector. It is critical that we continue to pursue public-private partnerships, and let our competitive market work to identify and solve solutions to our challenges.

Are there any suggestions you have on how we can modernize our infrastructure so that we could be spending our taxpayer dollars more wisely?

Mr. HERNICK. Well, sure. I think that the STARTER Act that was proposed by Republicans in this committee last year is a fantastic foundation for that discussion, focusing on strategic investments, where the Federal Government works in partnership with States so that decisions aren't being made out of Washington, DC, but are being made at the most local level possible on how folks actually get around.

This is a big country, and the transportation differences between where I am in Annapolis to your home district and how folks get around in DC varies a lot. And that is something that is important for Congress to understand. And so pursuing an approach where Federal dollars move to States, or where Federal public-private partnerships are possible is absolutely a necessary part of the equation.

Dr. BABIN. OK, thank you for that answer. My time has expired, and I will yield back, Mr. Chairman.

Mr. DEFAZIO. Thank you, Mr. Babin.

Just in response to Mr. Babin's—these are good questions about China. And the best way that I know of to respond to that would be through trade policy, where we establish standards, we meet the standards; they don't meet the standards, they pay a penalty on any goods they want to import that don't meet those standards. That is the best solution I have heard.

Mrs. NAPOLITANO?

Mrs. NAPOLITANO. Thank you, Mr. Chairman, for holding this very important hearing to discuss innovative policies that address the climate change.

And I was particularly appreciative of the quote you made following your meeting on infrastructure with President Biden. You said, and I quote, "We are still living off the legacy of President Eisenhower to the detriment of our safety, our economy, our communities, and our environment. It is time to get out of the 1950s and move forward on a transformational infrastructure bill that puts millions of people to work building the infrastructure of the 21st century and beyond, all while putting our country on a path toward zero pollution."

Thank you for working with me last Congress on a provision that I have been fighting for since the last FAST Act that would allow electric vehicle charging stations at park-and-ride rest areas.

My district is home to the largest transit station on the west coast, called the El Monte Transit Center. Because FHWA has determined the transit center is on the highway, the 2,000 parking spaces are not allowed to have electric vehicle charging stations. This is a problem throughout the country, including the Greenbelt Metro park-and-ride station 3 miles north of the Capital.

The question is for Ms. Giammona. The State of California has major plans to work with PG&E and other utilities to implement electric vehicle charging stations. But the prohibition on EV charging at many park-and-rides and rest areas has been a major challenge. Should Congress allow EV charging at park-and-ride and rest areas?

And would this help expand EV charging deployment and reduce range anxiety?

Ms. GIAMMONA. Congresswoman, thank you for your question. We have been working with the State of California to implement charging at State parks, at community centers, at schools, and within Tribes. We believe that Federal policy and enablement of charging infrastructure where consumers and customers actually want it will be beneficial for all of the Nation's consumers that will help to eliminate range anxiety.

But we believe it—

Mrs. NAPOLITANO. What have you—

Ms. GIAMMONA. We believe it is in partnership.

Mrs. NAPOLITANO. OK, thank you very much.

Mr. Allen of Proterra, I have visited the factory in the City of Industry. You are in my area.

Mr. ALLEN. Yes.

Mrs. NAPOLITANO. Thank you for testifying. I was very proud to have you and the company in my district. And some of your fast-charging buses are already in Foothill Transit, which is in my area.

What have been the challenges to EV bus deployment?

Are there additional challenges working with local bus operators on this new technology, and how do you address those challenges?

Mr. ALLEN. Great, thank you for the question, Congresswoman. And we are very proud of our relationship with Foothill Transit. They were the very first deployment of electric buses in this country with Proterra, back in 2010. So they are certainly on the absolute leading edge of this technology.

The challenges, I would say, are no more different than the challenges of any new technology. It just takes patience, and it takes time, and it takes a collaboration between the manufacturing and the supply base, the infrastructure people, and the agency. But we continue to progress with Foothill Transit and with other transit agencies around the country.

Mrs. NAPOLITANO. But what are you going to do about the challenges of working with the local bus operators on the new technology?

Mr. ALLEN. Well, training is certainly paramount. We have a relationship today within our facilities with the United Steelworkers, where we provide training in partnership with the Government. We focus on people of color, women, and formerly incarcerated people, to become employees within our facility. And we are very proud of that program in a public-private partnership.

Mrs. NAPOLITANO. That is wonderful. There are many things that I would like to see changed, and that would take a long time to try to get to them. But I think that training of employees, getting people to buy more electric cars—but if they don't have a place to charge them, they are not going to buy them.

Mr. ALLEN. Right.

Mrs. NAPOLITANO. So we have to work in tandem with that policy, plus all the other aspects of it.

Mr. ALLEN. We agree 100 percent, and we are happy to follow up afterwards with you and your staff on more things we can do together.

Mrs. NAPOLITANO. Thank you very much.

Thank you, Mr. Chair, I yield back.

Mr. KONAR. Mr. Chairman, if I—

Mr. DEFAZIO. I thank the—

Mr. KONAR. If I could just add a comment to the Congresswoman's question?

Mr. DEFAZIO. Very briefly.

Mr. KONAR. Yes, sir.

Mr. DEFAZIO. Very brief.

Mr. KONAR. I think charging at park-and-rides makes a lot of sense.

I think one thing I would request the committee to consider is, as we go into EVs, the whole charging experience changes. You have gone from 2 minutes to fuel a car to 40 minutes or 30 minutes to charge your car. And when we look at public rest areas, those 40 minutes, if you can keep people more engaged, give them more things they can do like you get at our travel centers, or that you get at the retail stops, where you can eat, you can shower, you can do other things, I think it will only help adoption of EVs. And I think we have got to keep that in mind, because if you are stuck for 40 minutes in some place, and it is not very well trafficked, it doesn't have—

Mr. DEFAZIO. OK—

Mr. KONAR [continuing]. Amenities, it will be a challenge.

Mr. DEFAZIO. Yes, OK. I thank the—

Mr. KONAR. Thank you.

Mr. DEFAZIO. I thank the gentleman. Yes, I was just commenting with Mr. Larsen. Our rest areas in Oregon are pretty ratty, and people aren't going to want to hang around there. They are going to want to go someplace where there is a restaurant or something else for 25 or 30 minutes to recharge. California is pushing that hard. We will see how we deal with it in the bill.

So now we are back—Mr. Perry is still not here, so Mr. Graves from Louisiana.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman. Mr. Chairman, the first question I would like to ask is for Mr. Lewis and Mr. Rudd.

In 2018 we made extraordinary progress on a bipartisan basis to advance resiliency measures to make investments in the resiliency of our communities, by ensuring that disasters are rebuilt in a way that builds in a standard looking toward the future and more resilient infrastructure, more resilient communities.

You both have advocated for more resilient infrastructure, but can you talk about some of the regulatory challenges or obstacles that prevent us from doing that, or perhaps even tailoring a regulatory structure such as NEPA to the type of investments we are making, like green infrastructure investments that actually benefit the environment?

Mr. LEWIS. Yes, I can certainly start.

The first one, on the issue of the resilience measures and mitigation, we basically have to be able to look at future conditions that are going to be very different than the conditions that were around when we wrote the current regulations, the current standards, building codes, and even some of the tools that we use, technically. They have all changed. So we need to be able to project ourselves

into the future, understand not just the physical conditions, but even the users of the future, how they might change.

We see things changing, for example, in the vehicle usage in the sense of automated vehicles that will change even the use of parking garages and things like that. So first we need more flexibility in our regulations and in our codes and standards that allows for that kind of future look, and for more agility and adaptability.

I think, in terms of regulations like NEPA, the problem is the open-ended timeframes. The private sector, in particular, and especially the innovators, tend to be most frustrated, and sometimes even put out of business by the open-endedness of some of the timeframes that occur.

So if the legislation and rulemaking and policies can all build some more hard deadlines and timeframes into the process, or give incentives, find ways to make it more predictable, because that is what is really holding back a lot of the deployment of new and innovative ideas and technologies, because—

Mr. GRAVES OF LOUISIANA. Thank you, thank you. I want to make sure we have time for Mr. Rudd to answer the question, as well, please.

Mr. RUDD. Yes. So building on what my colleague said, one of the things that we look at when we look at the construction of infrastructure is we look at cost. So usually, the elements of a bid for infrastructure are pre-defined, and our bid models that we use look at cost.

What they don't look at is they don't look at sort of the probability-weighted cost. Even though a climate event may be a low probability, the impact of it is very significant. So we need to think more holistically about the cost model, and how we actually rate or include resiliency, and the—some low-probability outcomes in that.

My suggestion would be to allow for nonconforming bids, moving forward for infrastructure, so that people can include innovation, and they can include resiliency and build a business case for it that may go beyond the current standards that we have for bidding projects and infrastructure.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Rudd.

Mr. SMITH, I would like to ask you a quick question. You talked about how your company is voluntarily setting a standard for 2040. I just want to be clear. Is there any Government mandate or anything that you are being coerced to do this, or is this just a decision by the company?

Mr. SMITH. The latter.

Mr. GRAVES OF LOUISIANA. OK, thank you. And the next question is, if we are operating, obviously, in a global environment—as Mr. Crawford mentioned earlier, for every 1 ton of emissions we produce in the United States, China has increased by four. They have increased by four, resulting in a net increase in global emissions. And including under the Paris Accords, this is allowed.

How do we, from an economic perspective, move forward on this?

How do we establish a social cost of carbon whenever other countries' actions we have no control over, and they are being irresponsible?

So how do we value that, as we look to a free market solution, moving forward?

Mr. SMITH. Well, I think one of the most promising areas is what Chairman DeFazio mentioned that you might consider, a border adjustment taxation, where, if goods come into the United States that have not improved their carbon footprint, there is a tariff on them.

And on the other side of the coin, we should have some sort of adjustment on our exports out from the United States when we have improved. The border adjustment tax is something that was carefully considered a few years ago. But if you combine it with carbon emissions, you could probably achieve the goal that you want, which is to incentivize foreign folks to do the same thing that we are doing.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman. I do want to make a note, with a border adjustment tax you are disincentivizing or making the U.S. economy less competitive. It would need to be globally adopted. And I don't support that—

Mr. SMITH. Mr. Graves, I don't agree with that, and I supported the TIACJ, and I think the biggest impediment we have to being export competitive is that we compete with people who have a value-added tax. And because of the historical trade agreements, we can't deduct our corporate income tax, and they can deduct their VAT. The VAT, adjusted on the outbound, would help our exports.

I would be glad to sit and talk to you about this, but I think it is a positive for U.S. exports.

Mr. DEFAZIO. I thank the gentleman for his question, and I thank Mr. Smith. I have raised that issue about the fact we can't give an adjustment for our income tax, and they have the VAT. And we agreed to that in the 1950s, when we made everything in the world. We don't care what they do. Who cares? They are going to buy it from us, anyway.

This is a different era. And I have talked to every trade representative about that. And they go, "Oh, yes, I hadn't thought about that."

I said, "well, you have got to change that, or we are going to continue to lose market share."

With that, Mr. Cohen.

Mr. COHEN. Thank you, Chairman DeFazio.

Mr. Smith, you were talking in your introduction about the length of trucks, and how maybe that could help with safety and with fuel economy. Would you go into more detail on that?

Mr. SMITH. Well, there are about 3¼ million trailers in the United States. The vast majority of them are 53-foot trailers. They are the type that are operated by the truckload carriers, where you pay by the mile: Swift, Schneider, J.B. Hunt, and so forth. There are about 300,000-odd so-called twin trailers, where they are 2 trailers together, articulated. They are used by parcel and LTL, or less than truckload carriers. There are only about 300,000 of them in the country.

So if you extended the length to 33 feet, we would save about 225 million gallons of fuel, reducing emissions, take lots of vehicles off the road. They are safer. We operate them every day in many parts

of the country. We have been operating them for years. For instance, in Florida they are more stable, and so we would advocate for that, and have been for years.

Mr. COHEN. The issue that people bring up when they talk against it is safety. Florida is pretty flat. You can go straight down from Tallahassee to Miami, and there is no mountain, there is no turn. Do you all have experience with these around mountainous areas, like east Tennessee, or some other places?

Mr. SMITH. Well, I don't think that the inherent safety of the 33-footers versus the 28-footers changes, based on the topology that we deal with. I would just say, Congressman, every meeting at FedEx begins with safety, above all. It is the centerpiece of our corporate strategy and our corporate philosophy. So we would not be advocating these if we did not believe that they were safer—not as safe—but safer. They are more stable, and they take thousands and thousands of trucks off the road, which improves safety by reducing the absolute number of accidents.

Mr. COHEN. Now I am going to ask you about two other futuristic things FedEx is looking at. One of them is the drones, and you all have worked with the FAA and the Memphis International Airport on some drone research.

How do you see drones, and then Roxo, which is the little robots, and—you know, I would have probably given you a failing grade on [inaudible] on FedEx, because I don't see the future as well as you do. How do you see Roxo and drones really integrating into the daily lives of people?

I mean, are you going to put a Roxo out at Oak Hall, and let them take delivery at East Memphis? Or how is that going to work?

Mr. SMITH. Well, as I mentioned a moment ago, the biggest parcel market is the parcel market where people order something off the internet and get delivery overnight. And in 2 days those items are transported overnight, and then they are put on route delivery networks during the day. That is what we do with 150,000 vehicles around the world.

There is no way that an aerial drone or a drone like Roxo can compete with a truck and an efficient driver doing that. But for same-day, let's just say a pizza, which we all get from time to time, when you order a pizza you have a driver that is driving a 2,500- to 3,000-pound car, delivering a 2-pound pizza. That is something that Roxo can do at a fraction of the emissions, and a fraction of the cost. So it is the same-day market for aviation drones and surface drones that have huge environmental and safety implications.

Mr. COHEN. Well, my question is—and I am just missing this—how does Roxo get to Pete & Sam's? Does FedEx have to take Roxo out there and drop it off, and then it goes around Park Avenue and the—

Mr. SMITH. No, Roxo is so cheap. Think about it like the parking lot at Target, where you walk outside with your shopping basket. So Target would have the Roxos there. And when you order something from Target, a prescription, the Target people simply put it in Roxo, it goes to your house, you take it out, it goes back, and then is reused again over and over during the day.

Mr. COHEN. So Roxos are all going to be out there in the field. They are not going to be out there at a central FedEx location. They are going to be more where the retail is.

Mr. SMITH. Exactly. They will be located at the origin of the demand. And then, when you order something, within a few minutes, Roxo, with virtually no fuel expended—certainly no traffic in your neighborhood of a 3,000-pound car delivering a prescription or a pizza—will come, and you will take it out of the device, and it will go back to its point of origin. Its average delivery radius will be probably about 3 miles.

Mr. COHEN. In 2006, you joined a group of—

Mr. DEFAZIO. Steve?

Mr. COHEN. Is my time up?

Mr. DEFAZIO. Yes, sorry.

Mr. COHEN. With that, I would yield, and go Falcons.

Mr. DEFAZIO. Mr. Bost?

Mr. BOST. Thank you, Mr. Chairman.

Mr. Konar, in your testimony, you talked about the fuel retailer's perspective on offering EV charging. It has been the private sector who has led the way in the electric vehicle innovation.

You mentioned that the fuel retailers are agnostic about the type of fuel they offer. Can you please expand on how companies like Pilot and smaller independent fuel retailers can help with providing the EV with making it economically viable?

Mr. KONAR. Thank you, Congressman Bost. So let me start by first saying the fuel retailers' goal was really to serve what our customer wants. Right? So we are highly focused on providing the service that our customer is looking for. And I will give you a great example, and then I will talk about how it could work in this case.

About 10 years ago, biodiesel and biofuels were definitely not something that were economic and were available in the market. And, you know, our customers didn't want it. Through the correct market incentives and public policy, what the Federal Government enabled us to do was actually provide cheaper biofuels to our customers, which has led to significant adoption of biofuels.

So, for example, Pilot next year or this year should probably sell about 11 billion gallons of fuel. And we are going to sell 1 billion gallons of biofuels, which is a combination of ethanol and biodiesel and renewable diesel and so on, which has a significantly smaller carbon footprint, and does something about it now at scale, right, which is equivalent to taking 1 million cars off the road.

So the way we think about it is we have to get our customer comfortable with going into the EV market. And there are three legs to that.

One is the cars should be cost competitive, and we are getting there. We are getting there very rapidly with the amount of focus there has been on batteries and the EVs.

The second is the functional experience should work. As Mr. Smith talked about the longer trailers, the functional experience from the car should work, and I think they do.

So the third part we need to solve expediently is basically how to deal with range anxiety, and provide a fueling experience that is safe and has additional attractions for our customers, and does not force them to change habits. And we are able to do that, and

we are fully willing to do that. But today the economics, just like in the adoption of biodiesel in the beginning, or in the adoption of solar power or wind generation, are very challenging for us to invest and be able to do that effectively.

So I think the way we can really enable this is get some support from the Government, not just for us, but also for the utility sector, who has to provide the green power. Because if you are burning coal to sell to charge EVs, we are kind of destroying the whole objective of this.

But, really, support the utility sector and support us, so that we can provide the right customer experience, and they can provide us the power. And then we can kind of eliminate that third issue we are dealing with, which is range anxiety. Hopefully I answered your question.

Mr. BOST. Yes, you did. Thank you.

Ms. Giammona, are there any technologies or R&D that is needed to reduce the cost of EVs, or to ensure that the grid can manage the new load?

[Pause.]

Mr. BOST. That is for Ms. Giammona.

VOICE. PG&E.

Ms. GIAMMONA. Thank you. Congressman, thank you for the question.

Yes, we do believe and support R&D to really help support the grid, nationwide. We are now having to operate the grid in a bidirectional fashion. So we think there are opportunities, both from an R&D perspective to support the grid, as well as support and enhance vehicle adoption and support for what consumers need.

We think there is an opportunity for the vehicle, as my colleague from Proterra mentioned, to become a battery storage. And we have been in trials with BMW and others to look at the second-generation batteries and what they might do to help grid stability and operate as a battery.

We also think there is an opportunity for electric vehicles to play a role in household resiliency in times of natural disasters, and that is vehicles with inverters. And we think that R&D at a Federal level could really help to accelerate the development in these areas.

Mr. BOST. Thank you——

Ms. GIAMMONA. Thank you for the question.

Mr. BOST. And just one real quick question for Mr. Smith, now that I am down to a few seconds. Is that the Eagle, Globe, and Anchor on your tie?

Mr. SMITH. It is, indeed. I served in the Marine Corps in 1966 to 1970.

Mr. BOST. Semper Fi.

Mr. SMITH. Semper Fi.

Mr. BOST. Thank you, and I yield back, Mr. Chairman.

Mr. DEFAZIO. I thank the gentleman.

Mr. Sires?

Perhaps he had to step out.

VOICE. He is on.

Mr. DEFAZIO. Oh, is he?

Mr. SIRES. I am.

Mr. DEFAZIO. All right, go for it.

Mr. SIRES. Can you hear me?

Mr. DEFAZIO. Yes. Speak up.

Mr. SIRES. Mr. Lewis—well, first of all, Chairman, thank you for this hearing. It is very interesting, very informative. And all the witnesses, thank you very much for taking the time to be with us and informing us.

Mr. Lewis, in your testimony you note data showing that each dollar spent on infrastructure risk mitigation and climate adoptions makes itself back at least four times over. Can you speak to the impact—

[Audio malfunction.]

Mr. SIRES [continuing]. Current and future?

And here is what I am talking about. I see all these tornadoes in the Midwest destroying everything, and they seem to rebuild them the same way that they were built before, not as resilient as it could be for the future weather. I know the Obama administration tried to do something about it. But, you know, I just don't get it.

The other issue I will tell you is in New Jersey, we had this Sandy storm which caused about \$30 billion in economic losses and damages. Basically, all along the beach, all along the shore. Yet people still want to build right next to it, and build the same way. So can you talk about how we change that attitude?

Mr. LEWIS. Yes, thank you for the question.

On your first question, the problem really stems from the Stafford Act, which has been around for decades. When FEMA responds to a Presidentially declared disaster, it is written in that the Public Assistance funding cannot be used to change what was there before. It basically incentivizes building the same thing back again, despite the fact that it is now proven that that element of infrastructure is susceptible to failure and damage when a disaster occurs.

So legislation needs to be created, either by just modifying the Stafford Act, or by overriding it in new legislation that allows for the evolution of the building back after a disaster to include these ideas that will make something better. By just an incremental 2-percent increase in the cost, you can then make it so that the next time the same disaster comes, it won't have the same disastrous impact.

As far as your question on building back in places that are proven to be susceptible, like the Jersey Shore, which, by the way, I lived at the Jersey Shore for over 10 years—

Mr. SIRES. People want to live on the water. They want to live—

Mr. LEWIS. Yes, exactly, exactly. And I think there are only two answers to that. Either you need to incentivize people to go elsewhere, which is very difficult, in this country in particular, but there are some programs that do that by paying a fair price to properties that are in vulnerable areas where people may be sick of having to rebuild after multiple floods. Or you need to build resilience.

And there are nature-based solutions, putting natural reefs or other breakwaters, using smart biodiversity-type solutions, like we are doing off of Staten Island, for example, which was a Sandy-funded mitigation. And these are good ways to protect from the storm surge that occurs. So there are solutions that make places safer if you can't, in fact, relocate people.

Mr. SIRES. Thank you.

I was just wondering about electric locomotives and hydrogen fuel cells, locomotives. Can somebody talk to me about that?

I know some of the railroad companies are looking into a lot of these electric locomotives. Can anybody talk a little bit about that?

[No response.]

Mr. SIRES. Anyone, take a shot.

[No response.]

Mr. SIRES. No takers? Is it good, or is it bad?

Mr. KONAR?

Mr. KONAR. Sir, I live in the world of trucks, but I will attempt to answer your question.

Mr. SIRES. Oh, OK, well, somebody—

Mr. KONAR. I do think, subject to what the chairman said, provision of hydrogen through non-fossil-fuel-based hydrogen becomes a challenge. But I think in locomotives you actually have the ability of doing that, because you are more centralized in where you fuel, as opposed to trucks, where you are fueling all over the country.

So I think it is a problem that is solvable, but I will be honest, I have not looked at the economics on the locomotive side, and the power—and the hauling side, as I have looked on the trucking side of it.

Mr. SIRES. All right. Well, I don't have any more—

Mr. SANTANA. Can you repeat your question, please? It is breaking up.

Mr. SIRES. Yes, I was just wondering about hydrogen fuel locomotives—

Mr. SANTANA. Representative, can you please repeat your question?

Mr. SIRES. Yes, I am—you can't hear me?

Mr. SANTANA. Representative, can you please repeat your question?

Mr. DEFAZIO. Albio, you are out of time, I am sorry. OK.

Mr. SIRES. OK.

Mr. DEFAZIO. Mrs. Steel?

Mrs. STEEL. Thank you very much, Mr. Chairman, and thank you for all the witnesses coming out today. We have—

Mr. SANTANA. Representative, can you please repeat your question?

Mr. DEFAZIO. Your microphone is on. Please shut off your microphone.

Mrs. Steel?

Mrs. STEEL. We have heard from many experts today that market-based innovation is working successfully.

In Orange County I have many local, small, mid-sized, and large companies voluntarily achieve carbon-neutral status. California companies are proactively investing in plans to cut carbon emis-

sions without additional regulations being enforced by Government by any level.

We must be careful when we talk about creating new taxes or shifting our tax code. We have said many times that heavy-handed mandates only cause more confusion and burdens. The Government is not good at picking winners and losers. The Federal Government must allow for flexibility, and we must eliminate barriers to major infrastructure projects by streamlining permit and modernizing the environmental review process.

VOICE. Hopefully you can hear me, Mr. Representative.

Mr. DEFAZIO. Hold on. She is making a statement. I don't know who is talking. It is her time.

Mrs. STEEL. I want to ask Mr. Lewis the question, what hurdles have you encountered as project manager for the California high-speed rail project?

Have California's environmental regulations been easy to abide by, since California has much harder regulations than any other State?

Mr. LEWIS. Yes, we have been able to work with the California High-Speed Rail Authority in a case-by-case basis to evaluate the different opportunities for sustainability and resilience elements within the program. And each one can have its different challenges, especially with regard to anything that has air emissions associated with it, because of the very stringent rules on air emissions in the State of California. So that is where you see the biggest challenges.

But luckily, a lot of the sustainability and resilience elements that we are building into the program don't involve the emissions. And so the regulatory hurdles are easier to deal with. But it really is a case-by-case basis. And you have to be willing to think outside the box, and really address each of the challenges with their own set of requirements and timeframes.

Mrs. STEEL. As you may know, the California high-speed rail project had its Federal funding terminated in 2019 for failure to comply with the grant terms, and failure to meet deadlines. Do you believe it is right for taxpayers to continue to fund the California high-speed rail project?

If so, what is the WSP's plan to fix this project, going forward?

What has changed about the project in 2 years to warrant more Federal funding?

Mr. Lewis?

Mr. LEWIS. I apologize. For some reason I couldn't hear you until the last 5 seconds there. Can you repeat the question?

Mrs. STEEL. Do you believe it is right for taxpayers to continue to fund the California high-speed rail project?

If so, what is the WSP's plan to fix this project, going forward?

What has changed about the project in 2 years to warrant more Federal funding?

Mr. LEWIS. Well, we are working through all of the different elements of the program, which is broken into different sections, of course. And each one has its own issues and challenges. So we are taking them in partnership with the California High-Speed Rail Authority, piece by piece, issue by issue. And we are coming up

with solutions that absolutely justify the project going forward, in our opinion.

Mrs. STEEL. But it has been already failed for all the deadlines and all the agreements. So you think that moving forward you are going to meet other deadlines, and will you need another Federal funding?

Mr. LEWIS. Well, yes, again, each issue has its own path to solution and timeframe. There have been some challenges that have been taken on, and have been evaluated, and coming up with the solutions in partnership with the High-Speed Rail Authority. So, yes, we feel like we can move forward in a very effective way.

Mrs. STEEL. Mr. Chairman, I yield back.

Ms. DAVIDS [presiding]. Thank you. The gentlelady yields. We will go to Mr. Johnson next.

[Pause.]

Ms. DAVIDS. OK, it looks like Mr. Johnson might be voting. We will go to Ms. Titus.

Ms. TITUS. Thank you very much. Yes, I represent the Las Vegas Valley, and we're thought of as lots of neon signs and glitz and glamour. You don't think of us necessarily as being out front when it comes to climate change, but that is really not accurate. We have a lot of LEED standard gold buildings. MGM Resorts has said they want to slash their carbon emissions in half by 2030. Big developments of solar power throughout the Las Vegas Valley. Steve Sisolak, our Governor, is trying to have the State meet the Paris Agreement standards.

And also, we have a State senator, Chris Brooks, who has introduced a bill that would require a \$100 million investment in EV charging infrastructure. And an interesting part of it is that 40 percent of that infrastructure has to be built in historically underserved communities. So I would like to go back to that EV infrastructure issue a little bit, and ask Mr. Konar to talk about this.

I support President Biden's efforts to invest in this, and his goal of a half a million new charging stations. We need this infrastructure available along I-15 that connects us to California. You have a couple of service stations and facilities along that road. If I-11 is built between Las Vegas and Phoenix, that would be another perfect place for this. I wonder if you could talk some more about the public-private relationship for establishing these stations, and also what we can do to be sure that they are built in some underserved communities, not just in more affluent neighborhoods.

Mr. KONAR. Thank you. Thank you very much for the question, Congresswoman Titus.

So I would like to kind of answer this in two parts. One is your point about building infrastructure on highways. From my perspective—and that is what I am way more qualified to speak on, because that is what we do—our focus there is reducing range anxiety. At Pilot right now, we have 58 charging stations, some of them actually in Arizona and in west Texas and up in Washington.

And as we looked at the data from these charging stations, what we have been seeing is that our utilization rates at these charging stations are way less than 1 percent. So, if you build a piece of infrastructure and it is being used less than 1 percent, as a fiduciary to your shareholders, it is very challenging to make that case.

So I think the Federal Government coming in and assisting us, especially during these early days, where I don't doubt if you were talking 10 years from now, that utilization number would be very different. But we need to incent the customer to drive and to charge. So we want to put that out there, because it is the chicken and the egg problem that we are suffering from. If there are no charging stations, people don't buy EVs and people don't go ahead and travel.

So we really—both us and the utility sector, I think, could benefit from getting help from the Federal Government in these early days, so that we get adoption and we get to critical mass.

To your second question, as it relates to inside the cities, that is a little bit of a different kind of issue. And maybe the lady from Pacific Gas and Electric could give you a better view on that. But in terms of highways, I think we can definitely make this work, and we definitely need some help from the Federal Government, as do the utilities, to get the infrastructure to us.

Ms. TITUS. Well, thank you. And I will ask her, but I would think there would be a demand for it along those—I-15 is just such a busy corridor. And then all our hotels welcome so many driving travelers from California, you would think there would be some incentive to put them there.

Mr. KONAR. We are exploring everywhere. We are exploring partnerships with people. And I have been just as surprised by the data as you are right now. In fact, in preparation for the hearing, I pulled data from our stations, as well as one of our partners out in Utah, and we are both at less than 1 percent. And it makes the economics very challenging right now.

But I do think range anxiety—I will just cite a study done by Morgan Stanley. They polled a lot of EV owners, and range anxiety—almost 50 percent of the people who would potentially buy an EV said they wouldn't buy them because of range anxiety. So we do need to solve that.

Ms. TITUS. Thank you. Anybody else want to comment?

Ms. GIAMMONA. Congresswoman, I really appreciate the question. I would offer that, in California, what has really helped the California utilities, in partnership with our commission and State regulators, we have focused goals on disadvantaged communities. So our programs and incentives are focused on meeting specific targets to ensure we have charging infrastructure built in—

Ms. DAVIDS. Ms. Giammona? Ms. Giammona?

Ms. GIAMMONA. Yes?

Ms. DAVIDS. Do you mind if we maybe come back to the remainder of the question? The gentlelady's time has expired.

Ms. TITUS. Well, thank you. Maybe we can be in touch, and I can learn more about it.

Ms. GIAMMONA. That is great. I am happy to follow up with you.

Ms. TITUS. Thank you.

Ms. DAVIDS. Mr. Stauber is recognized for 5 minutes.

[Pause.]

Mr. STAUBER. There you go. Now it is on. Thank you, Madam Chair, and I appreciate the witnesses. A few questions.

Mr. Allen, for your electric vehicles, what country are the minerals like copper, nickel, and cobalt used in your batteries and computer systems sourced from?

Mr. ALLEN. The battery cells that we get today are from Korea. Nickel, cobalt, and magnesium are the main ingredients. But I am afraid I don't have the information with me about where our supplier sources them.

I do know that all of the suppliers that we deal with are in compliance with the OECD due diligence requirement around conflict minerals. So we—you know, we do have—

Mr. STAUBER. Yes, Mr. Allen, I would like to inform you that most of the minerals come from the Congo and China. And does the Congo, Mr. Allen, does the Congo and China have better or worse labor and environmental standards than the United States?

Mr. ALLEN. I think an obvious answer to that question is that they don't, sir. But, as I was saying, we do work with the suppliers that we have to ensure that they pass the due diligence guidelines, that they are not buying products that violate human rights in our supply chain.

Mr. STAUBER. And again, the Congo and China do not have the environmental and labor standards the United States does.

My next question, Mr. HERNICK, what are some of the global environmental benefits to mining and sourcing critical minerals in the United States, as opposed to foreign countries with little to no environmental standards?

Mr. HERNICK. Well, Congressman, this is a values question. This is what do we stand for, as Americans, and for Americans, we stand for pride in our work, and human rights, freedom of speech, freedom of expression, freedom of assembly. And these are rights that we have that a lot of the countries that you are talking about—China and DRC, in particular—they don't have.

So when we are doing business with these countries and sourcing materials from them, we are supporting regimes that undermine American interests, very specifically. And—

Mr. STAUBER. Mr. HERNICK, would you agree that, if we purchase critical minerals mined in the Congo and China, especially in the Congo, there is child labor, forced child labor, to mine, for instance, the cobalt?

Mr. HERNICK. We know that. And, as the father of four daughters, that makes me very uncomfortable, and it is one where we need to be open to all-of-the-above approaches to solving the climate problem, and sourcing minerals, and looking in our own backyard, and not being afraid of fulfilling our high environmental and labor safeguards, and utilizing the resources that we have in our own country here.

Mr. STAUBER. And I think that all the witnesses and members of the T&I Committee know that, in northeastern Minnesota, we have the largest copper nickel find in North America. At least one company is in its 19th year of permitting and fighting court battles. We have the best environmental and the best labor standards in the world. The northeast Minnesota corridor, the Iron Range hosts the Duluth complex of this copper nickel find. We do it best. And I would suggest that we put a lot of effort into mining manufacturing be brought back to the United States.

Mr. Chair, it is clear that the committee has heard today that we have found the climate solution that also has a great business case. We can mine our critical minerals in the United States, we can refine these minerals in the United States, we can extract and transport our fuels in the United States, and bring back building and manufacturing items of importance into the United States using the best labor standards and the best environmental standards.

Nobody does it better than the United States. And the best part of all this is that we are following our labor and environmental standards. We emit the least amount of carbon when we environmentally source it right here, in our country. And northern Minnesota and the Iron Range stand ready to source these materials in an economically pristine and friendly way.

Ms. DAVIDS. The gentleman's time has expired.

Mr. STAUBER. I yield back.

Ms. DAVIDS. Mr. Huffman is recognized for 5 minutes.

Mr. HUFFMAN. Thank you. I want to thank the chair for a great hearing.

It has been suggested by some, though, that just because we have begun to reduce emissions over the past decade, that we are doing just fine, and we should just pat ourselves on the back and continue business as usual. I wish that were so. But the truth is we are not doing great. We are on track to lose this climate fight if we don't dramatically change course.

And just because we are finally starting to reduce emissions doesn't mean that we didn't put most of those greenhouse gases up there over the past century. And we are still one of the world's biggest greenhouse gas polluters.

So the truth is we are playing catch-up here. We are running out of time. And we can't indulge fantasies or invitations to slow down, or rest on our laurels, or otherwise continue fossil fuel business as usual.

Let's also not pretend that we have to be in some race to the bottom competition with Russia for sales of fossil fuels. Nothing threatens Russia's geopolitical influence like changing the paradigm to clean energy, where they can't compete with us or anyone else.

So with that, I want to ask a question to Mr. Smith from FedEx.

I very much appreciate your commitment to a zero-emission fleet by 2040. And you are doing this without waiting for Congress to pay for your infrastructure or your fleet transition. As a businessman, you have looked at total cost of ownership and efficiency, and you have concluded, from a business perspective, that a rapid transition to electric vehicles is the smartest move.

So fast forward—

[Audio malfunction.]

Ms. DAVIDS. The gentleman shall suspend. It seems as though we might be having some technical difficulties, Mr. Huffman. We are having a hard time hearing you.

And Mr. Smith has left the hearing, and won't be returning.

[Pause.]

Mr. HUFFMAN. Madam Chair, if I could get a little credit on time, and maybe come back to Mr. Smith, I will move on to my other question.

Mr. DEFAZIO [presiding]. Jared, unfortunately, I announced at the beginning he would have to leave in 2 hours, and he stayed longer than that, so he is no longer available.

Mr. HUFFMAN. Well, darn. I thought I had a pretty good question for him. Let's go to PG&E, Ms. Giammona, and I hope I will get a little break on time, since I missed out on Mr. Smith.

But California is, obviously, on its way to a 100-percent clean electricity portfolio. That is exciting. We are leading the way on vehicle electrification. And so the move to EVs won't just reduce tailpipe emissions. It is going to be clean, all the way around.

But we are also struggling to have a grid that avoids rolling blackouts, that doesn't spark wildfires. We are not alone. Clearly, Texas has huge problems. It will need to make a bunch of investments in its grid. Obviously, today, in many parts of the country, our grid is not ready for millions of new EVs adding all of that load. But we are planning for the future.

And I want to ask you, will the grid be ready?

What gives you confidence that our grid will be able to handle all these EVs in the next decade or two?

And what Federal policies would maximize your confidence that we can get there?

Ms. GIAMMONA. Congressman, thank you for the question. As you know, we are making significant investments in California in PG&E's grid with our system hardening, our undergrounding projects, and, really, in an attempt to modernize the grid to withstand the climate changes that we are experiencing in California, but, more importantly, be ready to adapt for new and cleaner technology that customers want and need for the future.

So I feel very confident in California. We are working very closely with our regulators, our policy makers, and I really see this as a concerted effort. It is not one utility, it is the utilities in partnership with good policy and strong regulators in the State.

As we think about it more nationally, we are working in partnership with all of the utilities through Electric Edison Institute and EPRI to really ensure that we are taking advantage of the best technology R&D resources out there to modernize the grids.

But we are an infrastructure company. We planned that infrastructure. And I think working with third-party markets, working with customers, and really understanding what the future of energy is going to look like, coupled with strong policy, strong R&D, and strong support from the Federal Government, we are going to be ready for this.

Mr. HUFFMAN. Thank you, I yield back.

Mr. DEFAZIO. I thank the gentleman.

Mr. Burchett?

Mr. BURCHETT. Thank you, Mr. Chairman, and I appreciate you bringing these folks to us.

Mr. Konar, many folks think of Pilot Flying J as just a gas station company. Can you talk a little bit about some of the other parts of Pilot's business, particularly the biofuels program and the low-carbon fuels?

Mr. KONAR. Yes, sir. Thank you. Thank you very much for the question.

What I would say is, I would say Pilot Flying J is a customer service company. Our goal is to provide the on-highway drivers who have just been amazing heroes through the pandemic, as they continue delivering goods and services, and today vaccines, as Mr. Smith talked about FedEx. Our goal is to support them in whatever way we can.

And in addition to that now, Pilot Flying J has also become a center for the four-wheel customer, the gas customer that is driving on the road.

So our goal, as Pilot, is to be a customer service-oriented company and deliver to the customer what they want to buy, where they want to buy it, and at a price that they are willing to pay.

So, when we talk about renewable fuels, and when we talk about reducing carbon footprint, I think the public-private partnerships that we have talked about during this hearing, as well as partnerships between Pilot Flying J and the utilities, would be a great solution to go ahead and reduce carbon footprint for the transportation sector. Because the utilities need money today in order to help their infrastructure.

As we discussed, it is not just the EV pressure that is going to hit the utilities infrastructure. Remember, we are trying to green the whole country. And the utilities are the ones that provide power. We change industrial processes, we change boilers, we change everything. The utilities have to get the green generation and deliver the power to us. So they need help. We need help in order to get us going, because at Pilot Flying J, we are in 44 States, we have got 1,000 locations around the country.

So we can actually step in there and say—and our retail dealers work with us—“You can drive an EV from L.A. to Jacksonville and not have to worry because every 100 miles I can get you food, I can get you Wi-Fi, I can get you fuel, I can get you a shower, I can get you an ATM machine, whatever you need.”

And I think this kind of gets lost in the mix when we talk about things like rest areas, and when we talk about trying to develop new infrastructure. Our goal, as a country and as a community, should be to leverage what is already in place, make it attractive for the customers so that they step in and start demonstrating the behaviors we want them to, and then use all our public funds to basically bridge us to the point where this is economic and it has taken up enough scale that we can do it with private investment.

To me, that would be the perfect solution. I know it was a mix of what does Pilot Flying J do, but really, I mean, my goal here is to try to reduce the carbon footprint and use all the efforts from this committee as effectively as possible so that the right people get the right amount of support, and we can move forward.

Mr. BURCHETT. Yes, sir. And I know you all started as a single gas station, but what prompted the company to change its business model and grow over time?

Was it because of Government mandates or private market decisions?

Mr. KONAR. It was completely because of private market decisions, because we saw a need for truckstops. Because, as you know,

trucks can't fuel at gas stations because of their size and because a truck needs to fuel at 14, 15 gallons a minute. Otherwise, the driver is going to be sitting there forever, which is a problem we have to solve on the EV side. So completely on market incentives.

Mr. BURCHETT. I figured that, knowing Mr. Haslam.

I would guess that Pilot is the largest employer and taxpayer in many of the communities where your truckstops are located. How many employees do you generally have at your locations?

And what do these travel centers mean for those communities?

Mr. KONAR. Well, it is a great question, because a lot of our travel centers are in very remote communities around the country, where there aren't jobs. And we often end up being the only source of fuel or food or amenities for a lot of the local communities.

A travel center, on average, has, depending on the size, between 60 to 80 people that we hire in local communities. Pilot employs about 28,000 people around the country. And a lot of them live in very rural environments. But, the interstate business and keeping America moving is a way for them to get a livelihood. So we are very appreciative of that.

Mr. BURCHETT. Thank you so much.

Mr. Chairman, I yield back the remainder of my time. And I wish, Mr. Chairman, if you could, express to leadership that we need to schedule better. This is a very important committee, and the Members are not—I don't think we are being served when we have to rush out and vote. Dadgummit, if we need to vote, we ought to vote until midnight or later. We are here to work, and this is very aggravating, and I don't think it is fair to the committee—

Mr. DEFAZIO. Well—

Mr. BURCHETT [continuing]. For us to continue our important work.

Mr. DEFAZIO. Well, I share the gentleman's frustration. But in part, we are having this many votes because some Members on his side of the aisle are insisting on votes on noncontroversial legislation.

Mr. BURCHETT. I understand that, Mr. Chairman, but this problem preceded all of that. So thank you.

Mr. DEFAZIO. Ms. Brownley?

Ms. BROWNLEY. Yes, thank you, Mr. Chairman. And thanks for holding this meeting. And I am going to have to be brief, because I do have to go and vote. But I wanted to ask a question of Mr. Allen.

And Mr. Allen, I thank you for your testimony. And I think, in your written testimony, you mentioned my bill, the Green Bus Act. And this is a bill, as you know, that would set a national goal for zero-emission buses, and it would require that, beginning in 2029, all new buses that are purchased using Federal funds be zero-emission buses.

I know you are helping California meet its goal, because this bill is modeled after what California is doing. So my question is, how can you and, I presume, other bus manufacturers, help transit agencies across the United States to meet this goal?

Mr. ALLEN. Yes. Thank you very much for the question. In my mind, there are a number of areas that the committee and the Federal Government could help that.

The first is to increase the funding for zero-emission buses through the Low or No Emission Vehicle program, and reauthorize that program, and step up the funding.

The second would be to incentivize domestic supply chain. There is an existing program called ATVM. And that program, unfortunately, is only allowed to be used for automotive and light-duty vehicles. We would love to see that program enhanced for heavy-duty vehicle suppliers and heavy-duty original equipment manufacturers. And this would allow companies to invest in state-of-the-art manufacturing and build the domestic supply chain that many of the discussions today have been about, that will allow us to compete against aggressive foreign competition. And this will also entice foreign battery cell manufacturers to come to the U.S. with their intellectual property and create jobs here, in America.

And then the last area, I would say, is around supporting programs for fleet electrification beyond the Low-No program. And that, specifically, is around schoolbuses and municipal fleets. Today, schoolbuses are not funded at all by the Federal Government. They are funded State and locally. And I believe a program to—the Federal Government help electrify schoolbuses would go a long way towards our challenges on climate.

Ms. BROWNLEY. Thank you so much for that, and, actually, thanks for mentioning the ATVM program, because Congresswoman Dingell and I have a bill to do exactly what you have suggested, to expand that program to medium and heavy-duty vehicles. So thank you for the plug.

The last question, quickly, is I think a green economy is going to create lots of good jobs. And again, Mr. Allen, can you talk a little bit about the wages and benefits that your company offers, because I think we are looking for good-paying jobs. And I think, in your company, there are good-paying jobs to be had.

Mr. ALLEN. Yes, there are. This is not what I would describe as just everyday manual labor. This is advanced manufacturing. We train our employees to be able to do very technical positions. They don't require anything more than a high school education to do that. We do the training for them, in conjunction with some of the programs we have with the local community colleges. And these people come to work, and they make a really decent wage in both South Carolina, Los Angeles, and in northern California.

We provide our employees 401(k) matching, and we also provide every single employee at Proterra stock options for when we ultimately go public. Every single employee will benefit from that.

Ms. BROWNLEY. Thank you so much, and I yield back, Mr. Chairman.

Mr. STANTON [presiding]. Thank you very much. Next up is Congress Member Mast.

[Pause.]

Mr. STANTON. Congress Member Mast, is he still on? We can come back to him, certainly.

OK, then how about Congress Member Johnson?

Mr. JOHNSON OF SOUTH DAKOTA. Thank you, Mr. Chairman. My first line of questioning will be for Ms. Giammona with Pacific Gas and Electric.

And, ma'am, I spent 6 years as a utility regulator in South Dakota, a member of the South Dakota Public Utilities Commission. And I like that you called out in your testimony, ma'am, the importance of balancing safety, reliability, affordability, and sustainability. I don't think many ratepayers understand the importance of balancing those sometimes competing interests for an investor-owned utility.

Of course, we have been talking today about Government intervention, and how it can expedite some of this progress that my colleagues are looking for. So I guess my question would be, from your perspective, ma'am, to what extent have regulations, requirements, mandates from the California PUC or from the State legislature hindered your ability, your company's ability to properly balance those four critical stakeholder interests?

And maybe rate that from 1 to 10, 1 being no intervention or constraint, and 10 being the regulators have made all the decisions for you.

Ms. GIAMMONA. Congressman, thank you for the question. My opinion is it is a partnership. And our regulators in California are very focused on and have the same interests that we do, and that is providing safe, reliable, affordable, and clean energy to the consumers in California.

And as such, we have not only aggressive policy and aggressive goals, but we have been really far ahead on program design in the areas of energy efficiency, our solar incentives, demand response, community choice aggregation. We have run the gamut of energy programs, and that has really been in partnership with our regulators.

Mr. JOHNSON OF SOUTH DAKOTA. Ms. Giammona, yes, thank you. And I do understand the suite of offerings that you all have offered and deployed, some of them in South Dakota in my time as a regulator. I mean, it sounds as though you do view this as a partnership, and that you largely or maybe completely endorse the regulations and requirements within California. I mean, giving that a rating on a scale from 1 to 10, I mean, how do you feel like PG&E has been able to balance safety, reliability, affordability, and sustainability?

Ms. GIAMMONA. I would love to rate us as a 10.

I think the challenges that we have faced are our climate changes. So what we have experienced is the climate is changing and our conditions are changing rapidly. As you know, utilities have major infrastructure, with large cycles of depreciation, and we are finding ourselves having to be much more nimble to respond to what is now a new climate in California.

So we are really working closely with our regulators to ensure that policy moves quickly so that we can act upon that policy and really act to support the climate in California.

Mr. JOHNSON OF SOUTH DAKOTA. Well, and I would just say this. I mean, clearly, I think it should be important to all of us on either side of the dais here. This issue we are talking about, I mean,

clearly, we need to build systems that are increasingly environmentally friendly, that provide some sustainability.

I would push back on your characterization that PG&E in California should get a 10 on balancing these interests. And I would just perhaps call out my State of South Dakota again. I have got some pride, having been a regulator there. But you bragged—and I think understandably so—about how green your fleet of generation is. I think South Dakota has a lot to brag about, as well. Seventy percent of our electrical generation in the State comes from renewable sources.

But I am concerned there has not been a proper balancing of ratepayer interests—the affordability issue—when you all have made decisions. And when you look at the residential price per kilowatthour—in South Dakota it is \$.12, and in California it is \$.22. Now, that is an overly simplistic way to look at it, I admit. But that is 86 percent higher. And we are 70 percent renewable; you say you all are 88 percent, and that is a great number.

But if we are going to hold up—if we are going to say, ma'am, that California is a 10, that PG&E gets a 10 on balancing affordability and sustainability, then I think we just need to acknowledge that you are willing to pay an 86-percent premium at the rate level to be able to secure that 10. And I just don't know that that is the proper way to balance.

And with that, Mr. Chairman, I would yield back. Thank you.

Mr. STANTON. Thank you very much. Next up will be Congress Member Payne.

[Pause.]

Mr. STANTON. All right.

OK, please unmute, Congress Member.

Mr. PAYNE. Good afternoon. Can you hear me?

Mr. STANTON. Yes.

Mr. PAYNE. OK, thank you.

Let's see, Mr. Santana, as chairman of the Subcommittee on Railroads, Pipelines, and Hazardous Materials, I care a great deal about the effects of rail transportation on the environment.

New technologies have the potential to significantly reduce the railroad sector's carbon footprint. Other countries have recently put trains into service that are powered by hydrogen fuel cells. The United States should take advantage of opportunities that integrate innovative technologies that could provide efficient rail service, while reducing carbon emissions.

Can you explain the potential benefits of hydrogen-powered trains, and how quickly the United States could get to a position to take advantage of this technology?

Mr. SANTANA. Representative, hydrogen will play a role in terms of decarbonizing rail.

To your point with seeing other countries taking steps in that direction, like China, for instance, like Europe, and we should take the lead here. When we think about the roadmap to decarbonize, we could very much, as you think about batteries, where we are applying it now in effective ways into rail, you will get to that same point on hydrogen. And what you are going to be seeing is a number of these technologies permeating different industries, getting to

economies of scale that will allow this to be efficient, to be competitive. So we need to take the lead there.

Mr. PAYNE. Thank you. Mr. Rudd, 9 years ago, Hurricane Sandy provided a stark reminder of how climate change can result in more extreme weather and greater harm to our infrastructure. Along the Northeast Corridor this means that any infrastructure project needs to consider the increasing number of hurricanes and other significant weather events.

Can you explain the cost of failing to make substantial investments in the resilient infrastructure now?

Mr. RUDD. Yes, and building off something one of our colleagues said a little earlier was, when we look at the economic cost, it really has a four-to-one relationship. So underinvesting in resiliency today, although it is a generalization, it comes with a very heavy cost, without making those initial investments.

And with respect to some of the things you are talking about, it gets back to the point about thinking about our procurement model, and building into the procurement models for future infrastructure the opportunity to build in innovation, and to build in the cost of resiliency, and evaluating that in the low-cost models that are currently used to make those infrastructure decisions.

Mr. PAYNE. Thank you.

Mr. RUDD. Thank you.

Mr. PAYNE. Also, Mr. Rudd, it goes without question that the public and private sector must work together to meaningfully address the pressing issues around climate change. How do you envision the roles for the public and private sectors in creating a climate-forward model of infrastructure investment and construction?

Mr. RUDD. Well, again, when we look at the infrastructure investments required, one of the largest challenges is going to be the funding itself, and the capital improvements.

And so, as we look forward, there are economic opportunities to improve that infrastructure that the private sector would be willing to participate in, and willing to fund. And my suggestion would be that, as part of the infrastructure bill, you look for opportunities to de-risk those private-sector investments, and to lower the cost of capital for those fundings, effectively creating an opportunity for a higher return, or an appropriate market return for that private investment.

There is so much capital that is required for this. I think the only way that we can move forward successfully at the right pace is to provide an incentive so that there is public capital and private capital coming into these infrastructure investments.

Mr. PAYNE. Thank you, Mr. Rudd. I appreciate that outlook.

And with that, Mr. Chairman, I yield back.

Mr. STANTON. Thank you very much. Next up is Congress Member Nehls.

Mr. NEHLS. Thank you, Chair. The U.S. has led the world in reducing emissions for 2 years now, and this largely has been due to the wider adoption of natural gas. Refrigerated methane, more commonly known as liquid natural gas, has the potential to continue the American energy revolution, reduce dependence on foreign energy sources, and continue to help our environment.

I have two questions, and my first is for Ms. Giammona from PG&E. In February, in my home State of Texas, we saw the tragic consequences of becoming overly reliant on certain energy sources. What role does fuel diversity play in ensuring that we have a reliable and resilient grid?

Ms. GIAMMONA. Congressman, thank you for the question. It was really difficult to watch what was happening in your State during the crisis in February, and know that our hearts are with the families and customers that were impacted by those extreme weather conditions.

We have been really focused on diversification of our fleet for a number of years, leveraging renewable power sources, but also leveraging our natural grid infrastructure. And I think, going forward, each State is going to look a bit different on how they plan to diversify their fleet in order to support that customer demand of new technologies, but, in addition, provide reliable power sources for customers as we are managing through a changing climate.

Mr. NEHLS. Thank you. My second question is for the rest of the panel.

We have seen a number of Northeastern States either limit or outright ban pipelines carrying American natural gas through their States. This has led to other States in the region having to look outside the U.S. for their natural gas supply, including to places like Russia. This not only harms our energy independence, but is also more harmful to the environment, given that our environmental standards far exceeds Russia.

How can we better spur American infrastructure development and enhance U.S. geopolitical strength?

Thank you, and then I will yield back.

Mr. HERNICK. Congressman, this is Charles Hernick with Citizens for Responsible Energy Solutions. I would like to jump in on that. I think that your point underscores the highlight—the need for an all-of-the-above approach to energy. That includes oil and natural gas. And it includes some of the other technologies that we have talked about here.

Very specifically, as it relates to—we need to create opportunities for fuel switching. One of the easiest ways to do that that has not been mentioned—we have spent a lot of time talking about switching to electric vehicles—but emissions can be reduced quickly, and at a cost savings to school districts, municipalities by switching from diesel to propane, just for example.

So there are very important areas where we can reduce emissions now, create cost savings now. It doesn't need to be always a tradeoff between reducing emissions and a high economic cost. There are ways to do this in a way that create options for customers, create options for States and municipalities, and reduce emissions quickly, and really improve livelihoods for people, instead of waiting for that more expensive option that may still be a little further down the road.

Mr. KONAR. Congressman Nehls—this is Shameek Konar—if I may just add to that this is a great point.

The renewable fuel standard, which has been in place, which has been enhancing the use of biodiesel and all the biofuels, is something that works today. And, as we think about policy for reducing

our carbon footprint, we should look at everything that we have at our disposal, which is a great point Mr. Hernick makes, which is that we can still bridge our way to EVs being adopted, hydrogen coming in, going from 1 percent utilization to 30 percent utilization by continuing to push the things that work today.

To your point about natural gas, we can be doing that today, while we wait for our future, because just waiting for the big bang costs us time. And all of these things will take a substantial amount of investment, and that takes time.

Mr. ALLEN. If I may just offer a contrarian view that, today, schoolbuses don't require a truckstop in order to be refueled. They go back home every day to their own spot. The total cost of ownership for schoolbuses to be all electric is there today. There is really, in my mind, no need to make an interim stop at propane. The economics for electric schoolbuses is viable today.

Mr. KONAR. No, that is a—it is a fair point.

Mr. STANTON. Thank you very much. We are out of time for that 5-minute period, so we will move on to the next Member to ask questions.

Mr. KONAR. Thank you.

Mr. NEHLS. Thank you, gentlemen. I yield back.

Mr. STANTON. The next questioner will be Congress Member Lowenthal.

Mr. LOWENTHAL. Thank you, Mr. Chairman, and thank all our panelists. I found this discussion fascinating, both in terms of what can be done in the short term, and also, really, maybe looking at more long-term solutions. But I want to focus on a specific challenge that we have.

It has been mentioned, but I really want to dig a little deeper, and that is heavy-duty vehicle electrification, which is a critical priority for reducing freight emissions. I represent the Port of Long Beach. And within the port complex, Long Beach and the Port of L.A. together, there is a huge number of truck traffic in and out of those ports. We are talking about 30,000 to 40,000 trips a day, at least. And we are talking about having—and I have seen over the years the ports have done a great deal, in terms of reducing the impacts upon those communities around the ports, which tend to be lower income communities, which suffer greatly from asthma and other types—not all due to trucks, obviously. We have ships and trains, too.

But I want to talk about now—and what is interesting is during this pandemic, while there was a drop in volumes through the ports, there has been a tremendous explosion, in terms of growth in ports, which we were already doing. So we have other issues going on now of congestion, and problems of moving goods out, because there is so much demand out there in the Nation for goods that are coming from outside of the country, which is another issue. But I am not going to deal with that.

So the issue is dealing with how we move forward in changing this fleet. How do we improve the public health, address environmental justice issues by reducing diesel emissions from this tremendously important, as a thing—we are talking about, as I say, a major part of the U.S. economy. We are not going to stop this. We need to enhance it.

And so I want to ask first Mr. Allen, then anyone else on the panel, how do we move forward with heavy-duty vehicle electrification more quickly? I know we are moving.

What is the research and investment that may be needed, if that is so?

What are the kinds of Federal support you see as possibly—to be a partner in this venture?

Because I am just focused on those heavy-duty trucks carrying 40-foot containers. We are talking about—and I am not downgrading the role of diesel. It has helped this Nation. We wouldn't be where we are today without it. So I want to know, how do we move forward?

Mr. ALLEN. Sure, Congressman. I think help is on the way for you. I believe that, with the right Government funding here in just the next couple of years, there will be vehicles that can go 250 miles—granted, they are not over-the-road, but they can go 250 miles, which will take a vehicle—

Mr. LOWENTHAL. But these vehicles frequently are going a lot more than 250 miles, as we know—

Mr. ALLEN. Right, the—

Mr. LOWENTHAL [continuing]. Where they—after 350 miles or so, they say good night.

Mr. ALLEN. Right.

Mr. LOWENTHAL. These are, you know—

Mr. ALLEN. So that is the first one. But also, there is help coming to terminal tractors that are used at the port, as well as the heavy-duty forklifts. We are working with companies like them today to help.

But I believe the best thing that the Federal Government can do would be to expand the funding. So today there is the Low or No Emission Vehicle program that is for transit vehicles. That should be expanded for areas of high-emissions focus, like the ports, to be able to incent both the manufacturers and the users to convert those vehicles quickly.

Mr. SANTANA. Representative Lowenthal, if I may, Rafael Santana.

I think that is one of the key roles that rail can play here, being the most sustainable way of moving freight over land. And what we see here is the opportunity to actually accelerate decarbonization at the same time you increase the utilization in rail.

And one of the things that we seek through the Freight 2030 vision is to also allow the creation standards of the information. So it allows you to understand how freight is coming to the ports and allowing a more, really, efficient way of moving tanks from point A to point B. And this has to solve, not just for speed, but it has to solve for efficiency, but also the [inaudible] carbon emission type of transportation.

Mr. LOWENTHAL. Thank you, Mr. Santana. I agree with you, and I think the ports agree with you. In the Nation, the role of rail is vitally important, getting more and more important. The major investments now in our ports are in rail infrastructure.

Mr. STANTON. Thank you, Congressman.

Mr. LOWENTHAL. But it is not just—there has got to be kind of a multimodal approach. And I am just concerned we are not going to get rid of trucks.

Mr. STANTON. Thank you very much, Congress Member Lowenthal, we have got to move on.

Mr. LOWENTHAL. I yield back. I yield back, thank you.

Mr. STANTON. Thank you, sir. Next up is Congress Member LaMalfa.

Is Congress Member LaMalfa still on?

OK. How about Congress Member Carabajal?

Mr. CARBAJAL. Thank you. My question is to Ms. Giammona. We know the transportation sector is a large emitter of harmful greenhouse gas emissions, and searching for fossil fuels has led to significant environmental damage to our communities.

I happen to represent the central coast of California. And in Santa Barbara County, our community has seen firsthand the devastation oil drilling inflicts to our environment and local economy. Not only did the 2015 Plains All American oilspill harm wildlife in the region, it cost us over \$90 million to clean up the area, not to mention the negative impact to our local economy.

How does electrification of our transportation sector help protect our environment?

And can you also walk us through the economic benefits and jobs associated with moving towards electric vehicles?

Ms. GIAMMONA. Congressman, thank you so much. Thank you for your question. As I stated in my opening statement, our domestic-produced clean energy is 88 percent GHG free. So, we have really focused on, as we are using more renewables, really moving to cleaner technology to really reduce greenhouse gas emissions.

As it relates to the economics of EVs, this has an opportunity to create many jobs, and many jobs across the Nation, both from an infrastructure standpoint, from a technology standpoint, and certainly at the vehicle level.

So in California, what we have seen is a tremendous opportunity for growth of employment to support this new technology. And in particular, at PG&E, we have partnered very closely with the IBEW, and ensured that we are using our great labor force that supports our current infrastructure to really support this new technology and growth within California.

Mr. CARBAJAL. Thank you very much.

Mr. Allen, expanding access to electric vehicles also requires an expansion of our charging stations and hydrogen fueling infrastructure. H.R. 2, the Moving Forward Act that I and my colleagues on this committee helped write, under the leadership of Chairman DeFazio, included several provisions to build infrastructure for the 21st century that includes electric charging stations and hydrogen fueling infrastructure.

In building up this infrastructure, how are we ensuring all Americans are benefitting from this, especially communities that have been traditionally left behind?

Mr. ALLEN. Thank you, Congressman. As we got into the electric vehicle and transit bus business over the past number of years, the biggest impediment for agencies to put more electric transit buses into service was the infrastructure. So we have focused our com-

pany on being able to provide charging and infrastructure solutions so that agencies can move forward faster.

These charging stations are open source. So not just can they be used by a transit agency for their buses, but they could also be used for municipal fleet vehicles, and even, depending on how they are located, could be used for the general public. And we believe that that is a big enabler to be able to provide charging and infrastructure in all communities, but especially ones that are typically not served by infrastructure.

Mr. CARBAJAL. Thank you.

Mr. Konar, what is the importance of leveraging the private sector to achieve the electric vehicle charging goals that President Biden laid out?

And how can companies like Pilot Flying J and other fuel retailers be part of the solution?

Mr. KONAR. Thank you for the question, Congressman. I would say the private sector has already invested a substantial amount of money. For example, if you look at Pilot, we have over \$10 billion invested in creating an infrastructure where people currently fuel today. So leveraging that infrastructure gets you to the answer a lot faster than trying to replicate that infrastructure.

So I think what the Federal Government should do, and I think will be helpful in reducing our carbon footprint, is allowing us to bridge our way from where the uptake of this technology is today—as I mentioned before, less than 1 percent usage on our interstate chargers—to a point where it is economically feasible to do it.

But everything else works. We have the locations, we have the investment. We just have to offer them a different fuel. And we are fuel agnostic. We are a customer service company. So we need to make sure that our customers are getting the service they need so that they buy more of that fuel. And it is a self-fulfilling prophecy.

Mr. STANTON. Thank you so much.

Mr. CARBAJAL. Thank you very much.

Mr. Chair, I yield back.

Mr. STANTON. Thank you very much. Next up will be Congress Member Malinowski.

Mr. MALINOWSKI. Thank you so much, Mr. Chairman, and thanks to the witnesses for very, very interesting presentations.

Let me just start by laying out the proposition that the transition from fossil fuels to clean energy is possibly the most significant, predictable economic transformation the world has ever seen. It is something that should happen, in my view. But, just as important, it is happening, and it will happen. And therefore, it is in our economic interest, as a country, from a competitiveness standpoint, to get ahead of it and to lead it.

Let me maybe start with you, Mr. Allen. Is that general statement something you would agree with?

Mr. ALLEN. I absolutely agree with that. I think that the policies of the Government here are an important factor in shaping the carbon emissions reductions in this country.

Mr. MALINOWSKI. Now you mentioned in your written testimony that there are just over 2,700 zero-emission transit buses on the road in the United States. But in China you noted there are 150,000 EV buses. As I hope all of us know, China is, by far, the

largest producer of solar and wind energy. It holds three-fourths of the world's manufacturing capacity for lithium ion battery cells.

In 2013, we, the United States, had five times as many electrical vehicles as China. Today China has twice as many as the United States. Why is this happening? Is it because the Politburo of the Chinese Communist Party had a meeting, and decided that they liked trees more than jobs? Are they, you know, all tree-hugger, Green New Deal? Is that what is going on? Or are they trying to win a race to the future?

Mr. ALLEN. I believe that, in my opinion, they are trying to win a race. I believe they have incentivized, or they have driven this through a combination of incentives and mandates. And they want to be the world's largest producer of electric vehicle technology.

And that is why we believe that we have the prime opportunity right now to incentivize the supply chain to be here in the United States through a combination of investments and domestic content requirements that can put the U.S. in the right place to lead, and be not just sufficient for ourselves, but be an exporter of this technology.

Mr. MALINOWSKI. Well, fantastic, and I am glad that your company is leading the way, in terms of manufacturing battery systems and other critical components of this in the United States. And thank you for encouraging us to do what we need to do to make sure the United States wins that race. That is my interest.

Mr. ALLEN. It is mine, also. Thank you, sir.

Mr. MALINOWSKI. Thank you.

In the same spirit, I will move to Mr. Smith, as well. I am very, very pleased to see that FedEx made this commitment to be carbon neutral by 2040. When I meet with corporate executives back home, increasingly I find there is a recognition that we need market-driven policies to encourage that sort of change, including a growing recognition that putting a price on carbon is an efficient, market-driven way to bring down global emissions.

The U.S. Chamber of Commerce just updated its position on climate change to include support for what it calls a market-based approach to accelerate reductions in emissions across the U.S. economy. The Business Roundtable has adopted a similar position. I just wanted to ask whether FedEx agrees, and whether you believe we need to move, nationally, to a carbon pricing system.

Mr. STANTON. Congress Member, I believe the representative from FedEx, unfortunately, had to leave the meeting early.

Mr. MALINOWSKI. Oh, I am sorry. Would anyone else be interested in taking that question, then?

Mr. KONAR. I can take a quick shot at it—I am definitely not speaking for FedEx—but I believe a national carbon pricing system—it is a global problem, it is a national problem that we face—would actually be helpful.

And, you know, kind of the provision of market-based incentives, which have worked in the renewable fuels standard, and I go back to that because that is a good blueprint on how this has worked before—is something that, you know, we should think about in this respect.

Mr. MALINOWSKI. Well, thank you. Well, I will say to you all, and I would certainly have said to FedEx if they were still here, it is

very encouraging to hear corporate CEOs say that, and to take those positions, just as it is encouraging to hear them say we should rejoin the Paris Climate Accords.

I am hopeful that our private-sector Chamber of Commerce, in particular, will really make this a priority, in terms of their advocacy on Capitol Hill, because sometimes they say these things, and they come to—

Mr. STANTON. Thank you.

Mr. MALINOWSKI [continuing]. With us, and it is not necessarily one of their top three issues. And that has got to change to make progress.

Thank you, I yield back.

Mr. STANTON. Thank you very much. Next up will be the vice chair of the committee, Vice Chair Davids.

Ms. DAVIDS. Thank you, Chairman. And thank you to our panel of witnesses for taking time to join us today.

I represent the Kansas Third Congressional District, which, thanks to its central location, is one of the busiest intermodal hubs in the country, where rail, trucking, aircargo, maritime, and others meet. But, because of our geographic location, we are right up against the confluence of the Kansas and Missouri Rivers. We also have the second largest Federal levees, only behind New Orleans.

The Weather Channel Climate Disruption Index has ranked Kansas City as the 5th of 25 cities to be most impacted by the effects of climate change in the coming years. Thanks in large part to the urban heat index effect, we are going to see 20 days per year above 90 degrees. That is as compared to our rural Kansas communities. And then we also have increased chances of drought in the coming years. And as storms and weather patterns become more severe, they are going to put a lot of stress on our transportation systems and public infrastructure.

And I think that we have heard a lot about how we can address all of these things here today. And during the 2 years I served on this committee I have been fortunate to see the ways that the folks here today in your sectors are responding to this existential threat. And I think that we have seen that we are going to need a true partnership to tackle these. And I think I am going to start with Mr. Lewis.

Your testimony recognizes the benefits of using a life-cycle funding cost perspective in infrastructure investment, and that there are very—“limited tools” is what you said. I was hoping you could expand on those tools, and whether or not Congress can help increase the access to those tools.

Mr. LEWIS. Yes, thank you for your question. Yes, there are tools, actually. Unfortunately, there is not a single set of consensus tools and standards to be applied. So, from a Federal standpoint, there could be at least guidelines that would commit to what an acceptable tool and an acceptable standard would need to include. And you wouldn't have this problem of multiple different sources and organizations putting out different performance metrics and approaches.

The American Society of Civil Engineers is currently working on a standard for sustainable infrastructure that should come out at

the end of this year, which will be an ANSI standard. That will help.

There is a tool called Envision at the Institute of Sustainable Infrastructure that was developed, and basically takes a life-cycle approach that includes both sustainability and resilience. So it goes even beyond what LEED does for buildings. This does it for all types of infrastructure, and really looks at not just how to build something sustainably and in a resilient way, but also how you pick projects and how you prioritize which projects should get the funding, and even what locations are best for projects.

So there are tools out there, but there needs to be incentives, or extra points, if you will, in Federal funding for projects that use these tools, and deploy them, and score higher on, for example, the Envision rating system that is in existence. Because right now it is really just the honor system in terms of organizations wanting to use these tools.

Ms. DAVIDS. Thank you. And I think that is a great segue to Mr. Rudd.

I would like to hear a little bit about the—you mentioned probability weight of cost, and having cost models that rate probability cost as we start looking at projects. And I am curious if you could maybe expand on that, and, as we talk about what tools are available, how you envision that being used.

Mr. RUDD. Certainly. And, really, this is building off what Mr. Lewis explained, which is, when you are looking at the models that are used to ultimately determine or choose the projects that will be invested in, in terms of infrastructure, we typically look at what is the lowest cost model to find around a certain set of parameters for that infrastructure.

And as Mr. Lewis pointed out, what we want to do is we want to actually change that scoring system so in that procurement process we are not simply looking at cost, we are also looking at the measurable outcomes of resiliency, the measurable impact on the environment or the emissions, the measurable impact on the community itself, in terms of the health and safety of the community. So it is, effectively, expanding that scoring system to not just look at the lowest cost option.

And included in that is also looking at innovation. A lot of times in these models innovation is ignored. I will give you an example. There was a large tollway project that was being evaluated. And in terms of noise reduction for the communities around it, they had to look at retaining walls to do that, a traditional way of insulating this noise. The alternative was to use low-noise asphalt. It would have reduced the cost by 30 percent of the project. But ultimately, it was not within the bounds of the standards of that procurement. And so it was not part of any submission that was made.

So it is really opening up the standards so that you can consider these other alternatives, other than cost.

Ms. DAVIDS. Thank you, Mr. Rudd.

And Chairman, I yield back.

Mr. DEFAZIO [presiding]. I thank the gentlelady.

Mr. Mast? Brian?

Mr. MAST. Thank you.

Mr. DEFAZIO. Are you available?

Mr. MAST. Yes, thank you—can you hear me, Mr. Chairman?

Mr. DEFAZIO. Yes, yes, go ahead.

Mr. MAST. All right. Look, I think there has been a lot of ambitious talking today about electrification, and I am not saying that in a negative way. Probably all of us, as parents, if we are parents, none of us would encourage our kids to strive for anything other than something ambitious. That is, hopefully, what defines us as Americans, is that we look to be ambitious about the things that we do.

But I want to ask some specific numbers, because this relates to everybody, as we are looking at the source of electrification, which is having the power to—whether it be a UPS or a FedEx truck, or some other delivery vehicle, or somebody's home. And so the questions are going to be geared towards you, Ms. Giammona.

As we look at some of those costs, obviously, we can see variations in when we look at fuel costs, based upon global geopolitics and what is going on. We can see fluctuations. But as we look around domestically, we also see various fluctuations in the cost for electricity, just domestically. And obviously, wind is better in some places, sun is better in other places. Different forms, you know, nuclear power in other places, and other things. But could you speak to how do we work to ambitiously get our average cost per kilowatthour down?

What is the best form of electrification in some places that we are not looking at?

Do we need to look at more nuclear, whereas you have seen the prices skyrocket in countries like Germany, because of their move away from nuclear? I don't have a bend on that, I am using that as an example.

I look at some of the averages, and I would be lying if I said I knew all of the inputs that the Communist Party has put into subsidizing their electricity costs. But Russia, being an average of \$.06 per kilowatthour, China listed as an average of \$.08 per kilowatthour, the U.S. on the average of somewhere around \$.13, \$.14 per kilowatthour, California being up in the 20s, Florida being down around \$.10 or \$.11 per kilowatthour. How do we ambitiously get to being at \$.05, \$.06 a kilowatthour?

Ms. GIAMMONA. Congressman, thank you for your question.

[Audio malfunction.]

Mr. DEFAZIO. Your internet is down.

Ms. GIAMMONA. I am sorry, can you hear me now?

Mr. DEFAZIO. Yes, just start over again, Laurie. We couldn't hear your answer to his question.

Ms. GIAMMONA. OK.

Mr. DEFAZIO. Perhaps you need to—your video—

Ms. GIAMMONA. OK, can you hear me now?

Mr. DEFAZIO. Yes.

Mr. MAST. Yes, ma'am.

Ms. GIAMMONA. Great. Congressman, thank—

VOICE. She is on mute.

Mr. DEFAZIO. Well, is she—are you muted?

We heard her for a second. I think it is the internet, isn't it?

OK. Have we figured out what it is? Is it on her end, or is it the—

[Pause.]

Mr. DEFAZIO. OK, Brian, why don't you try a question on someone else who has better connectivity, and let's see if it is the overall system or her connectivity.

Mr. MAST. Thank you, Mr. Chairman. Listen, I will yield back to you. Maybe if you could just agree to, when her internet gets back up, let her answer my question. It is really the crux of my question, since Mr. Smith has moved on, as well. So maybe, if you could just make that agreement, I would be happy to yield back.

Mr. DEFAZIO. Sure. I would be happy to do that.

Mr. MAST. Thank you, Mr. Chairman.

Mr. DEFAZIO. Ms. Mace?

Ms. MACE. Thank you, Mr. Chairman. And first of all, I want to thank everyone, all of our witnesses this afternoon, for being on this panel and sticking around and spending much of your day and answering our questions.

Being a freshman on the Transportation and Infrastructure Committee, I have learned a lot today, and a lot leading up to the testimony.

First, I want to thank Mr. Konar for his testimony. I am pleased to learn that, as an industry, that you all have adapted, and largely in response to tax incentives, and utilizing those to sell lower carbon-intensive alternatives to gasoline and diesel, and being innovative. And we have many innovators who are on our panel today.

And this also echoes the comments we heard earlier today by Mr. Hernick, who said that the Federal policy playbook should, first and foremost, really harness the power of free markets. And you really were speaking my language.

I want to turn to Mr. Allen, who is on here today, and I wanted to turn to you next. I am really excited to see the innovation of Proterra and what you are doing, not only in the State of South Carolina. My understanding is that your location in Greenville is expanding, you are looking to hire employees, particularly during a really challenging time for many businesses and industries.

In my hometown of Charleston, South Carolina, we have 6 electric buses, and our goal is to have 32 by the year 2022. And I learned today that it is not just Tesla that is creating batteries for electric vehicles and battery technology, but Proterra also is being very innovative. And I appreciate and commend your leadership and your company's leadership on that technology.

Oftentimes the Government, when we are looking to be innovative, can inhibit innovation through heavy-handed regulation, and picking winners and losers through different types of programs or funding mechanisms. Are there some areas that you could talk to where the Government could potentially get out of the way, or where we might be holding up growth and development for the industry, going forward, so that we can create better next-gen technologies, and a need for batteries, for vehicles, buses, and the like?

Mr. ALLEN. Thank you very much, Congresswoman. We have been in South Carolina—Greenville, specifically—since 2010. We love being there. We love our workforce. They are just incredibly dedicated, hard-working people. And I enjoy spending my time there as much as I can, also.

And in addition, those are our buses, with our battery technology that you are experiencing in Charleston right now, so we are very proud of that also.

In terms of how we can work with the Government, I would say from a manufacturing and development standpoint, the Government doesn't get in the way of what we are trying to do. We have a number of training programs in concert with Government agencies and local community colleges to get our people trained. And we are very proud of where that is.

I think the biggest thing that could help to accelerate this industry, really, is on the demand side, as I have stated earlier, and have the Government help agencies begin the transformation. There are about 400 transit agencies in North America today, and I believe less than 200 of those have their first electric vehicle.

So I think it would be great for the Government to continue to help agencies move towards electrification; and then again, to incentivize the domestic supply chain, and provide incentives through the ATVM program that would apply to our industry would be great; and then the third would be support fleet electrification. And primarily, this is on municipal fleets and schoolbus transformation to electrification. I think those three areas the Government supports today, and I think a continued focus there and an acceleration would be wonderful for our country. Thank you.

Ms. MACE. Thank you. And my last questions—I only have about 1 minute left—really would go to anybody on the panel today.

And learning more about electric vehicles across the board, obviously, there is the cart before the horse. To develop electric vehicles you have got to then have charging stations all around. And there seems to be some disparity in terms of what it costs, maybe, to put an electric charging station in a residence, like at somebody's home, in your driveway, or in your garage, versus maybe get a C store or a gas station or a restaurant, or some other commercial location. I don't know if there is anyone, with the few moments we have left, that could kind of talk to that a little bit for those who might be watching.

Mr. KONAR. Congresswoman Mace, if I may answer that, at least a little bit, there is a substantial difference between charging inside communities, as opposed to charging on the highway. When you have time, the cost of the charging stations, which are level 2 chargers, is not very much. But when you are looking to charge things in 20, 30, 40 minutes, then the cost and the infrastructure needs to expand substantially. It could be as much as 10-plus times when you are putting in these fast chargers.

So that is just to give you a little bit of perspective. But we are happy to follow up with that later, if you wish.

Ms. MACE. Thank you.

Thank you, Mr. Chairman.

Mr. DEFAZIO. Thank you.

We believe that Ms. Giammona is back online, and could now answer Representative Mast's question.

Ms. Giammona?

Mr. MAST. I'm listening.

Mr. DEFAZIO. Yes, I know. We are waiting, we were told when she was back online.

Ms. GIAMMONA. Thank you, can you hear me now?

Mr. DEFAZIO. Yes.

That is all we ever get, though. She says that, and then it goes down.

OK, sorry. We will try again in a minute.

Ms. GIAMMONA. OK, can you hear me now?

Mr. DEFAZIO. Yes, we hear you say that every time, and then it goes away. So keep talking.

Ms. GIAMMONA. OK, all right. Well, thank you very much for the question.

We believe that rates determined by commissions are really what are going to help the issue of affordability.

We are collaborating with our commission in California, focusing on addressing affordability, overall. And specifically, we believe that EVs, coupled with time-of-use rates, present opportunities to bring down rates overall, by getting more throughput during times where there is excess capacity on the grid.

Mr. DEFAZIO. OK. Brian, you have a little more time.

Mr. MAST. Thank you, Mr. Chairman.

Ma'am, if you could just expand a little bit on rates determined by a commission, are you looking at both price floors and price ceilings?

As we are all probably familiar with what we see on electric bills for high-usage surcharges, is there going to be an increase in seeing that, that you are not necessarily accounting for if you have to now account for putting however many kilowatthours into charging multiple vehicles of a home?

Just maybe elaborate a little bit on that for us. I would appreciate it.

Ms. GIAMMONA. Sure, thanks for the question.

California is moving to time-of-use rates for all residential customers. We have had high-use rate charges. We are starting to level those out. But the combination of time-of-use rates, not just for your general residential customer, but also for businesses, as well as programmatically for EV charging, allow us to flatten out grid usage, allow us to flatten out consumption, and which, ultimately, will bring rates down overall in the State.

Mr. MAST. And if I have 1 more second, let me just ask this, pointedly: Can we get to a U.S. average of \$.08 per kilowatthour, \$.06 per kilowatthour? Can you get us there?

I know there are many out there that do electricity, but let's hear your opinion.

Ms. GIAMMONA. Well, you know, as you noted, in California we are much higher than that, but it would be our hope. Our focus, along with our State commissions and our regulators and our policymakers, is really focused on reducing rates overall in California.

But, like we heard from the Congressman from South Dakota, rate structures are different, and fuel mix is different across the country. So I think it is really a State-by-State opportunity, if you will.

Mr. MAST. Thank you, Mr. Chairman.

Mr. DEFAZIO. Thank you.

Mr. Lamb?

Conor?

Mr. Auchincloss?  
 Ms. Bourdeaux?  
 Mr. DeSaulnier?  
 OK, Mr. Johnson?

Mr. JOHNSON OF GEORGIA. Thank you, Mr. Chairman, for holding this very important hearing, and I want to thank the witnesses for sticking it out with us. It has been a long hearing with some interruptions, but we appreciate you all very much for your testimony.

Mr. Lewis, in your written testimony you highlight the importance of incorporating equity into our climate and transit solutions. A solution to climate change is inextricably linked to the idea of transit. It is hard to separate the two, as lower income communities and communities of color seek environmental justice and transit justice.

Like the disparities laid bare by the effects of COVID-19 on health, death, and economic outcomes on people of color, the climate crisis disproportionately impacts people of color. What is your opinion on the issue of climate solutions being race conscious?

Mr. LEWIS. Yes, I think, absolutely, there is a connection. It has been shown, whether it be COVID or it be other urban challenges, in particular, that there is a disparate impact on the more disadvantaged communities, which tend to be populated by people of color. These are also communities that tend to have more industrialization around them, happen to be usually more in the flood-prone areas, closer to the waterfronts and coastal.

So there are several factors that all work against these highly vulnerable communities. And so that is why, when I talked in my testimony about meeting these communities where they are, you need to understand what they are dealing with, their physical issues, their environmental issues, their social issues. You need to reckon with the past that they have had to deal with, their realities, before you can get their buy-in on the solutions, whether they be transit solutions or they be other solutions, like distributed energy, solar in their neighborhoods, things like that, so that you can understand how they are viewing things, and then work their ideas and their perspectives into your solutions.

But transit is a great example, especially in urban environments, of a way you can do that and get better mobility for these communities, which gives them more opportunity, gives them more access to jobs, and is a virtuous cycle.

Mr. JOHNSON OF GEORGIA. Thank you.

Ms. Giammona, in your testimony you discuss the integration of climate science into your company's practices and functions. Please elaborate on how PG&E is responding to the climate crisis.

Ms. Giammona?

[Pause.]

Mr. JOHNSON OF GEORGIA. Well, I tell you, let me—OK, go ahead, Ms. Giammona.

Well, let me move to Mr. Santana.

Mr. Santana, last week the Railroads, Pipelines, and Hazardous Materials Subcommittee discussed the climate solutions that a robust freight rail network presents to us. What commitments are your companies making to ensure that worker protections are central to climate goals?

Mr. SANTANA. Sir, we are very committed. We invest about \$200 million every year to solutions that are very much focused along the lines of fuel efficiency and carbon reduction.

In addition to that, we look at ways to drive more utilization of rail, as this is the most sustainable way of moving freight along the way. And when we think about the Freight 2030 vision, this will greatly enable growth in rail, and that would help with all the goals you just mentioned.

Mr. JOHNSON OF GEORGIA. Yes, there are many energy sector jobs that are not considered worker-friendly, and that is the reason why I asked you that question. Any particular thing that your companies are doing to create worker protections that are in keeping with other industries?

Mr. SANTANA. Absolutely. And last year we issued our sustainability report, as a company, where we make a commitment directly to reduce emissions ourselves, reduce water usage, but at the same time a commitment to make sure that we are helping the communities that we operate in, and really offering jobs and opportunities here, whether it is for minorities, people of color, and female representation. This is very much part of the framework we have, and we have specific goals that we are committed to meet.

Mr. JOHNSON OF GEORGIA. Thank you, and my time is expired, and I yield back.

Mr. DEFAZIO. I thank the gentleman.

Mr. Westerman?

Mr. WESTERMAN. It is not coming on, Mr. Chair. Oh, I guess it is. The light is not working.

Thank you, Mr. Chairman, and thank you to the witnesses for your testimonies today.

Mr. Smith mentioned FedEx's investment in the Yale Center for Natural Carbon Capture, which partners with the Yale School of the Environment, where I attended long ago. From the front page of the center's website, it states that "emissions reductions are crucial, but alone are not enough."

I couldn't agree more, and that is why I have proposed proactive natural solutions like the Trillion Trees Act that would restore our forest, promote reforestation, promote innovation, and promote market-based solutions for wood products.

Mass timber construction is a relatively new innovation that has many environmental benefits, and benefits for rural economies. In my home State of Arkansas, the University of Arkansas has constructed the country's largest mass timber project, with two five-story dormitories. That project is soon to be dwarfed by Walmart's new 15,000-employee corporate headquarters that will also be constructed with mass timbers.

Now, Yale School of the Environment researchers recently published a paper in the journal *Nature Sustainability* titled, "Buildings as a Global Carbon Sink," and I ask unanimous consent to submit that to the record, Mr. Chairman.

[No audible verbal response.]

[The information follows:]



**Article entitled, “Buildings as a Global Carbon Sink,” by Alan Organschi and Galina Churkina, Scientist, Potsdam Institute for Climate Impact Research, Springer Nature Sustainability Community, February 5, 2020, Submitted for the Record by Hon. Bruce Westerman**

BUILDINGS AS A GLOBAL CARBON SINK

by Alan Organschi and Galina Churkina, scientist, Potsdam Institute for Climate Impact Research

Springer Nature Sustainability Community, February 5, 2020

<https://sustainabilitycommunity.springernature.com/posts/59221-buildings-as-a-global-carbon-sink>

For decades, as anthropogenic greenhouse gas emissions and corresponding atmospheric carbon concentrations have risen at an alarming rate, scientists have investigated the capacity of forests, soils, and oceans to act as carbon sinks, vast ecological systems that might absorb, store, and offset the enormous release of carbon dioxide associated with the combustion of fossil fuels. Some scientists have raised concerns about the future durability of such natural carbon sinks given that climate change itself has caused such significant disturbance to those ecosystems.

The creation of human-made carbon sinks has only recently emerged as a potential supplement to natural carbon uptake and storage domains. Although there have been technological proposals and experiments in the field of carbon capture—giant machines designed to draw CO<sub>2</sub> from the atmosphere—costs for both the hardware and the durable disposal of the solidified carbon that results from these processes remain prohibitively high relative to the current market value of carbon offsets.

The growth and urbanization of global populations anticipated over the next several decades will create an enormous demand for buildings and infrastructure. As cities expand in size and density, the manufacturing of materials required for constructing mid and high-rise urban buildings will create a significant spike in greenhouse gas emissions, a discharge that takes place at the beginning of each building life cycle. This production stage carbon debt could take precious decades to offset through operational energy efficiencies alone.

Steel and reinforced concrete, the conventional structural materials of the mid and high-rise cityscape have high production stage emissions and little or no capacity to store carbon. Their inherent advantages of strength and stiffness come at a significant environmental cost. New and emerging material technologies and building assemblies in engineered timber combine significant structural performance with carbon storage capacity and have been adopted by various national building codes. These adaptations have enabled so-called “mass timber” to challenge the dominance of mineral based structural materials in the construction of larger and taller urban buildings.



Construction of Brock Commons student residence using massive timber in Vancouver, Canada. Foto credit: naturallywood.com. Photographer: KK Law.

A small international and interdisciplinary team of architects, forest and industrial ecologists, social scientists and climate change researchers gathered to consider the possibility of exploiting an anticipated global building boom as a means to mitigate rather than exacerbate climate change. Could the use of bio-based, carbon-storing materials such as timber, bamboo, and other forms of plant cellulose to construct dense urban building landscapes serve as a technique to offset most of the production stage emissions produced by the extraction and manufacture of building components? Could the very material that gives form and structure to those new cityscapes, which we will have to build for 2.3 billion people by 2050, also act as a storage bank for photosynthesized carbon? How much wood would the world need to harvest to meet that demand and what would be the impact to the health of forest ecosystems around the world?



Construction of ARBORA complex with 435 residential units using massive timber in Montreal, Canada. Foto credit: Nordic Structures.

As a consensus among the authors grew, they focused on concerns about the feasibility of sustainable forest harvest at the global scale and weighed a variety of potential mechanisms for the transfer of woody plant material into urban building structures; no options were ignored. (One scientist suggested that building log houses with very low manufacturing CO<sub>2</sub> emissions might serve to produce the fewest impacts and the greatest material efficiencies, a proposition quickly vetoed by the architects who argued that log-building would fail to meet both the performance requirements and the construction practicalities of contemporary mid-rise urban building, not to mention that it was unlikely to have cultural appeal for today's city dwellers.) Debates ebbed and flowed. After months of robust conversation and the exchange of dozens of drafts, the team arrived at the design of a study that would assess—succinctly but as comprehensively as possible within the limits of a single technical paper—the relative potential of major structural materials to either accelerate or mitigate climate change, an approach described in a newly published Nature Sustainability “Perspective”.

The broad-based substitution of engineered timber for steel and concrete in mid-rise urban building offers the opportunity to transform cityscapes from their current status as net sources of greenhouse gas emissions into large scale, human-made carbon sinks. The sheer volume of urban buildings projected for the remainder of the first half of the 21st century suggests that such a scenario could become a powerful tool to mitigate climate change. Construction of timber buildings for more than two billion new urban dwellers from 2020 to 2050 could store 0.01–0.68 GtC per year depending on the scenario and the average floor area per capita. Over a period of thirty years, wood-based construction can accumulate 0.25–20 GtC and reduce cumulative emissions of carbon from 4 (7–20) GtC to 2 (0.3–10) GtC.

Such a transition to bio-based building materials, implemented through the adoption of engineered structural timber products and assemblies by the urban building sector, will succeed as a climate mitigation strategy *only* under two conditions. First, designated “working” forests must be managed and harvested sustainably using techniques appropriate to each forest at the stand level in order to avoid scenarios of forest degradation and soil depletion. Second, the wood from existing and future buildings (the latter specifically designed for ease of disassembly) must be recovered and reused as a raw material resource for consumer product manufacture or the next generation of buildings. In this way, the city and the forest, historically antagonistic landscapes, may begin to work in synergy to help stabilize a climate in crisis.

**Article entitled, “Buildings as a Global Carbon Sink,” by G. Churkina, A. Organschi, C.P.O. Reyer, et al., *Nature Sustainability*, Vol. 3, April 2020, Submitted for the Record by Hon. Bruce Westerman**

[An abstract of the article appears below. The article is retained in committee files.]

Churkina, G., Organschi, A., Reyer, C.P.O. *et al.* Buildings as a global carbon sink. *Nat Sustain* 3, 269–276 (2020). <https://doi.org/10.1038/s41893-019-0462-4>

**Abstract**—The anticipated growth and urbanization of the global population over the next several decades will create a vast demand for the construction of new housing, commercial buildings and accompanying infrastructure. The production of cement, steel and other building materials associated with this wave of construction will become a major source of greenhouse gas emissions. Might it be possible to transform this potential threat to the global climate system into a powerful means to mitigate climate change? To answer this provocative question, we explore the potential of mid-rise urban buildings designed with engineered timber to provide long-term storage of carbon and to avoid the carbon-intensive production of mineral-based construction materials.

Mr. WESTERMAN. Thank you.

We know that forests are the largest scale, most efficient system to pull carbon out of the atmosphere, and wood products like we see here on this dais are 40 to 50 percent, by weight, stored carbon. Except for in some Western States, where we are burning up forests faster than we are growing them, U.S. forests are continuing to add carbon storage volume each year.

From the Yale study, the authors stated that mass timber construction has the potential to create a vast bank vault that could store up to 68 million tons of carbon, annually. They added that a city using mass timber construction will become a carbon sink versus a carbon source. They also concluded the overwhelming climate benefit of mass timber is something that every city planner should consider.

Mr. RUDD, I know your company is a large, global company. And I have seen on your website that you have done some work with mass timber. I have two questions.

The first one is what are the barriers for more mass timber construction in buildings?

Mr. RUDD. Thank you for the question.

First of all, most of the projects that we are involved with obviously are driven by the desires and the economic benefits to our customers and to our clients.

And so, first of all, today, when we look at the—again, I am repeating this—the models that are used to evaluate these types of projects is focused on cost. It is not focused on elements beyond simply the cost of the project. So, for example, like promoting the investment in timber construction, which effectively is creating a carbon sink, promoting decarbonization of our environments.

So, again, my suggestion again is, when we look at these types of projects, some encouragement in terms of the legislation to promote thinking beyond just simply the lowest cost model of construction would allow us to move in the direction of promoting timber construction, large timber construction, and promoting the creation and investment in carbon sinks.

Mr. WESTERMAN. Are you facing any regulations or building codes that prohibit using mass timber construction?

Mr. RUDD. I will have to have somebody research that, and get back to you with the answer. I don't know the answer to that question.

Mr. WESTERMAN. The U.S. Forest Service lab has also done studies that show that using mass timbers in bridge construction can produce structures that last up to 50 years. What do you think about engineering firms, architecture firms using mass timber in rural bridge construction?

Mr. RUDD. Well, again, when we look at our projects around the world, we see a combination of mass timber construction, steel bridge construction, and concrete bridge construction. As far as I can tell, there is no regulation that is preventing the adoption of it. I think we have to change that direction, and look at not mandates, but look at ways of encouraging use towards mass timber construction.

Mr. WESTERMAN. And with what little time I have got, Mr. Chairman, I would just add a plug that we have got to produce more of our rare earth minerals here, in the United States, to fuel our green economy. And I yield back.

Mr. DEFAZIO. I thank the gentleman.

Mr. Stanton?

Mr. STANTON. Thank you very much, Mr. Chair. Under your leadership, this committee will soon take up a transformative infrastructure investment bill. I can't wait. And it is so important that we make the case that this hearing is making, that when we make that investment, not only will it do right by the American economy, and job creation, and pay for itself many times over, but it is also going to help, when we do it right, reestablish American leadership on the issue of climate change. So thank you for hosting this important hearing.

I know that, as a former mayor of one of the largest cities in America, that when we made smart investments in fighting climate change and climate adaptation, it helped the city's bottom line. It certainly helped when the various credit rating agencies, the bond agencies, would rate the city of Phoenix, which had the highest bond rating of any of the largest cities in America. The fact that we made smart investments to fight climate change at the municipal level was an advantage.

Arizona, of course, is getting hit harder, as hard or even harder than almost any other State in the country, with extreme heat and the drought conditions that we are facing, as well as forest fires. So these investments are important, and they are very real to our community.

On the private-sector side, by the way, corporations, publicly traded corporations, are being judged whether or not they are making the right investments in their future in fighting climate change. So at the global level, at the national level, at the State level, on the private level, this is really good for business.

Mr. Allen, my question is for you. Your testimony states that the Federal surface transportation policy supporting the development of alternative fuel technologies and investments in zero-emission vehicles can help ensure the United States becomes the global leader that it should be in research, development, and manufacturing of electric vehicles. I want you to elaborate a little bit more on that.

And what can this committee, this important committee, do to help ensure that the U.S. competitiveness stays in the global electric vehicle market?

Mr. ALLEN. Thank you, sir, for the question. I think the biggest area that this committee can help with, and the biggest thing that we can do in the United States is support domestic supply chain.

Today, the cells that all of us use come from a foreign country. Many of them are from China, Korea, Japan. There is no reason, with the increasing demand in the United States, that we can't have cell manufacturing here in the United States, and in partnership with the companies that are currently making them. This will help mining in North America. This will reduce supply chain costs, overall cost. It will create phenomenal manufacturing jobs in the United States. So I encourage this committee, through both incentives and Buy America requirements, to move forward and help the supply chain make these investments in North America.

As the gentleman from Pilot Flying J has said, it is very difficult for companies to do this because of a little bit of the chicken and the egg. So to have Government get out ahead, and help these companies when volumes are low to be able to provide the opportunity to scale up, is really an important factor that I think can be a great public-private partnership, going forward.

Mr. STANTON. Thank you so much for that answer.

Mr. Chair, I have some additional questions. I will submit them for the record in the interest of time, and I will yield back.

Mr. DEFAZIO. I thank the gentleman.

Mr. Lamb?

Mr. LAMB. Thank you—

Mr. DEFAZIO. Mr. García?

Mr. LAMB [continuing]. Mr. Chairman.

Mr. DEFAZIO. What?

Mr. LAMB. Thank you, Mr. Chairman. And I—

Mr. DEFAZIO. Sorry, wait a minute, wait a minute. It was a Republican turn.

Mr. Guest?

Sorry.

Mr. GUEST. Thank you, Mr. Chairman. To all of our distinguished panel, I want to thank you for being with us today. I want to start off.

Mr. Hernick, in reading your testimony that you provided to the committee, on page 2 you talk about "Congress will need to reduce or eliminate barriers to infrastructure development. It should take 2 years, not 10 years, to permit infrastructure projects. Redtape is not the price of good Government; it is the enemy of good Government. America could modernize its infrastructure, reduce costs, while dramatically enhancing environmental benefits, with a 2-year approval process for large construction projects."

You go on to say that polling shows a significant percentage, roughly 73 percent, support streamlining and reforming Government regulations. I know that this is something that I hear about routinely when I am back home in the district, meeting with governmental officials. And I would just ask you if you could please just expand on that for just a few moments.

Mr. HERNICK. Yes, absolutely, Congressman, I appreciate the opportunity to go into a little more detail.

The truth is that what Americans want from their Government is responsiveness. They are interested in seeing private-sector solutions to meet their needs on a daily basis. And there is a role for Government to safeguard the environment, safeguard the people working on projects, and to safeguard national monuments and the things that make this country great.

But really, Americans are looking for a firm thumbs up or thumbs down on whether or not a project or a business can proceed at pace. And when we are talking about creating jobs, when we are talking about the economic transformation and benefits that we are going to see from moving to a cleaner and cleaner grid, and moving to a cleaner and cleaner national transportation infrastructure, we want to make sure that that can be done on a timely basis.

And I think that the FAST-41—the FAST Act—demonstrated that these types of projects can be done upholding all of the social and environmental safeguards that we need, that if we hold Government bureaucrats accountable to a timeline, the same way that the private sector is, the same way that I am, as an employee, and that if we hold Government to those same standards, Government can perform on a timeline. And I think that is not too much to ask.

Mr. GUEST. And you go on on page 8, and you talk about the fact that there is another cost-efficient way to significantly reduce emissions in the vehicle fleet. And you talk about switching to low-emission fuel, such as natural gas or propane. And I have also had the opportunity, when I am home in the district visiting some of my propane suppliers, to talk about or to hear about the benefits of propane vehicles, whether it be automobiles, forklifts, riding lawn mowers—normally vehicles which would burn either gas or diesel—being converted to natural gas or propane.

You talked about cost savings, emission reduction, and energy security. Again, could you just expand on that very briefly, about the benefits of vehicles which would use natural gas or propane, instead of gasoline or diesel?

Mr. HERNICK. Absolutely. The bottom line, Congressman, is that we need an all-of-the-above approach.

Mr. Allen spoke about the price point for electric schoolbuses being there now. But there is still an upfront cost. And some school districts, some municipalities just don't have the cash on hand, especially in these tough economic times, to make those kinds of investments.

It is going to be more appropriate to switch to propane in some cases. And, you know, for moms and kids and dads standing at the bus stop, those types of air quality emissions benefits that we can see within the next year or two, well, that matters a lot more than waiting for a complete transition to electric vehicles. And that is not to say that electric vehicles aren't a part of the future, they certainly are. But I think that what we want is, from Government, an all-of-the-above approach to be able to allow States and municipalities to utilize the most locally appropriate approach.

Mr. GUEST. And would you agree that we currently have the technology, the ability on many of our vehicles to go ahead and transition them over right now to propane or natural gas?

Mr. HERNICK. It is happening right now. I live in Maryland, and it is one where Governor Hogan has taken the issue very seriously. He wants to reduce emissions. And so it has been great to see his administration be able to make those switches, and make that investment. They are improving air quality and reducing emissions in a very cost-effective way, and I think that is something that the Federal Government can look at, too.

Mr. GUEST. Thank you, Mr. Chairman, I yield back.

Mr. DEFAZIO. I thank the gentleman.

Mr. Lamb?

Mr. LAMB. Thank you, Mr. Chairman. I wanted to start out by just emphasizing the great local support that Wabtec's Freight 2030 vision has already obtained in Pittsburgh.

And if I could ask unanimous consent to insert two letters into the record from the Greater Pittsburgh Chamber of Commerce and the Allegheny County Executive regarding the Freight 2030 vision.

Mr. DEFAZIO. Without objection.

[The information follows:]

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**Letter of March 17, 2021, from Matt Smith, President, Greater Pittsburgh Chamber of Commerce, Submitted for the Record by Hon. Conor Lamb**

MARCH 17, 2021.

Hon. PETER DEFAZIO,

*Chairman,*

*Transportation and Infrastructure Committee, U.S. House of Representatives, 2134 Rayburn Office Building, Washington, DC.*

Hon. SAM GRAVES,

*Ranking Member,*

*Transportation and Infrastructure Committee, U.S. House of Representatives, 1135 Longworth House Office Building, Washington, DC.*

DEAR CHAIR DEFAZIO AND CONGRESSMAN GRAVES:

On behalf of the Greater Pittsburgh Chamber of Commerce, the advocacy affiliate of the Allegheny Conference on Community Development, I write to express our support for the public-private partnership proposed by Wabtec Corporation, Genesee & Wyoming, and Carnegie Mellon University to establish a Freight Rail Innovation Institute. This partnership presents a unique opportunity to positively impact our environment, improve the economic future of the Pittsburgh region while also increasing the competitiveness of the nation's infrastructure by providing the equipment and technology to move freight more efficiently, effectively, and cleanly.

The Pittsburgh region is an established testbed and proving ground for world shaping technologies and innovations like the ones that this partnership is designed to yield. The region's world-class educational institutions, including two Tier 1 universities that anchor a robust innovation ecosystem, coupled with a long history of effective public-private collaboration, make it exceptionally positioned to serve as home to this institute.

Furthermore, this project is consistent with the sustainability principles adopted unanimously by the Allegheny Conference's Board of Directors in January 2019. These principles guide the Conference's work as it seeks to balance a healthy environment and a healthy economy. The proposed Freight Rail Innovation Institute aligns with these principles given its efforts to expand the use of rail freight, accelerate the reduction of national greenhouse gas emissions, extend the life of our roadway networks, and make transportation safer for the benefit of all our communities.

We recognize and welcome investments in sustainable energy and the efforts to achieve a low carbon future. Achieving this objective will require unwavering commitment to and investment in research and development initiatives; the proposed Freight Rail Innovation Institute will catalyze these efforts.

With freight volumes forecasted to grow approximately 30 percent from 2018 to 2040 according to the U.S. Department of Transportation, the proposed institute possesses a unique opportunity to drive a more sustainable future that also increases economic growth. With over 140,000 miles of track across the U.S. freight

network, investment in the future of rail benefits the entire country and invests in the network that moves our goods to market and makes modern life possible. Investment in this private-public partnership will accelerate the commercialization of technologies dedicated to sustainable energy, autonomous deployments, and advanced network logistics, and strengthen the ecosystem of rail supply companies and contractors that employ thousands of well-paying freight-related careers. Support of the vision championed by Wabtec Corporation, Genesee & Wyoming, and Carnegie Mellon University will take this vision to a reality from which we can all benefit.

Pittsburgh is an innovative hub for tangible outcomes changing the world. As such, we feel there is no better place for this Institute to thrive. I urge your strong consideration and support of the Freight 2030 vision and investment in our shared economic future. Please feel free to contact me with any questions or if you need further information.

Sincerely,

MATT SMITH,  
*President, Greater Pittsburgh Chamber of Commerce.*

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**Letter of March 16, 2021, from Rich Fitzgerald, County Executive,  
Allegheny County, PA, Submitted for the Record by Hon. Conor Lamb**

MARCH 16, 2021.

Hon. PETER DEFAZIO,  
*Chair,  
Transportation and Infrastructure Committee, U.S. House of Representatives, 2134  
Rayburn Office Building, Washington, DC.*

Hon. SAM GRAVES,  
*Ranking Member,  
Transportation and Infrastructure Committee, U.S. House of Representatives, 1135  
Longworth House Office Building, Washington, DC.*

CHAIR DEFAZIO AND CONGRESSMAN GRAVES:

I write today to convey my support for the public-private partnership being proposed by Wabtec Corporation, Genesee & Wyoming, and Carnegie Mellon University to create a Freight Rail Innovation Institute. This initiative will assist in Congressional goals of building a clean energy economy and creating jobs while also curbing the effects of climate change. Its location in the Pittsburgh region would also allow for all parties involved to take advantage of the education and research occurring here.

Our region is not the Pittsburgh of 30 years ago, but it is a community that welcomes, embraces and invests in green energy and sustainability. We also recognize that there is a bridge that moves all of us from reliance on fossil fuels to sustainable energy. That shift in our energy requires investment and commitment, as well as a vision, that is clearly evident in the proposed Freight Rail Innovation Institute. Efforts to expand the use of freight rail, accelerate the reduction of national GHG emissions, reduce road congestion, and make transportation safer is a benefit for all of our communities.

As you are likely aware, this region has a long relationship with rail and has continued to invest in its development and expansion. With over 140,000 miles of track across the U.S. freight network, investment in the future of rail benefits the entire country. A single freight train can move a ton of freight 472 miles on one gallon of fuel. Rail moves 40% of freight and accounts for less than 1% of total U.S. GHG emissions. Imagine the our domestic policy. With investment in this partnership, technology research moves forward more quickly with a vision and there are dedicated efforts to focus on best practices as it relates to green energy and advanced network logistics. Support of this effort takes this vision to a reality from which we can all benefit.

I urge your strong consideration and support of the Freight 2030 vision and investment in the future of freight. I stand ready to answer any questions you may have of me, or to provide additional information as needed.

Sincerely,

RICH FITZGERALD,  
*County Executive, Allegheny County, PA.*

Mr. LAMB. Thank you, Mr. Chairman. This vision really builds on what, in western Pennsylvania, has been a successful model of collaboration between our universities—in particular, Carnegie Mellon—and these great heritage companies that we have, like Wabtec, which is related to the original Westinghouse set of endeavors, that has given us things over the years like nuclear energy, and a number of defense technologies, and important technologies for freight rail. And this is really the next generation.

And so, Mr. Santana, I'm hoping that you are still on here remotely, I was hoping that you could go into a little bit more detail for the committee about the sort of public-private balance of the project that you guys are proposing here. Our understanding is you already have a locomotive running on a battery, essentially, out in some very harsh terrain out in California. But there are further leaps that need to be made, further scientifically—in particular, bringing hydrogen into the equation, and all of the manufacturing and engineering that would go into actually making those fuel cells for the future.

If you could, talk a little bit about how that demand for further research and knowledge would be met in a mix of investment by your company privately, a university like Carnegie Mellon, and the Federal Government, as well.

Mr. SANTANA. Representative Lamb, we are seeking your approval for this public-private partnership, so we can really bring and start working with the Department of Energy, the Department of Transportation, and making sure that we ultimately are really executing on the vision we laid out, which starts with decarbonization.

There is significant steps here that would evolve with the next generation of battery-electric locomotives. But getting to fuel cells and getting to hydrogen, it is a roadmap that provides, I think, critical milestones to continue to decarbonize solutions for rail at the same time it de-risks as we go there.

On the other front, we have the opportunity here to increase rail utilization. This partnership with CMU, we bring the best of the country, and certainly the best of Pittsburgh, when it comes to both artificial intelligence and robotics. This is about, really, creating more efficiency as you move things from point A to point B, which ultimately translates to more competitive logistics for the country. And it comes down to creating standards. It comes down to really connecting a multitude of stakeholders to this process.

And so—

Mr. LAMB. Thank you and I think the competitiveness—

Mr. SANTANA [continuing]. Down the—

Mr. LAMB. If I could, yes, just get in before we run out of time, I think the competitiveness point is a key one, because we are not the only ones in the world who are interested in improving our freight and logistics.

And we certainly are not the only ones in the world who are interested in hydrogen. Europe and China have both already openly published national hydrogen strategies. This is a new technology that they intend to dominate and not allow the United States to be the world leader in the way that we were world leaders in oil

exploration, and natural gas exploration, and nuclear energy, and all the rest.

And so, for those considering what is the role of public investment in public and private partnerships like this, one important role is simply to win the race, to speed up the pace of our development and advancements, because we are going against state-backed enterprises from China, and similar dynamics from the EU, as well.

So I think your proposal is a great one. I hope that the committee can continue to work with Wabtec and CMU, and all of those interested in this, not just for the good of western Pennsylvania, which is very close to my heart, but I think it is part of our overall national transportation and competitiveness strategy.

And with that, Mr. Chairman, I yield back.

Mr. DEFAZIO. I thank the gentleman.

Mr. Fitzpatrick?

Mr. FITZPATRICK. Thank you very much, Mr. Chairman. I have two questions for Mr. Henrick.

And I will ask both of them, and I will allow you to respond.

The Federal Government just spent close to \$7 trillion over the last year in response to the pandemic. My first question is, how do you think Congress should pay for the country's much-needed infrastructure, going forward, what revenue mechanism?

And second, you had mentioned FAST-41 in your opening testimony. It is viewed as a tremendously successful model for ensuring infrastructure projects stay on track. So I was just wondering, secondarily, if you could outline some of the successes from this program, and explain why you think this bipartisan initiative should be extended.

Mr. HERNICK. Well, thank you for your questions, Congressman Fitzpatrick.

There has been a lot of stimulus, and a lot of money that Congress has passed just recently. I do want to underscore that \$34 billion of that was for clean energy, as a part of the Energy Act of 2020. And I do want to thank, again, the Members who voted in a bipartisan manner to support that Energy Act of 2020. It included very important price signals for the market in terms of tax incentives, and also included important updates for the Department of Energy, in particular, to be able to get us to that next generation of clean energy.

I think that is important to underline, that we have already done a lot, and I think it is important to see how that affects the economy. I mentioned earlier that I have four daughters. In terms of how to pay, I would rather that we figure out how the folks on this screen here can pay for any additional spending on transportation and infrastructure, and not those girls. I think it is important to be able to look at a balanced budget approach, and make sure that we are not overdoing it. There is a lot of stimulus in the pipeline.

There is no shortage of private-sector capital that is aimed at clean energy. Very specifically, some of the biggest investors on Wall Street have climate considerations that they are putting in on a voluntary basis to help guide their funding towards clean energy. So if you have got a clean energy project, and it can pencil out, you have got an investor. There is no question about that.

In terms of FAST-41, I think that it is also important to note that there are the types of projects that we need to make this transition to a clean transportation and a clean energy future in there: wind power on public land, and then a couple of different transmission lines that are going to be needed to assure that we have the reliability built into our grid to diversify, maintain an all-of-the-above approach to generating power, and then ensure that folks can keep the lights on, no matter what Mother Nature brings or has in store for us.

So there is a major opportunity to reauthorize FAST-41. That is kind of a first step, in my mind. I think that looking to One Federal Decision and codifying that, as well, would be a second and also a beneficial step.

Mr. FITZPATRICK. Thank you, Mr. Henrick, and thank you to your organization for being very objective, very policy focused, working in a bipartisan manner. There is a huge need out there. You guys do a really good job in working with Democrats and Republicans to advance responsible solutions. So I thank you for that, sir.

I yield back, Mr. Chairman.

Mr. HERNICK. Thank you.

Mr. DEFAZIO. Thank you.

Mr. García?

[Pause.]

Mr. DEFAZIO. What? All right.

Well, I want to thank our witnesses for hanging in through a long hearing. I appreciate all your contributions to this topic, and you have proved to be a valuable resource.

So, since there are no further questions from the committee, I ask unanimous consent that the record of today's hearing remain open until such a time as our witnesses have provided answers to any questions that may be submitted to them in writing.

I also ask unanimous consent the record remain open for 15 days for any additional comments and information submitted by Members or witnesses to be included in the record of today's hearing.

Without objection, so ordered.

The committee stands adjourned.

[Whereupon, at 3:02 p.m., the committee was adjourned.]



## SUBMISSIONS FOR THE RECORD

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### **Prepared Statement of Hon. Eddie Bernice Johnson, a Representative in Congress from the State of Texas**

Mr. Chairman, the work of the Full Committee on climate change and our ability to impact change is critical to the health and wellbeing of people in our country. Climate impacts everyone and everything. The transportation industry is one of the largest contributors to greenhouse gas emissions because of the number of trucks and cars on the road.

This hearing, focusing on the business case for climate solutions, gives us the opportunity to understand how private sector innovation, along with meaningful government investments, will help the U.S. become a leader in the clean energy economy. We cannot allow this industry to be dominated by foreign companies. We must bring these jobs home.

President Biden's goal of adding 500,000 EV charging stations over the next decade requires a strong partnership between the federal government and the private sector. I would like to see American companies building and maintaining the clean energy sector in the United States. We must be self-reliant and build resilient and affordable clean energy solutions. There is no doubt that expanding the electric vehicle industry will provide more well paid jobs here in the U.S. I understand that in California, electric vehicles provided over 275,600 jobs with an average annual wage of \$91,300 in 2018.

According to the Dallas-Fort Worth Clean Cities, direct jobs are created through increased production by firms that make plug-in electric vehicles (PEVs), PEV components, and PEV infrastructure. Indirect jobs are those tied to firms that supply to these direct producers. Further, higher employment in direct and indirect jobs leads to more spending in the broader economy. These create induced jobs in industries like food, clothing, and entertainment.

According to Plug in America, the increased use of domestic electricity in the transportation sector promotes national security by reducing our dependence on imported oil. These vehicles keep the U.S. competitive with China and the European Union, which are both moving aggressively towards full deployment of the vehicles and nationwide charging systems. There are currently over 19,281 PEVs on Texas roads today, with the market ready to expand as new vehicle makes and models become available in Texas. These vehicles are a win-win for Texas and consumers want more of them.

In the public transportation sector, research shows that in 2019, over 9.9 billion trips were taken by Americans on public transportation. Over 71% of those public transit riders are employed. Public transit takes people to work and back home and it leads the way to a cleaner climate and thus healthier lives for everyone.

It is my hope that the fuel operators and the electric vehicle charging network will be able to work together to establish a safe, affordable and reliable network to keep our country moving forward. I look forward to the testimony of each of the witnesses today. Thank you, Mr. Chairman.

**Letter of March 17, 2021, from Cathy Bennett, Sr. Vice President for Public Policy, Greater Kansas City Chamber of Commerce et al., Submitted for the Record by Hon. Peter A. DeFazio**

MARCH 17, 2021.

Hon. PETER DEFAZIO,  
*Chair,*  
*Committee on Transportation and Infrastructure, 2134 Rayburn House Office Building, Washington, DC.*

Hon. SAM GRAVES,  
*Ranking Member,*  
*Committee on Transportation and Infrastructure, 1135 Longworth House Office Building, Washington, DC.*

DEAR CHAIR DEFAZIO AND RANKING MEMBER GRAVES:

Our business organizations urge your committee to update the federal transportation program to measure success by access to destinations—*not* vehicle speed—to support public transit, connected communities, businesses, and our climate.

Communities with strong transit, walking, and bike access to jobs and services produce lower greenhouse gas emissions, while also serving as great environments for vibrant economic activity and more equitable opportunity. Yet the federal transportation program does not support the development of these communities.

Instead, the federal transportation program increases vehicle miles traveled—and thus greenhouse gas emissions—by design, solidifying transportation as the largest source of greenhouse gas emissions in the United States. This is because for decades, the federal program has used vehicle speed as a flawed proxy to measure how well people can access jobs and services like healthcare, education, and grocery stores.

As a result, our states and communities have built more roads and spread out destinations, often requiring longer car trips while making walking, bicycling, and accessing public transit stations unsafe, unpleasant, or impossible. This has put the United States on a path of endlessly-increasing vehicle miles traveled and greenhouse gas emissions. It has also made our communities less convenient and limited economic growth by increasing costs and travel times for transportation.

Fortunately, technology exists to measure success by what actually matters to Americans and our businesses: the ease of arriving at your destination—not vehicle speed. Instead of prioritizing investments in road widenings and expansions that fail to improve access to jobs and services and increase our carbon emissions, we can invest in the most impactful and cost efficient infrastructure, which may be highways, public transit, passenger rail, or safe pedestrian and cyclist infrastructure. Providing more transportation choices and more connected communities creates more opportunities for business while also reducing emissions from transportation.

To do this, the federal transportation program should require the U.S. Department of Transportation to determine how well the transportation system connects people to jobs and services, and prioritize projects that will improve those connections. USDOT must collect the data necessary to develop a national assessment of access to jobs and services and set national goals for improvement. With this data, state departments of transportation and planning organizations can ensure that federal investments effectively connect people to economic opportunity. Funding should go to projects that will improve these connections, regardless of mode. State departments of transportation (DOTs) and metropolitan planning organizations (MPOs) should be held accountable by evaluating how well their investments help connect people to destinations.

We are tired of spending over \$40 billion in federal tax dollars on transportation every year that fails to bring us the connected, transit, biking and walking friendly neighborhoods that businesses and customers desire. We urge your committee to align transportation funding with the outcomes our businesses need: getting people to jobs and services sustainably, equitably, affordably, and conveniently—by any mode. This approach will benefit the bottom line and the climate.

Sincerely,

CATHY BENNETT,  
*Sr. Vice President for Public Policy, Greater KC Chamber of Commerce,  
Kansas City, MO.*

MARK FISHER,  
*Chief Policy Officer, Indy Chamber, Indianapolis, IN.*

NICHOLAS GLOVER,  
*Vice President, Advocacy, Tampa Bay Chamber, Tampa, FL.*

CHIP HALLOCK,  
*President & CEO, Newark Regional Business Partnership, Newark, NJ.*

ASHLEY HENRY,  
*Executive Director, Business for a Better Portland, Portland, OR.*

PAUL OH,  
*Manager, Public Policy, Gwinnett Chamber of Commerce, Duluth, GA.*

WILLIAM SCHROEER,  
*Executive Director, East Metro Strong, Saint Paul, MN.*

ANN SILVER,  
*Chief Executive Officer, Reno + Sparks Chamber of Commerce, Reno, AZ.*

JONATHAN WEINHAGEN,  
*President & CEO, Minneapolis Regional Chamber of Commerce, Minneapolis, MN.*

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**Statement of the Carnegie Mellon University, Submitted for the Record by  
Hon. Peter A. DeFazio**

INTRODUCTION

Carnegie Mellon University commends Chairman DeFazio, Ranking Member Graves and the Members of the Committee for pursuing an aggressive hearing agenda at the start of the 117th Congress to examine the critical challenges facing the United States—from economic recovery to climate change, environmental equity, global competitiveness, and optimizing US supply chain and manufacturing, and how central investments in the transportation sector are to addressing them.

In particular, we are pleased to submit the following statement for the record following the Committee's March 17, 2021 hearing on the Business Case for Climate Solutions, which examined the potential of US industry, including the rail industry, to mitigate climate change. This hearing highlighted the role that a bold agenda for the decarbonization of freight rail can play in achieving climate objectives, strengthening U.S. manufacturing and enabling a more robust and resilient manufacturing supply chain.

FREIGHT 2030—ENSURING U.S. LEADERSHIP IN CLEAN ENERGY RAIL FREIGHT  
TECHNOLOGIES AND IMPROVING RAIL SAFETY

As Mr. Rafael Santana, President and CEO of Wabtec testified at the hearing, Freight 2030 is a bold plan to accelerate the development of near zero emissions freight rail. Developed in collaboration with Carnegie Mellon and Genesee and Wyoming Railroad, Freight 2030 offers a vision to ensure that the U.S. wins the race for global leadership in Zero Emission rail. It is an industry-driven strategy to rapidly combine breakthrough research with applied development, prototyping and scalable commercialization. It also requires a creative and comprehensive workforce strategy to support training and education for workers across the transportation and manufacturing industries.

The goals of this initiative are ambitious and transformative: To transition the freight rail system to zero or near-zero-emission battery and hydrogen hybrid locomotives, with a target reduction of 120 million metric tons of CO<sub>2</sub> per year in the US; enable a 50% reduction in safety incidents through intelligent systems and sensing; enable a 50% increase in freight rail utilization; and generate up to 250,000 new jobs, of which half would be direct job creation in transportation and manufacturing.

Freight 2030 envisions the creation of a new advanced clean energy rail technology and logistics ecosystem. Achieving H<sub>2</sub> substitution in engine operations and railway grade fuel cells demands advances in new materials and advances in batteries and storage, combined with the intelligent systems engineering needed to deploy these capabilities. In turn, advances in artificial intelligence will be needed to

support expanded rail capacity. AI will enable the enhanced signaling and network traffic systems to ensure increased safety and increased rail utilization and seamlessly connect the railroad system to intelligent ports. AI and autonomous systems technologies will be vital to break the last mile bottleneck that will enable realization of enhanced multi-modal innovation.

Carnegie Mellon has a rich history of engagement in initiatives advancing innovation in energy and artificial intelligence to transform industries and foster innovation led job creation. The focus on integrating research deployment Freight 2030 has the potential to catalyze job growth across the nation and strengthen leadership in both clean energy and logistics industries.

This is a global race. This initiative will match similar investments that global competitors are advancing. Support for Freight 2030 will help ensure that the U.S. wins the race to global leadership in Zero Emission rail.

BUILDING THE TOOLS TO SUPPORT WORKFORCE DEVELOPMENT AND ENGAGING  
DIRECTLY WITH WORKERS

Freight 2030 is at its essence a jobs initiative. It seeks to create jobs throughout a new clean energy rail industry—from clean fuel locomotive production to systems operations to rail yard management across the nation.

These jobs will require new skills, understanding of new data driven technology applications, and increased worker teaming with intelligent systems.

Freight 2030 will include the development of workforce training initiatives from the start. This effort will include collaborations with training organizations supporting both manufacturing and rail operations workers.

CONCLUSION

This Committee continues to demonstrate transformative leadership to accelerate innovation in American transportation industries. It was the work of this Committee that helped catalyze U.S. leadership in autonomous vehicle technologies, which has contributed to the creation of over three thousand jobs in just the Pittsburgh region alone. The Committee's unwavering commitment to innovation initiatives in the Department of Transportation has also helped shape collaborative university/industry initiatives in areas such as smart city technologies that are reshaping transportation, mobility and the sustainability of urban and rural communities.

Freight 2030 can add yet another chapter to this record of innovation by advancing a new generation of U.S. leadership in freight rail manufacturing and technologies.

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**Letter of February 7, 2021, from Joy Ditto, President & CEO, American Public Power Association; Tom Kuhn, President, Edison Electric Institute; and Jim Matheson, CEO, National Rural Electric Cooperative Association, Submitted for the Record by Hon. Peter A. DeFazio**

FEBRUARY 7, 2021.

Hon. PETE BUTTIGIEG,  
*Secretary,*  
*U.S. Department of Transportation, 1200 New Jersey Ave., SE, Washington, DC.*

Hon. MICHAEL REGAN,  
*Administrator-designate,*  
*U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW, Washington, DC.*

Hon. JENNIFER GRANHOLM,  
*Secretary-designate,*  
*U.S. Department of Energy, 1000 Independence Ave., SW, Washington, DC.*

Hon. GINA MCCARTHY,  
*National Climate Advisor,*  
*Executive Office of the President, 1650 Pennsylvania Ave., NW, Washington, DC.*

DEAR SECRETARY BUTTIGIEG, SECRETARY-DESIGNATE GRANHOLM, ADMINISTRATOR-DESIGNATE REGAN, AND CLIMATE ADVISOR MCCARTHY:

The nation's investor-owned electric companies, public power utilities, and electric cooperatives—which our organizations proudly represent—look forward to working with you and to leveraging the investments our members are making to help meet

your Administration's goal of deploying electric vehicle charging stations across the country.

Our members provide safe, reliable, and affordable energy to more than 300 million Americans. The electric power industry supports more than 7 million American jobs and contributes \$880 billion annually to U.S. gross domestic product, about 5 percent of the total. Each year, our industry invests more than \$110 billion to make the energy grid stronger, smarter, cleaner, more dynamic, and more secure. These investments enable us to integrate more clean energy and new technologies into our electric systems, including electric vehicles (EVs), to benefit customers.

Our members are proud of the progress that has been made in deploying clean energy resources. As the Administration turns to electrifying transportation, we are committed to working with you to leverage our industry's investments to deploy electric vehicle charging infrastructure and to accelerate electric transportation adoption that will grow the economy and benefit the environment.

To get more EVs on U.S. roads, it is important that we invest in and deploy more charging infrastructure. Building this infrastructure will require public-private partnerships, and our members are critical to that effort, in part because they employ a highly skilled workforce that builds and maintains the energy grid. A collaboration between the federal government and our sector will help to create additional jobs and will help spur economic recovery.

Charging stations are one piece of a vast system with implications for the grid. Our members are a crucial partner in building and maintaining the infrastructure to deploy EV charging stations at all the locations where EVs charge. These investments are structured to best serve communities and customers.

Our members already own and operate EV charging stations in a variety of locations and for all types of customers. These arrangements are particularly beneficial to consumers who prefer not to procure and maintain charging infrastructure and seek a turnkey solution. Some of our members install the "make-ready" infrastructure that connects to the charging equipment, leaving it to the consumer to own and maintain the charging station. And other members offer rebate programs to offset the costs to install charging infrastructure.

Regardless of the approach, each of these solutions is critical to building charging infrastructure that helps to spur the EV market and benefit communities. This is particularly true in regions where private investment in EV charging stations historically has been difficult.

It is important that all communities have access to the benefits of EVs, and our members are investing in underserved communities, in electrifying car-sharing and public transportation systems that serve those who do not own vehicles, in electrifying commercial vehicles such as delivery trucks that operate within neighborhoods, and assuring that Americans can charge their vehicles coast-to-coast in urban, suburban, and rural communities. Each community may have a different model that works best. Providing flexibility will ensure that more communities can participate in charging programs, leading to more EV charging stations across the country.

Local decision-making will help ensure charging stations meet the needs of each community. Our members continue to work with local stakeholders and are best-positioned to understand and to maximize the value of different technologies and systems that can help optimize the operation of the grid, integrate EVs, and recover more quickly from natural disasters.

However, the federal government is a key partner in the research and development related to EVs and the associated charging infrastructure, and technical and financial assistance can help accelerate deployment. Existing programs across federal agencies have been effective in deploying alternative-fuel vehicles and infrastructure, while other programs should be updated to reflect current advancements in technology.

Today, nearly 40 percent of the nation's electricity comes from carbon-free sources, and carbon emissions from the U.S. power sector are at their lowest level in more than 30 years—and continue to fall. The electric power sector's significant leadership in reducing carbon emissions can help drive carbon reductions in other sectors, especially transportation, through increased electrification.

We look forward to working with you and to our continued partnership in advancing clean energy technologies and electric vehicle infrastructure.

Sincerely,

JOY DITTO,  
*President & CEO, American Public Power Association.*  
 TOM KUHN,  
*President, Edison Electric Institute.*  
 JIM MATHESON,  
*CEO, National Rural Electric Cooperative Association.*

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**Letter of March 15, 2021, from Joe Britton, Executive Director, Zero Emission Transportation Association, Submitted for the Record by Hon. Peter A. DeFazio**

MARCH 15, 2021.

Hon. PETER DEFAZIO,  
*Chairman,*  
*House Committee on Transportation and Infrastructure, United States House of Representatives, 2134 Rayburn House Office Building, Washington, DC.*

DEAR CHAIRMAN DEFAZIO,

Electrifying transportation is critical to helping the United States compete for investment, advance technological innovation, grow our economy and address climate change. We have the opportunity—if we make the right policy decisions today—to cultivate an advanced vehicle industry that drives decarbonization, creates jobs, and once again makes us the envy of the automotive world.

Electric vehicles (EVs) support over 300,000 American jobs with new EV manufacturing and infrastructure poised to create hundreds of thousands of new jobs in the years to come. EV growth is projected to accelerate worldwide, whether manufactured in the U.S. or elsewhere. Other countries know this and are moving aggressively to seize the generational opportunity. We must lead this race or we'll cede this economic opportunity to foreign competitors.

In particular, China and the EU have risen to dominance in the critical supply chain and EV sector over the past 15 years. China's moves to control critical material supply chains are not only a threat to EVs but also consumer electronics and national security infrastructure. While some raw materials are sourced in other parts of the world, China controls a full 70–90% of the processing and production. The U.S. has an opportunity to counter this threat, and secure our own economy, by responsibly expanding our ability to source these materials from within our own borders. Not only will domestic sourcing bolster job creation, but it will also ensure high standards for our environment and workforce.

Despite the gains made by other nations, the United States is still strongly positioned to outcompete even the most advanced EV leaders around the globe. In fact, the most sought-after EV technologies are homegrown in the United States. Dozens of aspiring U.S. companies are producing EVs that will alter the landscape in the years ahead.

As you know, transportation is the largest carbon-emitting sector in the economy, responsible for 28% of emissions. Electrification of the transportation sector will significantly reduce emissions and address both climate change and public health effects throughout the country. While any manufacturing process includes some carbon impacts, EVs are cleaner than gasoline-powered cars, and will only get cleaner as we decarbonize the grid.<sup>1</sup> When we evaluate the entire process of manufacturing an EV and sourcing the electricity, EVs generate up to 67% fewer emissions over their lifetime than their gas-powered counterparts.<sup>2</sup>

EVs are not just good for reducing emissions—consumers also benefit from direct fuel and maintenance savings. EV owners can save over \$700 a year in fuel and \$330 in annual maintenance costs. Meanwhile, the retail price of EVs continues to decline as manufacturing scales up. And we are set to manufacture vehicles with 400–500 miles of range and battery packs costing as little as \$60/-per-kwh, two developments that will allow EVs to outperform internal combustion engine vehicles on both range and price. Consumers can now drive zero-emission vehicles without sacrificing on cost or features they have become accustomed to, and federal, state, and local incentives have the ability to drive greater consumer benefits and EV adoption.

<sup>1</sup> bloomberg.com/news/articles/2019-01-15/electric-cars-seen-getting-cleaner-even-where-grids-rely-on-coal

<sup>2</sup> woodmac.com/press-releases/evs-up-to-67-less-emissions-intensive-than-ice-cars/

For these and other reasons, we must grow and expand consumer incentives for light-, medium- and heavy-duty vehicles, invest in an extensive charging infrastructure network, and send a market signal that electrification is the future by setting strong fuel economy standards. The choices we make now will determine our course for decades to come. We can either embrace the economic and domestic manufacturing opportunities we now face, or risk relying on foreign imports for years to come.

For this reason, the Zero Emission Transportation Association is urging policymakers to act now and invest wisely to help the United States realize the economic potential of an electrified domestic transportation sector. We look forward to working with you as you continue to tackle these difficult decisions and support local economies across the United States.

Sincerely,

JOE BRITTON,

*Executive Director, Zero Emission Transportation Association.*

**Amazon and Global Optimism Co-founded The Climate Pledge, Submitted for the Record by Hon. Peter A. DeFazio**

[Editor's note: The following PDF has been modified from its original version. It has been formatted to fit this publication.]



Amazon is taking bold actions to address climate change.

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**THE Paris... CLIMATE 10 years PLEDGE Early**  
theclimatepledge.com

In 2019 Amazon and Global Optimism co-founded The Climate Pledge, a commitment to be net zero carbon by 2040—10 years ahead of the Paris Agreement.

52

Fifty-two additional companies—including **Unilever, Microsoft, Verizon, Best Buy, and JetBlue**—have joined Amazon in committing to achieve that goal. This coalition is growing rapidly, and includes partnerships with We Mean Business, the Race to Zero Campaign, and TED Countdown to scale climate solutions and action throughout global supply chains. This leadership builds on many years of advocacy in support of public policies that advance access to and the expansion of clean energy.

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**In support of Amazon's net zero carbon commitment, we are focused on action in the following areas:**



## 127 wind and solar projects around the world

### Renewable Energy

Amazon is the world's largest corporate purchaser of renewable energy, with investments in 127 wind and solar projects around the globe. These investments will enable us to supply our operations with more than 18 million megawatt hours (MWh) of renewable energy annually, enough to power 1.7 million U.S. homes for one year. These projects will supply renewable energy for Amazon's corporate offices, fulfillment centers, and Amazon Web Services (AWS) data centers that support millions of customers globally. They will also help advance our commitment to power our infrastructure with 100% renewable energy. Amazon is now on a path to achieve this milestone by 2025, five years ahead of our initial 2030 target.



### Sustainable Packaging

Amazon continues to innovate and find new ways to reduce packaging waste. Since 2015, we have **reduced the weight of outbound packaging by 33% and eliminated over 1 million tons of packaging material, the equivalent of over 2 billion shipping boxes.** Our Frustration-Free Packaging program encourages manufacturers to package their products in easy-to-open packaging that is ready to ship to customers without the need for an additional shipping box. We also recently introduced a fully recyclable paper mailer, and are expanding recycling options in local communities for materials like plastic film. We also partner with organizations like the Recycling Partnership and the Closed Loop Fund to expand circular economy infrastructure throughout North America.

### Sustainable Transport

We established a "Shipment Zero" goal to make all Amazon shipments net zero carbon, with **50% of shipments net zero carbon by 2030.** This means the fulfillment operations we undertake to deliver a customer's shipment are net zero carbon—from the fulfillment center where an item is picked off the shelf to the materials used to package the item, and the mode of transportation that gets the package to the customer's door. In support of this goal, in 2019, Amazon ordered **100,000 new electric delivery vehicles** from Rivian, a U.S. electric vehicle (EV) manufacturer, which we will begin to deploy in 2021, and will supplement existing EVs we operate around the world. Amazon plans to have **10,000 of the new Rivian electric vehicles on the road as early as 2022** and all **100,000 vehicles on the road by 2030.** We are also expanding our use of electric cargo bikes in U.S. cities. In July 2020, Amazon Air secured up to six million gallons of sustainable aviation fuel (SAF), and we are prioritizing sustainability by bringing SAF into our North America air operations.

### Climate Data

Our Amazon Sustainability Data Initiative (ASDI) on the AWS Cloud seeks to accelerate sustainability research and innovation by minimizing the cost and time required to acquire and analyze large sustainability datasets. ASDI supports innovators and researchers with data, tools, and technical expertise, and currently works with scientific organizations like NOAA and NASA to identify, host, deploy, and make publicly available key datasets on the Amazon Web Services (AWS) Cloud. ASDI also provides cloud grants to those interested in exploring the use of AWS' technology and scalable infrastructure to solve big, long-term sustainability challenges with this data.



**100,000 new electric delivery vehicles will be on the road by 2030**

**Technology Investments**

Through the Climate Pledge Fund, Amazon is investing at least **\$2 billion in visionary companies** whose products and service solutions will facilitate the transition to a low carbon economy, and support Amazon and other signatories on their path to net zero carbon. The Climate Pledge Fund invests in companies in multiple industries, with an initial focus on transportation and logistics; energy generation, storage, and utilization; manufacturing and materials; circular economy; and food and agriculture. We have already announced six investments in companies at the forefront of innovation across sectors, including carbon removal, electric vehicles, battery recycling, forest monitoring, efficient motors, and zero-carbon aviation.

**Sustainable Buildings**

As part of our commitment to The Climate Pledge, Amazon is working to reduce the carbon emissions associated with our buildings and facilities across the globe. We are transitioning our buildings to be net zero carbon, powered by renewable energy, and highly energy efficient, with demonstrated reductions in embodied carbon—the emissions associated with a building's construction materials. With more than 175 facilities covering 150 million square feet of space across the world, Amazon fulfillment centers, sortation centers, and delivery stations account for a major part of our embodied carbon. In 2020, Amazon began an in-depth study of our operations buildings in order to transition these facilities to net zero carbon. We are updating our design templates and criteria to capture these changes, and apply net zero strategies across all global regions.

**Sustainable Products**

For Amazon-owned Private Brand products and Amazon Devices, we work with our manufacturers and suppliers to drive sustainability improvements through materials and ingredients, design, sourcing, and manufacturing technology. Starting in 2020, we began investing in new wind and solar farms to produce clean energy equivalent to the electricity used by every customer's Echo device. We are also making it easier for customers to discover and shop for sustainable products through the Climate Pledge Friendly program. This new program allows customers to shop for products on Amazon that have one or more of 19 different sustainability certifications, such as Energy Star, EPEAT, Cradle to Cradle and others, that help preserve the natural world. Amazon also introduced its own certification, Compact by Design, to feature products that result in less use of air, water, or packaging.

**Nature-based Solutions**

Nature-based climate solutions create real and lasting carbon reductions, while also empowering communities, enhancing natural environments, and protecting wildlife. The Climate Pledge outlines that nature-based solutions must be additional, quantifiable, real, permanent, and socially beneficial. In order to accelerate these opportunities for carbon reductions, Amazon established the \$100 million Right Now Climate Fund to restore and conserve forests, wetlands and grasslands around the world. Our initial **\$10 million investment is a partnership with The Nature Conservancy, the American Forest Foundation, and the Vermont Land Trust** to help Appalachian family forest owners sequester carbon and participate in voluntary carbon markets. We also announced a **\$4 million investment in The Nature Conservancy's Urban Greening program in Germany**, which uses nature-based solutions to help cities become more resilient to the impacts of climate change.

Amazon Sustainability | March 2021 | [sustainability.aboutamazon.com](https://sustainability.aboutamazon.com)

**Statement of Nicholas Guida, Chairman and Chief Executive Officer, Tamarack Aerospace Group Corporation, Submitted for the Record by Hon. Sam Graves of Missouri**

Chairman DeFazio, Ranking Member Graves and Members of the Committee, thank you for accepting my testimony to the committee on “The Business Case for Climate Solutions.” I am Nick Guida and I’m the founder and CEO of Tamarack Aerospace Group Corporation.

Climate change is of course one of the most significant challenges currently facing human civilization. Despite aviation being a relatively small contributor of overall global carbon dioxide emissions at 2–3%, aviation’s statistical position is often cited

in the media and that trend will no doubt continue as aviation continues to grow. (Graver, Zhang, & Rutherford, 2019). As a result, the environmental impact of flying is consistently breaking into the consciousness of passengers and the public alike, influencing their perception of aviation.

Aviation must leverage all legacy and especially new technologies to constantly strengthen a perception that the industry proactively supports sustainability and science that will mitigate the negative outcomes of climate change.

America and the world need to aggressively use all available current technologies to reduce the metastasizing carbon footprint and not ignore any pending technologies—including pending solutions like bio-fuels, electric and hydrogen propulsion—as they become commonly available over time. America needs to open its eyes to all current possibilities, especially those that are not widely known but can be so-called game-changers, game-changers that also make good business sense.

One such new, and game-changing technology available right now and gaining notice by the aviation industry and regulators, is Active Winglets™, developed by Tamarack Aerospace Group. Tamarack is based in Sandpoint, Idaho—we are a growing American company built on invention.

Active Winglets look very much like the curved-upward passive winglets you see on the ends of many commercial aircraft wings, except Active Winglets have an extension and an autonomous sensing system that in a fraction of a second mechanically adjusts the wing tips to any amount of turbulence and, in so doing, allows for the most efficient, fuel-saving and flight smoothing capabilities available today.

Patented Active Winglet innovation delivers a CO<sub>2</sub> and fuel burn reduction of up to 33% as compared to an approximate 4% fuel savings from different types of traditional winglets seen on many current commercial, business and military aircraft. Active Winglets increase the number of fuel efficient and safer non-stop flights, and reduce the amount of maintenance needed for all aircraft. Active Winglet technology stands out in many ways amongst other sustainability initiatives as a sustainability supporting immediate solution for reducing aviation's carbon footprint to meet industry goals (Forbes Magazine, Tamarack Aerospace Group, 2020 and former aeronautical professor and commercial pilot, NASA astronaut Byron Lichtenberg, 2021, to cite just a few of the multiple sources).

There are several steps that aircraft operators can put in place to significantly reduce emissions. The science and market demands are dictating that we need to act now. Technology such as Sustainable Aviation Fuels are absolutely viable solutions but face significant scalability obstacles, carbon sequestration and offsetting would be required on a vast scale to have a significant impact and the introduction of newer, more fuel-efficient aircraft which emit less CO<sub>2</sub>, will not be sufficient on its own to offset the growth in the number of air transport movements.

Active Winglets are a proven technology that has been installed on more than one-hundred-and-twenty Cessna Jets, has been certified by the Federal Aviation Administration (FAA) and European Union Aviation Safety Agency (EASA), and can be retrofitted onto several current aircraft variants, including larger single-aisle commercial, cargo and military aircraft ... even drones. Active Winglets are cost-effective and can be rapidly retrofitted to the existing fleet as well as future designs to improve safety, mitigate turbulence, reduce noise and other pollution associated with aviation and reduce the downtime and need for aircraft maintenance.

The Active Winglet technology is economically viable, paying the investment for the modification back to the aircraft operator in a short period and can have a significant benefit for the existing as well as future fleets of aircraft. Of course, if business and government can't make an economic argument for adopting specific actions, those actions will naturally fail. Conservative estimates on narrow bodied and specific military aircraft, demonstrate that Tamarack's Active Winglets can reduce fuel burn by 14–20%, while there is proven fuel savings for many business airframes of up to 33%, providing significant cost savings and having a meaningful impact now on aviation's carbon crisis.

A case study conducted by Tamarack estimates, for instance, that if Active Winglets were to be fitted onto the commercial jet narrow-bodied fleet (Airbus A320 / Boeing 737 variants) alone, 1.6 billion tons of CO<sub>2</sub> would be saved by 2040, reducing the emissions gap by approximately 20%. Tamarack's technology offers a greater reduction in fuel burn and carbon emissions for existing aircraft than any other retrofittable solution available at present and certainly will make a demonstrable fuel savings and carbon footprint reduction as part of a new aircraft build.

More context about winglet technology. Winglets are small aerofoils applied vertically to the wing tips and are a positive addition to aircraft as they reduce drag and increase efficiency. They work by reducing the aerodynamic drag associated with vortices. Vortices form due to the pressure differentiation between the low-pressure upper wing surface and the high-pressure lower wing surface. At the wing

tip, air is free to move from the regions of high pressure to the regions of low pressure forming a circular movement of air which trails from the wing tip (Anderson, 2017). The creation of vortices causes a redistribution of the surface pressure over the wing termed induced drag (Anderson, Introduction to Flight, 2016). The advantages of Active Winglets are significant and address the vortices and fuel usage challenges more than other winglet technologies; they are retrofittable and therefore can improve today's aircraft, as well as those coming off the production line; they are largely cost effective to implement; and are a 'win, win' as they pay back economically and environmentally.

The Active Winglet uses the combination of a wing extension to significantly increase aspect ratio with the most optimal winglet to reduce induced drag. Traditionally, the most optimal winglet design is associated with more structural reinforcement, but the Active Winglet doesn't need the structural reinforcement that common passive winglets do.

Active Winglets reap maximum fuel efficiency benefits without subtracting the inefficiencies that occur due to additional structural requirements. This is achieved using load alleviation at the wing tip.

Additionally, Active Winglet modified aircraft need shorter runways for landing and takeoff and get higher faster than aircraft without the modification. For instance, it can take a Cessna Jet with Active Winglets to reach 41,000 feet in less than 30 minutes, while a similar unmodified business jet will have to reach higher altitudes after climbing in steps and may never reach 41,000 feet at all, depending on flight conditions and the time of the trip (AOPA reporting Active Winglet flight, 2021). As mentioned, once an aircraft gets to higher altitudes faster, the carbon footprint is greatly reduced.

Tamarack commends the committee on its backing of current U.S. government programs to encourage innovation in aviation and we hope that kind of assistance increases. This committee, for instance, is well aware of government grants for emissions innovative companies. For example, the Federal Aviation Administration (FAA) Continuous Lower Energy, Emissions and Noise (CLEEN) program has already contributed \$225 million through phases I and II of CLEEN, and the industry has contributed \$388 million. The 2020 grants under CLEEN III are to be issued soon (FAA, 2020). Tamarack will be applying for the next tranche of grants in order to go through the certification process for additional airframes. Meanwhile, we hope the committee will continue to encourage all technologies and efforts to embrace business cases for climate solutions.

Part of the reason that aviation is gaining so much attention relative to reducing the carbon footprint is an immediate need, like so many other industries, to reduce its dependence on fossil fuels in the face of expected continued rapid growth (UNFCCC, 2014). Active Winglets and other technologies available now or soon warrant additional focus by regulators and the entire aviation community.

The coronavirus pandemic has shrunk the world fleet because of airlines going out of business and older, less efficient aircraft being retired early. From 2020 onwards, this will unquestionably deliver reduced CO2 emissions lower than previously projected. However, this is not the solution to aviation's carbon emission challenges. Although passenger numbers dropped by 2690 million (60%) in 2020 compared to 2019, passenger numbers are predicted to recover to 2019 levels within the next 3–5 years (ICAO, 2021). Furthermore, in 2020 compared to 2019, approximately USD \$370 billion of gross passenger operating revenues of airlines were lost (ICAO, 2021). This unprecedented event could present a major opportunity for operators to reset their thinking on emissions targets and implement sustainable practices in every aspect of their new, reshaped organizations.

Aircraft are reliant on fossil fuels and with no clear path or timeframe to a zero-emission alternative, ICAO predicts a large gap in the emissions targets set for the period of 2020 to 2040. There are several steps that aircraft operators can put in place to significantly reduce emissions. The science and market demands are dictating that we need to act now. Technology such as Sustainable Aviation Fuels are absolutely viable solutions but face significant scalability obstacles, carbon sequestration and offsetting would be required on a vast scale to have a significant impact and the introduction of newer, more fuel-efficient aircraft which emit less CO2, will not be sufficient on its own to offset the growth in the number of air transport movements.

Active Winglet technology is economically viable, paying the investment back in a short period and can have a significant benefit for the existing as well as future fleets of aircraft. Of course, if business and government can't make an economic argument for adopting specific actions, those actions will naturally fail. Conservative estimates on narrow bodied aircraft, demonstrate that Tamarack's Active Winglets

can reduce fuel burn by 14–20%, providing significant cost savings and having a meaningful impact on aviation’s carbon crisis.

As availability of Sustainable Aviation Fuels increases and technology advances, the aviation sector will see substantial reductions in carbon emissions until zero emissions aircraft can be developed. However, where a near-term solution is needed, fitting Active Winglets would be a significant step forward for operators looking to obtain carbon neutral operations, particularly when combined with a host of other sustainable initiatives. Tamarack hopes this committee considers all emission reducing options including Active Winglet technology that stands out as an exciting prospect which can reduce the emissions gap by over 1.6 billion tons (-20%), it is available now and is scalable.

As mentioned, Tamarack is growing. We have additional primary service and installation centers in South Carolina and England and other support facilities in more than twenty other locations across the United States and world-wide. We have been growing our facilities, staff, and customer base, despite the pandemic because our current and prospective customers want the innovative capabilities only Tamarack Active Winglets can provide to business, commercial and military aviation.

Tamarack is currently working with U.S. and international aviation regulators, along with aviation associations like NBAA and GAMA, noted academia representatives and getting constant feedback from existing and future customers, including the U.S. military. We are confident that U.S. innovation tempered by prudent government regulation will meet or possibly exceed carbon footprint reduction goals specifically outlined for the aviation industry. Those ambitious goals will only be achieved through cooperation and teamwork involving all stakeholders and by climbing the very steep education curve that recognizes and adopts the most pragmatic innovations addressing our climate crisis.

Tamarack thinks of itself as a good corporate citizen for America and also the world and believes news about its sustainability-supporting technology, and other avenues for aviation to reduce carbon emissions, will be recognized by this committee as a current way to quickly provide a solution to help the growing aviation industry reach its carbon footprint reducing goals.

Tamarack looks forward to providing details and science-based information alluded to in these comments and will eagerly cooperate with this committee to embrace solutions that bolster the reputation of aviation as we achieve the climate-saving goals we all want.

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**Letter of March 29, 2021, from Frederick W. Smith, Chairman of the Board and Chief Executive Officer, FedEx Corporation, Submitted for the Record by Hon. Steve Cohen**

FEDEX CORPORATION,  
942 SOUTH SHADY GROVE ROAD,  
Memphis, TN 38120, March 29, 2021.

Hon. STEVE COHEN,  
U.S. House of Representatives,  
2104 Rayburn HOB, Washington, DC.

DEAR CONGRESSMAN COHEN,

Thank you for the kind introduction and the opportunity to testify on March 17, 2021 at the House Transportation and Infrastructure Committee hearing on “The Business Case for Climate Solutions”. I wanted to follow up regarding your question about the safety of the twin 33’ trailer configuration.

At FedEx, “Safety Above All” is the centerpiece of our corporate strategy and our corporate philosophy, and public safety is the real story when it comes to the adoption of twin 33’ trailers. Studies have shown twin 33’ trailers are more dynamically stable at highway speeds and are more stable during abrupt evasive maneuvers and less likely to roll over than twin 28’ trailers. FedEx Ground has been operating twin 33’ trailers on the Florida Turnpike since 2010 with no accidents and our drivers have told us repeatedly they find them more stable to operate.

Additionally, the adoption of twin 33’ trailers would take trucks off the road by reducing trips and miles driven through efficiency gains, resulting in 4,500 accidents avoided annually. The proposal we support also calls for twin 33s to operate with a suite of modern safety enhancing technologies: collision avoidance with automatic braking, electronic stability control, lane departure, speed limiters and other advanced safety features.

Longer combination vehicles (LCVs) already safely operate in 22 states, 20 of which allow operation of twin 33’ trailers. These LCVs include even longer trailer

combinations like the “Turnpike Double” configuration of twin 48’ trailers, triple 28’ trailers and the “Rocky Mountain Double” configuration of a 48’ trailer and 28’ trailer.

There are also significant efficiency and environmental benefits from removing trucks from the road. The adoption of twin 33’ trailers equates to 274 million fewer gallons of fuel, 3.12 million fewer tons of CO2 emissions and 3.36 billion fewer vehicle miles traveled with transportation efficiencies. Furthermore, studies have shown that twin 33’ trailers can move the same amount of freight with 18 percent fewer truck trips, reducing congestion by 57.2 million hours, decreasing wear and tear on roads and bridges, and allowing consumers and businesses to realize \$2.8 billion annually in lower shipping costs with quicker delivery times. These safety, environmental and efficiency benefits come at no cost to taxpayers and without any change to the 80,000-pound federal gross vehicle weight (GVW) limit or the federal bridge formula.

In 2016, the Department of Transportation projected that freight volumes would increase by 40% by 2045. The trucking industry has been a vital lifeline to the U.S. economy during the COVID-19 pandemic by supporting the rapid increase of e-commerce and movement of essential goods across the country. The adoption of twin 33’ trailers would provide much needed capacity while benefiting our nation’s consumers, businesses, environment and overall safety.

I urge you and your colleagues to consider modernizing trucking regulations to include these trailers that have proven to be safe and efficient by corporate leaders in transportation and logistics.

Thank you for your consideration of this important issue.

Sincerely,

FREDERICK W. SMITH,  
*Chairman of the Board and Chief Executive Officer.*

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**Letter of March 22, 2021, from William Peduto, Mayor, City of Pittsburgh, PA, Submitted for the Record by Hon. Conor Lamb**

MARCH 22, 2021.

Hon. PETER DEFAZIO,

*Chair,*

*Transportation and Infrastructure Committee, United States House of Representatives, 2134 Rayburn Office Building, Washington, DC.*

Hon. SAM GRAVES,

*Ranking Member,*

*Transportation and Infrastructure Committee, United States House of Representatives, 1135 Longworth House Office Building, Washington, DC.*

DEAR CHAIRMAN DEFAZIO AND RANKING MEMBER GRAVES,

I am writing in full support of the Freight Rail Innovation Institute, a proposed public-private partnership led by Wabtec Corporation, Genesee and Wyoming, Inc., and Carnegie Mellon University. Collaborations across levels of government and economic sectors have helped Pittsburgh shed its industrial past and become a 21st century hub for sustainability and green energy. The Institute would represent yet another Pittsburgh-based initiative designed to harness the power of innovation, research, and technology, combat climate change, create family-sustaining jobs, and build a clean-energy future for our nation.

Over 140,000 miles of railway play an integral role in moving people and products across the continental United States, and currently, trains transport 40% of our nation’s freight. The proposed Freight Rail Innovation Institute presents a prime opportunity to invest in a cleaner future for freight rail that will benefit the entire country. The Institute will research and develop the groundbreaking technology needed to move toward carbon-free rail. By investing in this vision for the future of freight transportation, we can reduce our nation’s Greenhouse Gas emissions, improve safety and limit congestion on our highways, and create the jobs of the future. By empowering Wabtec, Genesee and Wyoming, and Carnegie Mellon University to advance this technology, we can develop trains that can more efficiently and safely move goods across the country without polluting our air and our planet.

As you are developing the plan to rebuild our nation’s infrastructure, I respectfully urge you to consider investing in the Freight Rail Innovation Institute. Thank you in advance for your consideration. Should you need additional information, please do not hesitate to contact me.

Sincerely,

WILLIAM PEDUTO,  
*Mayor of Pittsburgh.*


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**Letter of March 22, 2021, from Sam Williamson, Board Chair and Greg Flisram, Executive Director, Urban Redevelopment Authority of Pittsburgh, Submitted for the Record by Hon. Conor Lamb**

MARCH 22, 2021.

Hon. PETER DEFAZIO,  
*Chair,*  
*Transportation and Infrastructure Committee, U.S. House of Representatives, 2134*  
*Rayburn Office Building, Washington, DC.*

Hon. SAM GRAVES,  
*Ranking Member,*  
*Transportation and Infrastructure Committee, U.S. House of Representatives, 1135*  
*Longworth House Office Building, Washington, DC.*

RE: Letter of Support—Freight Rail Innovation Institute

DEAR CHAIR DEFAZIO AND CONGRESSMAN GRAVES:

We are writing in support of the public-private partnership being proposed by Wabtec Corporation, Genesee & Wyoming, and Carnegie Mellon University to create a Freight Rail Innovation Institute. This initiative will assist in the Congressional goals of building a clean energy economy and creating jobs as well as reducing the effects of climate change. Its location in the Pittsburgh region would allow for all parties involved to take advantage of the education and innovative research occurring here.

Pittsburgh is a city that welcomes, embraces, and invests in green energy and sustainability. As the North American representative to the Global Covenant of Mayors for Climate and Energy, Pittsburgh's Mayor William Peduto has been a leading international voice on the power of local government to fight climate change. Our city serves as an example of best practices on dealing with the effects of climate change and the impact mayors are having on protecting the environment for future generations and was recently honored with first place in the U.S. Conference of Mayors (USCM) 14th Annual Climate Protection Awards. The Urban Redevelopment Authority of Pittsburgh (URA) is proud to partner with the Mayor and City of Pittsburgh on these critical sustainability efforts.

We recognize that the shift from the reliance on fossil fuels to sustainable energy requires investment and commitment, and that is clearly evident in the proposed Freight Rail Innovation Institute. Efforts to expand the use of freight rail, accelerate the reduction of national GHG emissions, reduce road congestion, and make transportation safer is a benefit for all of our communities.

This region has a long relationship with rail and has continued to invest in its development and expansion. With over 140,000 miles of track across the U.S. freight network, investment in the future of rail benefits the entire country. A single freight train can move a ton of freight 472 miles on one gallon of fuel. Rail moves 40% of freight and accounts for less than 1% of total U.S. GHG emissions. Imagine the possibilities of zero emission locomotives. With investment in the partnership, technology research moves forward more quickly with a vision and there are dedicated efforts to focus on best practices as it relates to green energy and advanced network logistics. Support of this effort takes this vision to a reality, benefiting all.

For these reasons, we hope that you favorably consider and support the Freight Rail Innovation Institute, an important endeavor for the Pittsburgh region.

Sincerely,

SAM WILLIAMSON,  
*Board Chair, Urban Redevelopment Authority of Pittsburgh.*GREG FLISRAM,  
*Executive Director, Urban Redevelopment Authority of Pittsburgh.*

## APPENDIX

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QUESTIONS FROM HON. PETER A. DEFAZIO TO JACK ALLEN, CHIEF EXECUTIVE OFFICER AND CHAIRMAN, PROTERRA, INC.

*Question 1.* Mr. Allen, you mentioned the difficulty of sourcing domestic minerals for electric batteries. Cobalt in particular is difficult to find domestically, even if we expand domestic mining.

Are there any promising developments in domestic battery cell manufacturing capacity?

*ANSWER.* Progress is being made but the U.S. is currently behind other markets in building capacity. This Committee and the Federal government can play an important role in accelerating US leadership in alternative fuel technologies for zero emission vehicles that are critical to our economic future as the world addresses global warming and the need to cut carbon emissions.

Today, we lag other technology centers in developing domestic capacity for battery production. For example, today, there are no domestic manufacturers of small format cylindrical cells that are available to Proterra for use in battery packs for transit buses or other medium or heavy duty commercial vehicles.

According to a recent Wall Street Journal report, “China today has 93 ‘gigafactories’ that manufacture lithium-ion battery cells ... If current trends continue, China is projected to have 140 gigafactories, by 2030, while Europe will have 17 and the United States, just 10.”<sup>1</sup>

China and Europe also lead the United States as the largest electric car markets internationally, according to the International Energy Association.<sup>2</sup> “China (at 4.9%) and Europe (at 3.5%) achieved new records in electric vehicle market share in 2019.” The United States trails at 2.1% market share for electric vehicles in 2019.<sup>3</sup>

Increasing demand domestically for zero emission technology will spur growth of the supply chain and attract private investment in domestic cell production to meet the market demand for electric vehicles. Investments in US technology and manufacturing leadership will serve our domestic needs and allow the US to become a world leader in this important shift away from fossil fuel dependency in transportation.

Legislation like H.R. 2 (Moving Forward Act) as well as President Biden’s American Jobs Plan contain meaningful investments to accelerate growth in medium and heavy-duty electric vehicles, including battery electric transit buses, school buses and delivery vehicles.

*Question 2.* What steps has Proterra taken to recycle batteries that are past their useful life for transit buses, and how can this committee help to support this work?

*ANSWER.* Proterra has designed its battery systems with the full life cycle in mind. Our batteries are designed for easy extraction of rare minerals and for recycling and reuse of key components, including our heavy duty aluminum pack enclosures. Importantly, once a battery pack has reached its end of life, the minerals can be extracted and reused, reducing the need to mine for new sources.<sup>4</sup>

The United States has an opportunity to build industry and good paying jobs from building batteries to recycling components. Proterra has partnered with Redwood Materials in Carson City, Nevada to recycle batteries at the end of their useful life. Proterra has already sent roughly 26,000 pounds of battery material to Redwood for recycling.

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<sup>1</sup> <https://www.washingtonpost.com/technology/2021/02/11/us-battery-production-china-europe/>

<sup>2</sup> <https://www.iea.org/news/electric-car-sales-this-year-resist-covid-19-s-blow-to-global-car-market>

<sup>3</sup> <https://www.iea.org/reports/global-ev-outlook-2020>

<sup>4</sup> <https://www.nrel.gov/news/program/2021/pathways-to-achieve-new-circular-vision-for-lithium-ion-batteries.html>

In addition, Proterra batteries are designed with second-life applications in mind. When Proterra batteries have met their useful life in a vehicle, they still retain a significant amount of energy that can be used in applications such as stationary storage, to reduce electricity demand charges, and to charge electric vehicles with renewable solar energy stored throughout the day. Our charging systems are also capable of sending stored energy from the vehicles back to the power grid, becoming a strategic asset for grid stability and resilience.<sup>5</sup> Other second life battery applications could include backup power, grid services such as frequency regulation, and utility scale storage.

*Question 3.* What other steps can this committee and the Federal government take to help anchor the battery supply chain domestically?

*ANSWER.* There are many steps that Congress and the Federal government can take to help anchor the battery supply chain domestically. The Department of Energy's Advanced Technology Vehicle Manufacturing (ATVM) program can be revived in support of its goals of strengthening US vehicle manufacturing and promoting US energy independence and competitiveness by: 1) expanding eligibility to US-based medium- and heavy-duty vehicles manufacturers and component suppliers, specifically including battery cells manufacturers; and 2) revising the financial viability requirements for loan applicants to more closely align with the Department of Energy's Title XVII loan guarantee program. Congress could also consider making appropriations for the grant program that was authorized in the ATVM program but have not been funded. Proterra supports the Advanced Technology Vehicle Manufacturing (ATVM) Future Act introduced by Congresswomen Julia Brownley and Congresswoman Debbie Dingell as well as reforms to the program made by section 33342 of last year's HR 2, Moving Forward Act.

Restoring the Section 48C tax credit or launching a new investment tax credit (ITC) would also support the development of the battery supply chain in the United States. Proterra supports the "American Jobs in Energy Manufacturing Act of 2021," which was introduced by Senators Debbie Stabenow and Joe Manchin, to reauthorize Section 48C and explicitly allow the 30% ITC to be used for EV battery manufacturing, assembly lines, and facility buildout and retooling.

The battery electric transit bus market also benefits from broader Federal incentives for the electrification of other medium and heavy duty vehicle types, including school buses and delivery vehicles for the United State Postal Service and the federal fleet, such as the Environmental Protection Agency's (EPA) Diesel Emissions Reduction Act (DERA) program.

QUESTIONS FROM HON. JULIA BROWNLEY TO JACK ALLEN, CHIEF EXECUTIVE OFFICER AND CHAIRMAN, PROTERRA, INC.

*Question 4.* You mentioned in your testimony that in addition to Proterra's electric transit buses, you also provide the battery systems for electric school buses.

Can you please elaborate on the technology readiness, are electric school buses able to handle the workload that is currently delivered by diesel school buses?

*ANSWER.* An electric school bus is more than capable of handling the workload of a diesel school bus. According to a 2014 study by the National Renewable Energy Laboratory (NREL), the average school bus travels approximately 31 miles per cycle, with a maximum of 127 miles.<sup>6</sup>

In 2018, Thomas Built Buses (TTB) and Proterra unveiled the high-performance Jouley electric school bus. The Saf-T-Liner C2 Jouley couples 226 kWh of total energy capacity from Proterra's battery technology with an electric drivetrain to offer up to 135 miles of drive range to meet the needs of school bus fleets.<sup>7</sup>

As of May 5, 2021, we, along with our partner Thomas Built Buses, have delivered 50 electric school buses that are in operation today to meet the school transportation needs of communities across the United States.

- In Virginia, TBB and Sonny Merryman Inc. were selected as the exclusive provider of 50 electric school buses to 15 public school districts for the first phase of Dominion Energy's electric school bus program. The first of these buses, which represent the first battery-electric buses in Virginia, were delivered in November of 2020.<sup>8</sup>

<sup>5</sup> <https://www.proterra.com/press-release/city-of-beverly-selects-electric-school-bus-powered-by-proterra/>

<sup>6</sup> <https://www.nrel.gov/docs/fy14osti/60068.pdf>

<sup>7</sup> [https://thomasbuiltbuses.com/powertrains/electric?gclid=Cj0KCQjwvr6EBhDOARIsAPpqUPES35MxMphGMdxI383oAckhRf8PUQHaj\\_hKDj6D3C4aLU5eZX4rYrYaAiDaEALw\\_20pwcB](https://thomasbuiltbuses.com/powertrains/electric?gclid=Cj0KCQjwvr6EBhDOARIsAPpqUPES35MxMphGMdxI383oAckhRf8PUQHaj_hKDj6D3C4aLU5eZX4rYrYaAiDaEALw_20pwcB)

<sup>8</sup> <https://www.proterra.com/press-release/virginias-electric-school-buses/>

- In Michigan, Ann Arbor and Roseville Public Schools are operating six Jouley school buses in partnership with DTE Energy. DTE Energy will also initiate a Vehicle to Grid (V2G) study to obtain data regarding the energy efficiency and environmental benefits of electric vehicles and develop programs that benefit the schools based vehicle capabilities.<sup>9</sup>
- In Massachusetts, the City of Beverly and Beverly Public Schools recently unveiled its first Jouley school bus in partnership with Highland Electric Transportation, a solutions provider for electric school buses based in Hamilton, Mass. The bus will further participate in a V2G strategy deployed by Highland Electric Transportation and utility provider, National Grid.<sup>10</sup>
- In Alaska, Tok Transportation is operating the first battery-electric school bus in the state, a Jouley school bus, in partnership with the Alaskan Energy Authority.<sup>11</sup>
- In Indiana, Monroe County Community Schools and Delphi Community Schools both recently received their first Thomas Built electric school buses.

*Question 5.* What are the total lifecycle cost benefits to cities and school districts of switching to electric school buses?

*ANSWER.* Over 90 percent of the school bus fleet in the United States is fueled by diesel.<sup>12</sup> Burning diesel for fuel is associated with emissions known to harm human health such as particulate matter and nitrogen oxide.<sup>13</sup> Children may be particularly vulnerable to emissions exposure from diesel-fueled school buses.<sup>14</sup>

In addition to the clear environmental and health benefits of switching to zero-emission, electric school buses, electric school buses contain fewer parts than diesel buses, which can generate operational and maintenance savings for school districts.<sup>15</sup> The Thomas Built Buses Saf-T-Liner C2 Jouley school bus, for instance, enables fuel economies of up to 24.6 MPGe, an improvement over the average 6.2 MPGe fuel economy for school buses.<sup>16 17</sup>

While electric school buses today cost more upfront than a diesel school bus, some studies have shown that the operational and maintenance savings afforded by switching to electric can save schools nearly \$2,000 annually in fuel costs and \$4,400 in maintenance costs. Further, electric school buses can save more than \$31,000 in operational costs over its vehicle lifetime.<sup>18</sup>

In addition, new financing models are reducing the upfront cost to school districts of acquiring electric school buses.<sup>19</sup>

Potential vehicle-to-grid applications provide opportunities to lower cost barriers to school districts while increasing savings over time by leveraging the electric school bus as a grid resource.

*Question 6.* What other opportunities do electric school buses provide to schools, such as V2G and emergency power backup?

*ANSWER.* Electric school buses can strengthen the electricity grid and provide resilience to local communities. Cities and utilities are exploring different ways to unlock the full potential of electric buses and heavy-duty vehicles.

According to WRI, “... electrifying the entire school bus fleet can unlock 72 GW-hours of energy storage for utilities via vehicle-to-grid technologies, enabling new opportunities to expand businesses and integrate clean energy.”<sup>20</sup>

In 2018, Thomas Built Buses and Proterra unveiled the high-performance Jouley electric school bus, which is capable of supplying power back to the electric grid using vehicle-to-grid (“V2G”) technology. Proterra’s bi-directional bus/truck charging infrastructure system means that customers can send stored power back to the elec-

<sup>9</sup> <https://www.michigan.gov/mienvironment/0,9349,7-385-90161-551135--,00.html>

<sup>10</sup> <https://www.prnewswire.com/news-releases/city-of-beverly-and-highland-electric-transportation-select-electric-school-bus-from-thomas-built-buses-powered-by-proterra-ev-technology-301014159.html>

<sup>11</sup> <https://www.alaskanewssource.com/2020/10/08/alaskas-first-electric-school-bus-heading-to-tok/>

<sup>12</sup> [https://uspig.org/sites/pirg/files/reports/US\\_EL%20buses%202021%20scrn.pdf](https://uspig.org/sites/pirg/files/reports/US_EL%20buses%202021%20scrn.pdf)

<sup>13</sup> <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/transportation>

<sup>14</sup> <https://www.ehhi.org/reports/diesel/dieselintr.pdf>

<sup>15</sup> <https://thomasbuiltbuses.com/bus-advisor/articles/top-6-benefits-of-electric-school-buses/>

<sup>16</sup> <https://afdc.energy.gov/data/10310>

<sup>17</sup> <https://thomasbuiltbuses.com/content/uploads/2020/08/brochure-C2-Jouley-and-Proterra-summer-2020.pdf>

<sup>18</sup> <https://www.clintonfoundation.org/clinton-global-initiative/commitments/launching-market-electric-school-buses>

<sup>19</sup> <https://www.greentechmedia.com/articles/read/on-heels-of-253m-raise-highland-electric-lands-biggest-electric-school-bus-contract-in-the-u.s>

<sup>20</sup> <https://www.wri.org/research/financing-electric-and-hybrid-electric-buses>

tricity grid at times when its needed most or even to provide back-up power to critical facilities like schools.

Because school buses are on the road for only certain hours during the day and otherwise idle, especially during the weekends and summer months, battery-electric school buses present an optimal use case for V2G applications.

In Virginia, Thomas Built Buses was selected as the provider of 50 electric school buses for the first phase of Dominion Energy's electric school bus program. Under the program, participating school districts will pay about the price of a traditional diesel bus while Dominion Energy covers the difference.<sup>21</sup> Virginia school districts could save \$700 per month or \$8,400 per year in operating costs, according to Dominion Energy.<sup>22</sup> The initiative aims to add 1,000 electric school buses by 2025 and replace all diesel buses with zero-emission, electric school buses in the school districts serviced within Dominion's territory by 2030. Adding 1,000 electric school buses would store enough energy to power 10,000 homes.<sup>23</sup>

In Massachusetts, Thomas Built Buses recently delivered the first Proterra Powered all-electric school bus in New England, supported by VW Settlement funding. Highland Electric Transportation and National Grid, the local utility, are also working together to deploy a vehicle-to-grid strategy with these electric school buses.

In Michigan, we recently deployed six Proterra Powered battery-electric school buses to Ann Arbor and Roseville public schools for a five-year pilot program that also includes a vehicle-to-grid study. This includes the ability for the bus battery to provide energy to the school during a power outage.<sup>24</sup>

QUESTIONS FROM HON. MICHAEL GUEST TO JACK ALLEN, CHIEF EXECUTIVE OFFICER AND CHAIRMAN, PROTERRA, INC.

*Question 7.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* As a commercial electric vehicle and battery manufacturer, Proterra does not have a position on approaches to user fees, such as a VMT tax, for surface transportation funding. Proterra transit vehicles are designed to serve rural and urban communities alike and our buses are currently serving rural communities.

*Question 8.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* Modernizing our transportation infrastructure is critical to addressing emissions reduction in rural America. Ensuring the nation's roads and bridges are in a state of good repair can reduce the amount of time vehicles are spent idling or traversing poor infrastructure, both of which can result in increased vehicle emissions.<sup>25</sup> Our battery electric transit buses are designed to serve rural communities and our zero emission buses are serving rural communities across the United States today.

QUESTIONS FROM HON. SCOTT PERRY TO JACK ALLEN, CHIEF EXECUTIVE OFFICER AND CHAIRMAN, PROTERRA, INC.

*Question 9.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are

<sup>21</sup> <https://www.eesi.org/articles/view/electrifying-virginias-school-bus-fleet>

<sup>22</sup> <https://www.axios.com/electric-school-buses-vehicle-to-grid-power-19f7b6b1-662b-4501-a96e-dcf3fd57a886.html>

<sup>23</sup> <https://www.eesi.org/articles/view/electrifying-virginias-school-bus-fleet>

<sup>24</sup> <https://www.michigan.gov/mienviroment/0,9349,7-385-90161-551135--,00.html>

<sup>25</sup> <https://deq.nc.gov/about/divisions/air-quality/motor-vehicles-air-quality/idle-reduction/why-idling-harmful>

marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

If this cooperative effort is to succeed, it will cause great harm to America's prosperity and security.

While it appears nearly everyone testifying before the Committee today—and much of the broader corporate community—has accepted and embraced the radical, whole-sale approach to rapidly electrify our transportation sector, historical and recent consumption trends indicate that your consumers—and our constituents—don't share this warm embrace.

These concerns will grow to disdain as the costs of all consumer goods continues to skyrocket.

The near universal acceptance that electrification is inevitable must be met with the proper historical context—the electric vehicle is NOT some emerging technology that will breakthrough if enough taxpayer money is spent.

As a matter of fact, electric vehicles are as old as motorized vehicles themselves. In 1896—yes, eighteen-ninety-six—Thomas Edison wrote to Henry Ford admitting the electric vehicle had been rendered obsolete by the cheaper, superior alternative, the internal combustion engine:

“Electric cars must keep near to power stations. The storage battery is too heavy ... Your car is self-contained—carries its own power plant—no fire, no boiler, no smoke and no steam. You have the thing. Keep at it.”

125 years after this exchange, EVs are still plagued by largely the same deficiencies relative to ICEs—a lack of range, higher costs, and a lack of battery capacity per pound.

More recent concerns about battery life-span, the diminished range of aging batteries, and the propensity for aging batteries to erupt in flames add to consumer weariness.

Until these fundamental issues are resolved, American consumers will not adopt electric vehicles voluntarily as demonstrated by EV's anemic market share and the continual failure to meet projected sales figures.

At the height of the Obama administration's taxpayer handouts for EV companies, he predicted there would be 1 million EVs on the road by 2015—a figure that wasn't reached until the end of 2018.

Over the past decade, the EV industry received \$43 billion in federal subsidies and tax incentives to manufacturers and consumers—plus state and local incentives—and electric vehicle sales made up only 1.9 percent of US retail car sales in 2020.

Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*Question 10.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER TO QUESTIONS 9 & 10.* Proterra has been serving our customers for over a decade with battery electric vehicles. Customers across the nation are adopting battery electric vehicles because of the low total cost of ownership in addition to the environmental benefits of cleaner air and less noise pollution. Our transit bus and fleet charging customers include transit agencies, airports, universities and commercial establishments. Our electric powertrain customers include school bus, coach bus, delivery truck and construction equipment manufacturers. Recent polling also shows that Americans support the transition to electric vehicles for the broader benefits of health of Americans, air pollution, and reducing asthma<sup>26</sup>. Overall, the poll found that 63% of Americans support U.S. automakers transitioning to zero-emission vehicles.

A 2019 poll of prospective car buyers, conducted by Consumer Reports and the Union of Concerned Scientists found that 63 percent of prospective car buyers in the US have some interest in electric vehicles including 31% that would consider one for their next purchase, 27% that would consider one at some point down the road, and 5% that say they are definitely planning on buying or leasing one for their next vehicle<sup>27</sup>.

The industries that will support the clean economy globally should be built in the United States and those jobs should be American manufacturing and American technology jobs. The federal government has provided important support and mar-

<sup>26</sup> [https://www.edf.org/sites/default/files/u76/210219\\_EDF\\_GMEV%20Memo\\_D3\\_EH.pdf](https://www.edf.org/sites/default/files/u76/210219_EDF_GMEV%20Memo_D3_EH.pdf)

<sup>27</sup> <https://www.ucsusa.org/resources/surveying-consumers-electric-vehicles>

ket signals to build the clean technology industry here. Proterra delivered our first battery electric transit bus to Foothill Transit in the San Gabriel Valley over ten years ago. Foothill Transit was the first public transit agency in the United States to operate a battery-electric transit bus in revenue service. This initial deployment was supported by federal grant funding from the Recovery Act in 2009.

Building on these early deployments, the federal government has increased support for zero-emission, electric transportation through programs like the Federal Transit Administration's Low or No Emission Vehicle Program ("Low No"). It has been responsible for funding electric buses that are being deployed nationwide in urban and rural communities in over 40 states.

Since our initial deployment to Foothill Transit, Proterra has grown into a leading manufacturer of electric transit buses in North America. We've sold more than 1,000 electric buses with 600 that are on the road today. Our battery technology has been proven over 18 million miles of revenue service driven by our fleet of transit buses. This success has resulted in over 600 direct good-paying American jobs nationwide at Proterra, as well as jobs at component vendor companies in over 40 other states.

The federal government's role in spurring demand for electrification through programs like Low No has established a strong foundation that companies like Proterra have been able to build upon.

Battery costs have also declined approximately 85% since 2010<sup>28</sup> and the value proposition that electric vehicles offer to private enterprise has grown. With lower operating costs, including maintenance and energy costs that are significantly lower than internal combustion engine vehicles, electric vehicles now offer a compelling economic proposition.

As a result, companies that operate some of the world's largest vehicle fleets like FedEx, UPS, and Amazon are advancing aggressive electrification targets.<sup>29</sup>

It is in this backdrop of technological innovation that our company has transformed into a diversified provider of electric vehicle technology.

Increasing federal support for electrification can help drive the next wave of innovation and job creation that will position the United States well against foreign competition in this emerging market.

QUESTIONS FROM HON. PETER A. DEFazio TO SHAMEEK KONAR, CHIEF EXECUTIVE OFFICER, PILOT FLYING J, ON BEHALF OF THE NATIONAL ASSOCIATION OF TRUCK-STOP OPERATORS

*Question 1.* Mr. Konar, during the hearing, you mentioned that Pilot Flying J has deployed 58 charging stations, and the Federal government has a critical role to play to help fill the gap and get to mass-adoption of EV charging infrastructure in the retail fuel sector.

How much money have NATSO members invested in EV charging infrastructure nationwide, and how many DC Fast charging stations are located at NATSO members' facilities?

*ANSWER.* In February of 2020, NATSO launched the National Highway Charging Collaborative with ChargePoint, the world's largest EV charging network. The Collaborative aims to leverage \$1 billion in capital to deploy charging at more than 4,000 travel plazas and fuel stops by 2030, enabling long distance electric travel along major routes and providing access to charging in rural communities. The Collaborative also advocates for public policies that are designed to create a business case for off-highway fuel retailers to invest in EV charging infrastructure.

The Collaborative announced in March 2021 that it has successfully generated more than 150 DC fast charging stations. This number is underinclusive of chargers available at NATSO members' facilities because it does not include: (1) members that have not informed NATSO of the investments they have made in EV charging stations at their facilities and (2) EV charging stations that are owned and operated by regulated utilities or other third-parties (eg, Tesla). Although those charging stations may be present now, they are not a long-term solution and therefore are not included in this data.

<sup>28</sup> BloombergNEF "Battery Pack Prices Fall As Market Ramps Up With Market Average At \$156/kWh In 2019" (December 2019)

<sup>29</sup> <https://www.npr.org/2021/03/17/976152350/from-amazon-to-fedex-the-delivery-truck-is-going-electric>

QUESTIONS FROM HON. MICHAEL GUEST TO SHAMEEK KONAR, CHIEF EXECUTIVE OFFICER, PILOT FLYING J, ON BEHALF OF THE NATIONAL ASSOCIATION OF TRUCKSTOP OPERATORS

*Question 2.* The U.S. has been leading in emission reductions for decades. Energy and climate solutions have been driven by the U.S. These solutions have been adopted by our allies and we've outpaced the Clean Power Plan by ten years. I am thankful for industry leaders who have led this charge, including many of you who testified before us. These same industry leaders use roads, bridges, rails, airports, and ports that they support through various fees and taxes, which allow these industries to compete in the market. These industries pay for the very programs that some would like to pull to address goals we are well on the way to meeting through the market.

Some are pushing expensive programs that would put small businesses and rural America out of pace with major corporations and major urban centers through costly mandates and disadvantaged retooling. Even if grant programs and tax incentives are there, the quick implementation turnarounds on many of these programs stifle growth for our smallest businesses if they have to change their business models without proper lead time.

Mississippi is home to over 5,000 small trucking companies, many mom and pop operations or small agriculture operations hauling livestock across the country.

How much of your business is servicing small trucking or delivery service companies or owner-operators?

*ANSWER.* Approximately 27–30% of our volume comes from what we would define as small fleets, though this number ebbs and flows throughout the year.

*Question 3.* As we've discussed, larger corporations and transportation system manufacturers are moving towards more efficient systems. In my opinion, this allows larger companies to sell more efficient used equipment to smaller operations or allow prices to be more affordable for small businesses while also not setting burdensome mandates or requirements for compliance by the federal government. We know this works because Americans moved to using more fuel-efficient cars when automakers worked to produce them. That's why our Highway Trust Fund is depleted.

What do you see as the impact on small businesses in your industries if mandated emission standards were put in place vs. allowing the market to work through this process we just discussed?

*ANSWER.* The most expeditious, efficient and economical way to achieve environmental advancements in transportation energy technology is through market-oriented, consumer-focused policies that encourage *all* businesses to offer more alternatives and our customers to purchase those alternatives. Fuel retailers are in the business of providing competitively priced fuel and services to our customers and have demonstrated in recent years that we are prepared to invest in any transportation fueling technology that our customers desire. With the right alignment of policy incentives, fuel retailers are well equipped to facilitate a faster, more widespread and cost-effective transition to alternatives—including electricity—in the coming years.

*Question 4.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* NATSO has adopted principles it believes lawmakers should follow when considering ways to fund highway programs. Funding mechanisms should be:

- *Simple*—It should be efficient and inexpensive to collect highway funds.
- *Difficult to Evade*—It should be difficult for taxpayers to evade paying the tax / fee for infrastructure investment.
- *User-Based*—The primary stream of funding for infrastructure projects should be user-based.
- *Energy Source-Neutral*—All energy sources must be subject to the same fee on a gallon / energy equivalent basis.
- *Transparent*—Users must be able to understand the amount they are being charged.

- *Dedicated to Infrastructure*—Funds raised in the name of improving surface transportation infrastructure should be dedicated to surface transportation infrastructure for the benefit of the payer. Reallocating such funds for other purposes should be prohibited.
- *Long-Term*—The revenue generated by the funding solution should not significantly diminish over time. As a means of guarding against future shortfalls, the funding solution should contain automatic adjustments to mitigate trends that decrease the revenue it generates, such as fuel efficiency.

*Question 5.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* NATSO has long supported robust investment in the nation's roads and bridges for a variety of reasons, including the improvements those investments would have on emissions.

QUESTIONS FROM HON. SCOTT PERRY TO SHAMEEK KONAR, CHIEF EXECUTIVE OFFICER, PILOT FLYING J, ON BEHALF OF THE NATIONAL ASSOCIATION OF TRUCKSTOP OPERATORS

*Question 6.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

If this cooperative effort is to succeed, it will cause great harm to America's prosperity and security.

While it appears nearly everyone testifying before the Committee today—and much of the broader corporate community—has accepted and embraced the radical, whole-sale approach to rapidly electrify our transportation sector, historical and recent consumption trends indicate that your consumers—and our constituents—don't share this warm embrace.

These concerns will grow to disdain as the costs of all consumer goods continues to skyrocket.

The near universal acceptance that electrification is inevitable must be met with the proper historical context—the electric vehicle is NOT some emerging technology that will breakthrough if enough taxpayer money is spent.

As a matter of fact, electric vehicles are as old as motorized vehicles themselves.

In 1896—yes, eighteen-ninety-six—Thomas Edison wrote to Henry Ford admitting the electric vehicle had been rendered obsolete by the cheaper, superior alternative, the internal combustion engine:

“Electric cars must keep near to power stations. The storage battery is too heavy . . . Your car is self-contained—carries its own power plant—no fire, no boiler, no smoke and no steam. You have the thing. Keep at it.”

125 years after this exchange, EVs are still plagued by largely the same deficiencies relative to ICEs—a lack of range, higher costs, and a lack of battery capacity per pound.

More recent concerns about battery life-span, the diminished range of aging batteries, and the propensity for aging batteries to erupt in flames add to consumer weariness.

Until these fundamental issues are resolved, American consumers will not adopt electric vehicles voluntarily as demonstrated by EV's anemic market share and the continual failure to meet projected sales figures.

At the height of the Obama administration's taxpayer handouts for EV companies, he predicted there would be 1 million EVs on the road by 2015—a figure that wasn't reached until the end of 2018.

Over the past decade, the EV industry received \$43 billion in federal subsidies and tax incentives to manufacturers and consumers—plus state and local incentives—and electric vehicle sales made up only 1.9 percent of US retail car sales in 2020.

Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*Question 7.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER TO QUESTIONS 6 & 7.* Until the number of EVs on the road reaches a critical mass, there is an important role for federal policy to “bridge the gap” and make private investments more viable while providing long-term consumer benefits. This would be comparable to the experience from the power generation sector, where numerous programs including investment tax credits, portfolio standards, cap and trade systems, and grants have fostered the development of renewable generation—especially wind and solar—to get those technologies to a point of scale and economic parity. The transportation sector needs to follow a similar path to foster the disciplined, expeditious and economic adoption of EVs, with the utility sector and retail fuel sector focusing on their core competencies to deliver the solution to consumers.

For maximum impact, grant programs or other federal investment designed to encourage investment in EV charging infrastructure and supply equipment should be dispersed in a manner that includes certain guardrails to ensure a level playing field, including incentives to incubate and foster development that will provide long-term consumer benefits. Policy mechanisms worth considering include: (1) direct investment and tax credits; (2) low carbon fuel programs; (3) reselling electricity; and (4) uniform pricing.

Conversely, policies that at first blush appear to be quick and easy solutions may have the unintended consequence of undermining either utilities’ incentives to restructure the power grid or retailers’ incentive to invest in EV charging infrastructure. Examples of these counterproductive policies include: (1) forcing ratepayers to underwrite utilities’ investment in EV charging stations or to subsidize the retail cost of electricity that charges electric vehicles; (2) allowing EV charging infrastructure at interstate rest areas; and (3) permitting utilities that own EV charging stations to charge other EV station owners higher rates for power than the internal transfer price they charge their own operations.

QUESTIONS FROM HON. PETER A. DEFazio TO TROY RUDD, CHIEF EXECUTIVE OFFICER, AECOM

*Question 1.* Mr. Rudd, one of the former Administration’s proposed changes to the environmental review process is intended limit the consideration of cumulative effects, such as climate change, in the environmental review process.

Given the cost of climate change to the government and the economy, do you believe it is appropriate that a NEPA analysis consider the impact of a proposed project on the climate?

*ANSWER.* The short answer is, yes. As we work collectively to advance our national focus toward addressing climate change, we see an opportunity to further this effort under the National Environmental Policy Act (NEPA) process. NEPA can analyze, in a meaningful way, the potential effects of Federal proposed actions on climate change considerations.

AECOM, in accordance with CEQ’s current guidance to address greenhouse gases pursuant to EO 13990 (see: [https://ceq.doe.gov/guidance/ceq\\_guidance\\_nepa\\_hghg.html](https://ceq.doe.gov/guidance/ceq_guidance_nepa_hghg.html)), has developed and is implementing an innovative process to assess climate change in NEPA documents addressing cumulative impacts through demonstration of the interplay of climate change with other environmental resources. Specifically, we couple: (1) a traditional evaluation of greenhouse gases as a component of the Air Quality analysis (i.e., effects of the project on climate change) with (2) a resource-specific climate change effects analysis for each resource area evaluated in the EIS (i.e., effects of climate change on the ROI, project, or program). The integration of climate change considerations into resource-specific effects analyses provides an opportunity to demonstrate the interplay of climate change considerations both across and within the context of specific resources analyzed, drawing on the expertise of all resource disciplines. With renewed interest in the climate change “crisis” under the Biden administration, we believe an efficient and streamlined process to assess climate impacts transversally across resources/disciplines is key to their meaningful inclusion in NEPA documents. We have found that this approach does not slow the process down (as demonstrated in recent Federal NEPA actions) but can actually speed up project implementation and reduce delays due to holistic and comprehensive planning, thereby maximizing return on investment (ROI).

*Question 2.* Mr. Rudd, your testimony noted that you helped primarily rural Fresno County, CA assess how rural transit agencies can benefit from vehicle electrification to improve resilience. Too often, transit is thought of as an urban-only solution. What role can rural transit play in providing climate solutions?

*ANSWER.* Often, exurban and rural communities depend on long-distance bus services that rural transit operators provide for both commuter access to the nearest employment centers. These same communities may also rely on commuter rail, and even intercity passenger rail for access to jobs, healthcare or higher education. Both rail and bus options, in addition to providing mobility access, contribute to climate and air-quality benefits by reducing long-distance single-occupancy vehicle (SOV) trips and thereby reducing VMT. In some cases, rural commuter service into urban centers can be substantial, providing the benefits of those reduced (SOV) trips and congestion improvements on the corridor served. While this type of access may not be available everywhere, the potential for climate friendly transportation service that also addresses cleaner air for rural communities and access to education opportunities, healthcare, and economic and employment centers is certainly worthwhile.

Climate change is having an impact in rural, suburban and urban communities, and transportation is the single largest contributor of carbon pollution. The steps we take to address the resiliency of our infrastructure, but also to provide cleaner transportation options, are appropriate in all communities.

Rural regions of the country will likely transition slower to zero emissions vehicles, as density will be less and public charging infrastructure will likely be reduced in low density areas, including rural areas. By creating a focus on rural transit, efforts to electrify bus fleets in these rural areas can accelerate availability of shared public charging infrastructure, catalyze the modernization of grid infrastructure to support future electric vehicles, and also provide the benefits of zero emissions vehicles to regions that may be slower to transition.

QUESTIONS FROM HON. MICHAEL GUEST TO TROY RUDD, CHIEF EXECUTIVE OFFICER, AECOM

*Question 1.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* Vehicle Miles Traveled (VMT) proposals [or Mileage Based User Fees (MBUFs) or Road User Charges (RUCs)] are being looked at as options to address the projected decline in purchasing power of the federal gas tax, which is currently the central use-oriented revenue source for highway, bridge, and transit investments. Currently, the more a person drives on the road, the more gas they use and federal and state motor fuel taxes they pay. It may be imperfect, but it has served as the best user-oriented revenue source we have had to date. However, while the gas tax currently raises a very sizable stream of revenue, many experts see its role in the long term as a declining revenue source, especially as we move toward more fuel efficient and electrified fleets. A VMT-oriented approach is currently seen as the best alternative to the gas tax that would maintain the connection between use of our surface transportation system and the revenues needed to support the spending to repair and replace them.

While many believe that a direct user pay model is also the fairest approach to charge those using the roads to help pay for them, there are certainly concerns among those in rural communities about how the approach will impact them. When considering the concerns of rural communities, it is important to understand that VMT (MBUF/RUC) approaches can be developed that recognize and adjust for rural equity concerns.

The Road User Charge (RUC) is increasingly being viewed as potentially the fairest method to charge for the use of infrastructure. The RUC would replace the amount paid for gas taxes with a fee for road use. While the current gas tax may be seen as disproportionately impacting rural drivers as they drive more miles and often drive less fuel-efficient vehicles, a RUC can be designed to be a more progressive charge allowing for initiatives such as rebates, discounts, and even charging different amounts per mile by vehicle, time of day, or roadway. To be fair, all vehicles including electric vehicles, should contribute to pay for the use of our roadway system.

The Eastern Corridor Coalition found that after participating in their RUC pilot, 83 percent of participants said RUC was as fair or fairer than the gas tax. The RUC can be a more equitable or fair method of collection than the gas tax because with

RUC, all drivers using the roadway, including highly fuel-efficient and alternative-fuel vehicles, pay to maintain and operate the roadway network.

In 2017, a report was issued on the RUC West Consortium entitled “Financial Impacts of Road User Charges on Urban and Rural Households.” This report provided an analysis of the financial impacts of a revenue-neutral RUC for drivers in urban and rural counties for eight states in the RUC West Consortium—Arizona, California, Idaho, Montana, Oregon, Texas, Utah, and Washington. The report’s analysis showed that households in rural census tracts will generally pay less under a road user charge than they are currently paying in gasoline taxes. In most states, households in mixed census tracts will also pay less under a RUC. Households in urban areas in all eight states could see a slight increase in payments.

The National Surface Transportation Infrastructure Financing Commission (established by Congress as part of the SAFETEA-LU Authorizing legislation) studied the range of funding options and concluded that: “a federal funding system based on more direct forms of “user pay” charges in the form of a charge for each mile driven (commonly referred to as a vehicle miles traveled or VMT fee system), has emerged as the consensus choice for the future.”

We share the following links as resources to consider as this issue progresses:

- [https://www.rucwest.org/wp-content/uploads/2018/07/RUC\\_RuralDrivers\\_folio\\_final-LTR.pdf](https://www.rucwest.org/wp-content/uploads/2018/07/RUC_RuralDrivers_folio_final-LTR.pdf)
- <http://www.mbufa.org/myth.html>
- [https://financemission.dot.gov/Documents/NSTIF\\_Commission\\_Final\\_Report\\_Exec\\_Summary\\_Feb09.pdf](https://financemission.dot.gov/Documents/NSTIF_Commission_Final_Report_Exec_Summary_Feb09.pdf)
- [https://tetcoalitionmbuf.org/states-are-exploring-new-ways-to-pay-for-transportation-our-latest-research-shows-addressing-public-opinion-will-be-key/?subscribe=success#wp-widget-blog\\_subscription](https://tetcoalitionmbuf.org/states-are-exploring-new-ways-to-pay-for-transportation-our-latest-research-shows-addressing-public-opinion-will-be-key/?subscribe=success#wp-widget-blog_subscription)
- [https://tetcoalitionmbuf.org/wp-content/uploads/2020/07/Coalition-MBUF-Equity-Fairness-Tech-Memo\\_2019.pdf](https://tetcoalitionmbuf.org/wp-content/uploads/2020/07/Coalition-MBUF-Equity-Fairness-Tech-Memo_2019.pdf)
- <https://itif.org/publications/2019/04/22/policymakers-guide-road-user-charges>

*Question 2.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* Investments in transportation that make the system more efficient and reduce congestion have the added benefit of opportunity to also reduce emissions. Improvements that address major deficiencies in infrastructure quality that result in reduced trip length, travel time, congestion and idling of commercial vehicles may have benefits on air quality, but the specifics of those improvements would be determining factors in how much improvement in air quality would result. There are also advances being made in materials that are showing promise for carbon emission reductions.

Additionally, often exurban and rural communities depend on long-distance bus services that rural transit operators provide for both commuter access to the nearest employment centers. Those options, in addition to providing mobility access, also provide climate and air-quality benefits by reducing long-distance single-occupancy vehicle (SOV) trips. In some cases, rural commuter service into urban centers can be substantial, providing the benefits of those reduced (SOV) trips and congestion improvements on the corridor served. While this type of access may not be available everywhere, the potential for climate friendly transportation service that also address access to economic and employment centers is certainly worthwhile.

Climate change is having an impact in rural, suburban and urban communities, and transportation is the single largest contributor of carbon pollution. The steps we take to address the resiliency of our infrastructure, but also to provide cleaner transportation options are appropriate in all communities.

QUESTIONS FROM HON. SCOTT PERRY TO TROY RUDD, CHIEF EXECUTIVE OFFICER,  
AECOM

*Question 3.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation’s political and corporate elites are marching in lockstep behind President Biden’s Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

If this cooperative effort is to succeed, it will cause great harm to America’s prosperity and security.

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These concerns will grow to disdain as the costs of all consumer goods continues to skyrocket.

The near universal acceptance that electrification is inevitable must be met with the proper historical context—the electric vehicle is NOT some emerging technology that will breakthrough if enough taxpayer money is spent.

As a matter of fact, electric vehicles are as old as motorized vehicles themselves.

In 1896—yes, eighteen-ninety-six—Thomas Edison wrote to Henry Ford admitting the electric vehicle had been rendered obsolete by the cheaper, superior alternative, the internal combustion engine:

“Electric cars must keep near to power stations. The storage battery is too heavy . . . Your car is self-contained—carries its own power plant—no fire, no boiler, no smoke and no steam. You have the thing. Keep at it.”

125 years after this exchange, EVs are still plagued by largely the same deficiencies relative to ICEs—a lack of range, higher costs, and a lack of battery capacity per pound.

More recent concerns about battery life-span, the diminished range of aging batteries, and the propensity for aging batteries to erupt in flames add to consumer weariness.

Until these fundamental issues are resolved, American consumers will not adopt electric vehicles voluntarily as demonstrated by EV's anemic market share and the continual failure to meet projected sales figures.

At the height of the Obama administration's taxpayer handouts for EV companies, he predicted there would be 1 million EVs on the road by 2015—a figure that wasn't reached until the end of 2018.

Over the past decade, the EV industry received \$43 billion in federal subsidies and tax incentives to manufacturers and consumers—plus state and local incentives—and electric vehicle sales made up only 1.9 percent of US retail car sales in 2020.

Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*Question 4.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER TO QUESTIONS 3 & 4.* We see electrification of the transportation sector as a solution to a problem that our clients are raising with us, and one that is thoroughly achievable.

We know that fossil fuels are contributing to greenhouse gas emissions. We also know that the transportation sector is currently the economic sector that is currently contributing the greatest amount to our carbon emissions total, making it the sector that has the most opportunity for reductions. A move towards electrification now will enable significant reductions in carbon emissions, and when coupled with decarbonization of the power sector, these changes hold great promise to help us achieve goals for reduced greenhouse gas emissions in the near and long term. A study by the American Lung Association found that with a nationwide transition to EVs by 2050, the U.S. could avoid 6,300 premature deaths, 93,000 asthma attacks, and 416,000 lost workdays each year. Over that time, it would add up to \$72 billion in health benefits and \$113 in climate-related benefits. Further, this transition would result in a 94% cut in greenhouse gas emissions, particularly for millions of Americans who live in counties where there are unhealthy levels of ozone and particle pollution.

Technology advances over the last decade have driven prices down significantly, with battery pack prices falling 89 percent and many automakers stating they believe electric vehicles will cost the same price as comparable internal combustion engines by 2023. Electric vehicles are also less expensive to maintain, and this means cost savings for governments and businesses that operate and maintain large fleets. These governments and businesses are beginning to recognize that the technology has reached a point of maturity where fleet conversion is not only possible but is practical and makes financial sense due to cost savings derived from both power and maintenance. We regularly support government and commercial clients in their dual goals to reduce costs (saving taxpayers or clients money) and reduce emissions

through energy efficiency and operations improvements. We think this makes good government sense, and good business sense.

AECOM is working with clients to develop holistic approaches to transportation electrification that combine fleet conversion and charging infrastructure with grid enhancements (microgrids and distributed energy), energy efficiency improvements, and renewable energy applications. When combined together, the savings achieved and the energy applied have enormous potential to reshape our transportation systems for the better.

QUESTIONS FROM HON. MICHAEL GUEST TO RAFAEL SANTANA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, WABTEC CORPORATION

*Question 1.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* Wabtec Corporation does not have a position on the Vehicle Miles Tax and its benefits for rural Americans. That issue is outside the scope of Wabtec's business which is freight rail locomotives and freight and transit rail components.

*Question 2.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* Wabtec Corporation generally supports increased investment in various infrastructure projects that might reduce emissions in rural America. As I discussed in my testimony, Wabtec believes that increasing freight rail utilization, capacity, and developing hydrogen locomotives will further reduce emissions in across America, including rural America where thousands of freight railroad lines connect cities and towns. Wabtec believes that increasing freight rail utilization by 50% and deploying hydrogen freight rail locomotives by 2030 will eliminate 100 million tons of carbon dioxide in the United States every year.

QUESTIONS FROM HON. SCOTT PERRY TO RAFAEL SANTANA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, WABTEC CORPORATION

*Question 3.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

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Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*Question 4.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER TO QUESTIONS 3 & 4.* Wabtec is a locomotive manufacturer and does not have a position on tax credits for electric vehicles.

QUESTIONS FROM HON. JARED HUFFMAN TO FREDERICK W. SMITH, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, FEDEX CORPORATION

*Question 1.* Mr. Smith, FedEx has made the business decision to have an entire fleet of zero vehicles (ZEV) by 2040. While this will have the environmental benefit of reduced emissions reduction, as a business you are first and foremost focused on your bottom line and the laser focus on total cost of ownership.

Why did you conclude from a business perspective that rapid transition to ZEV's was the smartest move?

*ANSWER.* As we announced on March 3, 2021, the transition to ZEV's will be via a phased approach that will occur over the next 19 years. We also announced interim goals for the FedEx Express pick-up and delivery (PUD) vehicle fleet, of which we expect 50% of our global PUD vehicle purchases to be ZEV by 2025 and 100% by 2030. These goals do not apply to our long-haul trucking fleet since the technological path to electrification for this class of vehicles is lagging light and medium-duty vehicles.

In addition to being the right thing to do for the well-being of the communities where we operate, there are economic considerations in transitioning away from internal combustion engines in our PUD fleet.

On average, FedEx anticipates that the savings achieved from electric vehicle use compared to continued use of internal combustion engine vehicles could be in a range of approximately 50% of current operating costs. We recognize that actual savings as a result of this transition will depend on external factors, such as changes in fuel costs over the 19-year transition, fluctuation in manufacturing and production costs, as well as capital expenditures to construct the supporting ground infrastructure needed for EVs.

*Question 2.* Fast forward to 2040, when FedEx and other business competitors will have all or significant ZEV fleets.

How much will FedEx save by 2040 with an all ZEV fleet?

*ANSWER.* As noted above, we expect the savings from this transition to be in a range of approximately 50% of today's current vehicle operating costs. This estimate will likely change based on other external factors, such as future fuel costs over the course of the 19-year transition, fluctuation in EV manufacturing and production, as well as capital expenditures to replace and electrify our network and pickup and delivery fleet. Much, if not all of this investment, will be recovered over time. Beyond the economic incentives for our company, this is an investment in the continued well-being of the communities we serve.

*Question 3.* Do you think any major business focused on delivery of goods at your scale could compete in 2040 without a nearly all ZEV fleet, instead depending on outdated gas-guzzling technology?

*ANSWER.* While I am not able to opine on the business decisions of FedEx's competitors, I think we will continue to see a transition away from ICE vehicles and toward EVs due to the clear and compelling economic and societal benefits, as well as consumer demand.

QUESTIONS FROM HON. MICHAEL GUEST TO FREDERICK W. SMITH, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, FEDEX CORPORATION

*Question 4.* As we've discussed, larger corporations and transportation system manufacturers are moving towards more efficient systems. In my opinion, this allows larger companies to sell more efficient used equipment to smaller operations or allow prices to be more affordable for small businesses while also not setting burdensome mandates or requirements for compliance by the federal government. We know this works because Americans moved to using more fuel-efficient cars when automakers worked to produce them. That's why our Highway Trust Fund is depleted.

What do you see as the impact on small businesses in your industries if mandated emission standards were put in place vs. allowing the market to work through this process we just discussed?

*ANSWER.* Emissions standards are currently regulated by the U.S. Environmental Protection Agency, and for the transportation industry, those standards are enforced by the relevant component agencies of the U.S. Department of Transportation. These standards are developed via the federal rulemaking process, which affords opportunity for public comment to allow the agency to fully consider the impact of these policy decisions on the affected stakeholders, including the consideration of alternatives that achieve the same objective yet minimize the burden on small businesses. When such policy changes are under consideration, we work closely with our independent service providers to assess the impact on our operation, as well as evaluate the rate of technology development and internal and external infrastructure modification and development that would be needed to support these changes to ensure these factors are considered by the relevant agencies.

*Question 5.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* As Americans continue to purchase and drive electric and hybrid passenger vehicles, receipts from motor fuel taxes paid into the Highway Trust Fund will continue to decline, thus further reducing resources needed to maintain the Federal highway system. An equitable and well-designed Vehicle Miles Traveled (VMT) tax could be implemented that builds on the existing user fee model for highways, while also balancing the needs of Americans living in rural areas. FedEx recognizes that such a policy shift is of interest to all who use the federal highway system and looks forward to working with Congress and the U.S. Department of Transportation in developing a system that builds upon the productivity of the nation's highways.

*Question 6.* How might a VMT change parcel service business models, both large and small?

*ANSWER.* Creating a stable source of funding to modernize and invest in infrastructure will increase safety and efficiency across our country's aging transportation system for all users—both passenger and commercial. The long-term benefits of this investment will be shared across the transportation companies, large and small, who move nearly 70% of all U.S. freight tonnage by trucks.

*Question 7.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* Infrastructure is not limited to being a rural or urban issue. Our interstate system is over 60 years old, and many of our roads and bridges are dangerously deteriorated, as regularly reported by the U.S. Department of Transport-

tation (DOT). In smaller, rural communities, when a bridge is not safe to cross, operators are often forced to drive miles out of their way to safely get to their destination, which only serves to increase vehicle emissions. Improvements in our infrastructure are necessary not only for reduction in emissions, but to keep our system safe for all users, and ensure the system is capable of sustaining and advancing the anticipated economic growth of all industries who rely on this system.

*Question 8.* As widespread use of commercial parcel delivery by Unmanned Aerial Systems becomes more of a reality, how can UAS be best used to address emissions and traffic issues across the country? Mississippi State University in my district houses the FAA Center of Excellence for UAS and would be glad to help address that need.

*ANSWER.* Continued investment in research and development of new technologies, including small unmanned aircraft systems, will result in safety and efficiency advancements for our team members and operations. As we have noted previously, it will take a portfolio of solutions to address the challenges of the anticipated growth in the e-commerce market. More research and development is needed to fully understand the impact and various use cases for small unmanned aircraft systems, which is why we continue to work with the U.S. Federal Aviation Administration via the agency's Beyond program to build on the findings of the U.S. Department of Transportation's Small Unmanned Aircraft System (UAS) Integration Pilot Program (IPP).

QUESTIONS FROM HON. SCOTT PERRY TO FREDERICK W. SMITH, CHAIRMAN AND  
CHIEF EXECUTIVE OFFICER, FEDEX CORPORATION

*Question 9.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

If this cooperative effort is to succeed, it will cause great harm to America's prosperity and security.

While it appears nearly everyone testifying before the Committee today—and much of the broader corporate community—has accepted and embraced the radical, whole-sale approach to rapidly electrify our transportation sector, historical and recent consumption trends indicate that your consumers—and our constituents—don't share this warm embrace.

These concerns will grow to disdain as the costs of all consumer goods continues to skyrocket.

The near universal acceptance that electrification is inevitable must be met with the proper historical context—the electric vehicle is NOT some emerging technology that will breakthrough if enough taxpayer money is spent.

As a matter of fact, electric vehicles are as old as motorized vehicles themselves.

In 1896—yes, eighteen-ninety-six—Thomas Edison wrote to Henry Ford admitting the electric vehicle had been rendered obsolete by the cheaper, superior alternative, the internal combustion engine:

“Electric cars must keep near to power stations. The storage battery is too heavy . . . Your car is self-contained—carries its own power plant—no fire, no boiler, no smoke and no steam. You have the thing. Keep at it.”

125 years after this exchange, EVs are still plagued by largely the same deficiencies relative to ICEs—a lack of range, higher costs, and a lack of battery capacity per pound.

More recent concerns about battery life-span, the diminished range of aging batteries, and the propensity for aging batteries to erupt in flames add to consumer weariness.

Until these fundamental issues are resolved, American consumers will not adopt electric vehicles voluntarily as demonstrated by EV's anemic market share and the continual failure to meet projected sales figures.

At the height of the Obama administration's taxpayer handouts for EV companies, he predicted there would be 1 million EVs on the road by 2015—a figure that wasn't reached until the end of 2018.

Over the past decade, the EV industry received \$43 billion in federal subsidies and tax incentives to manufacturers and consumers—plus state and local incentives—and electric vehicle sales made up only 1.9 percent of US retail car sales in 2020.

Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*Question 10.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER TO QUESTION 10.* As evidenced by our long-standing history of leadership in sustainability, including our announcement on March 3, 2021, businesses can and will lead in this effort. To do so, however, we need supportive policies that help advance innovation. Those policies can only come by working together to ensure alignment on investment and research and development priorities.

We have to modernize our country's infrastructure to accommodate new and more sustainable technologies. Widespread deployment of electric vehicles, not just by FedEx but other large fleets, small businesses, municipalities, and individuals will have a profound impact on the power grid. We support public policy that strengthens this infrastructure and ensures that the electricity being generated comes from a diverse set of low and zero emission sources and is of sufficient supply to meet the demand of all users.

I can't speak to the supply chains of individual EV manufacturers here in the U.S., but recent studies have shown that by shifting 50 percent of all vehicles produced to electric would result in a global net total of ten million new jobs across all sectors of the economy. Incentives intended to speed the adoption of and transition to EVs or stimulate manufacturing of EVs would stimulate both job growth and the economy.

QUESTIONS FROM HON. PETER A. DEFAZIO TO LAURIE M. GIAMMONA, SENIOR VICE PRESIDENT FOR CUSTOMER CARE, PACIFIC GAS AND ELECTRIC COMPANY

*Question 1.* Ms. Giammona, does PG&E support a change in Federal law to allow EV charging at park-and-ride facilities and rest areas? Would this help expand EV charging deployment and reduce range anxiety?

*ANSWER.* PG&E is dedicated to working with our customers, communities, regulators and policymakers to advance solutions that increase access to electric vehicle (EV) charging and reduce range anxiety. Range anxiety is one of the key barriers customers cite to EV adoption. While newer models of light-duty EVs provide increased range comparable with internal combustion engine vehicles, access to charging including along the interstate highway system is needed to provide EV drivers convenient, dependable recharging options for longer trips. If the Federal government decides EV charging should be allowed at park-and-ride facilities and rest areas, PG&E will be ready and willing to work with our customers to provide utility services needed to deploy charging at these locations.

*Question 2.* Do you have any examples of partnerships with the retail fuel sector to provide EV charging?

*ANSWER.* The role played by electric utilities is only one of many in the broader transportation electrification ecosystem. This ecosystem includes entities such as policy makers, automakers, EV charging companies, battery and component manufacturers, technology providers, utilities, and host sites for EV charging, including traditional fuel retailers. EV drivers will need multiple options for charging, and fuel retailers can play an important role in this space.

Through PG&E's EV Fast Charge program, we are partnering with fuel retailers, including 7-Eleven, to install public EV fast charging at retailer locations. PG&E's EV Fast Charge program is investing \$22 million from 2020 to 2025 to install infrastructure that supports Direct Current Fast Charging (DCFC) that is publicly accessible 24 hours a day, seven days a week. In February 2021, PG&E announced that the first public EV fast chargers installed through this program are now open at a 7-Eleven location in West Sacramento, and the companies are examining opportunities to install fast chargers at other 7-Eleven locations.<sup>1</sup>

*Question 3.* Ms. Giammona, can you expand on some of PG&E's efforts to ensure that EV charging infrastructure reaches all communities.

How much has PG&E, and the electric utility sector, invested in helping communities deploy EV charging infrastructure?

*ANSWER.* As part of our normal course of business, PG&E invests in upgrading and maintaining our electric distribution grid to accommodate all new loads, including the growing loads for EV charging. In addition, PG&E is making supplemental

<sup>1</sup> Pacific Gas and Electric Company, "PG&E Launches EV Fast Charge Program to Help Accelerate Electric Vehicle Adoption in California" (February 18, 2021), <https://www.pgecurrents.com/2021/02/18/pge-launches-ev-fast-charge-program-to-help-accelerate-electric-vehicle-adoption-in-california/>.

capital investments that total more than \$400 million in approved infrastructure programs through 2025—one of the largest utility-EV investments in the nation. These investments include:

- *EV Charge Network*: \$130 million to install 4,000 to 5,000 level-2 charging ports to support light-duty vehicle charging at workplaces and multi-unit dwellings. Through March 2021, 4,504 level-2 charging ports have been installed at 184 sites.
- *EV Fleet*: \$236 million to help 700+ organizations including school districts, transit agencies and small businesses electrify their fleet operations by supporting infrastructure for 6,500 medium- and heavy-duty EVs. Through March 2021, EV charging infrastructure has been installed at 22 sites to support 237 electric fleet vehicles.
- *EV Fast Charge*: \$22 million to install infrastructure to support public Direct Current Fast Charging (DCFC). Through March 2021, four DCFC ports have been installed at one site.
- *EV Schools and Parks*: \$12 million in charging infrastructure at schools and state parks. As of April 2021, PG&E is currently accepting and reviewing applications from potential program participants.

These charging programs include incentives for, and deployment targets in, disadvantaged communities, helping to ensure all customers can equitably access the benefits of EVs, and PG&E seeks to install up to 2,000 level-1 and level-2 home chargers for low-income customers by 2023.

While PG&E will continue to play a critical role deploying EV charging infrastructure in our service area, particularly in underserved communities, PG&E's investments alone will not meet the significant demand for EV charging in our service area. A recent EV charging infrastructure assessment performed by the California Energy Commission found that through September 2020 there were approximately 67,000 shared public and private chargers in California.<sup>2</sup> The assessment concluded the State would need nearly 1.5 million chargers by 2030 to support the number of vehicles envisaged by Governor Gavin Newsom's Executive Order setting a goal of phasing out sales of light-duty internal combustion engine vehicles by 2035.<sup>3</sup> The significant amount of charging infrastructure required demonstrates the need for support from EV markets and a multitude of stakeholders.

Industry-wide, the Edison Electric Institute (EEI), which represents all U.S. investor-owned electric companies, reports that as of the end of January 2021, 52 electric companies had received regulatory approval in 31 states for electric transportation filings.<sup>4</sup> As a result, these electric companies are investing nearly \$3 billion in customer programs to deploy charging infrastructure and accelerate electric transportation.

QUESTIONS FROM HON. MICHAEL GUEST TO LAURIE M. GIAMMONA, SENIOR VICE PRESIDENT FOR CUSTOMER CARE, PACIFIC GAS AND ELECTRIC COMPANY

*Question 4.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* While PG&E does not have a position on federal vehicle miles traveled (VMT) proposals, we believe all drivers, including EV owners, should contribute to the Highway Trust Fund and support the infrastructure they utilize. Any proposal should recognize the environmental benefits and efficiency of EVs while also considering the equity implications proposals may have on some drivers, including those who have longer commutes with limited public transit options.

<sup>2</sup> California Energy Commission, "Electric Vehicle Charging Infrastructure Assessment—AB 2127," <https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127>.

<sup>3</sup> Office of Governor Gavin Newsom, "Executive Order N-79-20" (September 23, 2020), <https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-text.pdf>

<sup>4</sup> Edison Electric Institute, "Electric Transportation Biannual State Regulatory Update" (February 2021), [https://www.eei.org/issuesandpolicy/electrictransportation/Documents/FINAL\\_ET%20Biannual%20State%20Regulatory%20Update\\_February2021.pdf](https://www.eei.org/issuesandpolicy/electrictransportation/Documents/FINAL_ET%20Biannual%20State%20Regulatory%20Update_February2021.pdf).

*Question 5.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* According to research sponsored by the National Science Foundation, traffic congestion increases vehicle emissions and degrades air quality, which leads to excess morbidity and mortality for drivers, commuters and individuals living near major roadways.<sup>5</sup> Traffic congestion can be caused by various factors, including accidents, weather, work zones, poorly managed traffic controls, and physical bottlenecks due to insufficient or deteriorated infrastructure that cannot efficiently accommodate the volume of travelers.

Improved infrastructure could help reduce traffic congestion and as result help lower transportation emissions. Further, greater deployment of EVs, which emit no tailpipe emissions, will further reduce transportation pollution in all communities.

QUESTIONS FROM HON. GREG STANTON TO LAURIE M. GIAMMONA, SENIOR VICE  
PRESIDENT FOR CUSTOMER CARE, PACIFIC GAS AND ELECTRIC COMPANY

*Question 6.* Ms. Giammona, in your testimony, you described the importance of a partnership among public sector, private sector, and regulated utilities to facilitate electrification of the light duty vehicle fleet.

What role has PG&E played in providing publicly available EV supply equipment, and how can utilities like PG&E partner with the public and private sector to advance the adoption of EVs?

*ANSWER.* PG&E is actively collaborating with automakers, charging equipment providers, state agencies, customers, and communities to support the large-scale electric infrastructure needed to incorporate EV charging systems into the energy grid. Additionally, PG&E is making investments totaling more than \$400 million in approved infrastructure programs through 2025—one of the largest utility-EV investments in the nation. These investments include \$22 million to install infrastructure to support public Direct Current Fast Charging (DCFC) and \$12 million in charging infrastructure at schools and state parks. All DCFC installed through PG&E's Fast Charge program will be accessible to the public 24 hours a day, seven days a week while charging infrastructure installed at certain schools and parks will also be available for public use. Other PG&E charging programs target infrastructure investments in medium- and heavy-duty fleet electrification and level-2 charging at workplaces and multi-unit dwellings, which are not necessarily publicly accessible but will aid in efforts for fleets and individuals to transition to electric transportation.

To help advance the adoption of EVs in Northern and Central California, PG&E partners with both the private and public sectors to overcome common barriers to adoption. PG&E provides vital assistance to help our customers overcome these barriers by expanding access to charging infrastructure, reducing the total cost of ownership of EVs, and engaging and educating customers about the benefits of EVs. PG&E is also working to optimize charging infrastructure siting and usage to maximize grid benefits and support customer affordability. To ensure a smooth transition to widespread EV adoption, PG&E strongly encourages our customers, policymakers, and regulators seeking to support EV charging in our service area to communicate early with PG&E so we can ensure the distribution grid is best prepared to meet these new demands in an efficient, timely manner. Utilities across the United States can take similar steps to aid public and private sector customers' transition to electrified transportation.

QUESTIONS FROM HON. NIKEMA WILLIAMS TO LAURIE M. GIAMMONA, SENIOR VICE  
PRESIDENT FOR CUSTOMER CARE, PACIFIC GAS AND ELECTRIC COMPANY

*Question 7.* There is rising pressure to find sustainable solutions to combat climate change and protect our resources for the future generations to come.

Ms. Giammona, in your testimony you suggested grant funding for public EVs and other forms of clean fuel infrastructure for deployment in disadvantaged communities.

<sup>5</sup> Zhang, Kai and Batterman, Stuart, "Air pollution and health risks due to vehicle traffic" (November 2014), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4243514/#:~:text=Traffic%20congestion%20increases%20vehicle%20emissions,on%20roads%20is%20very%20limited.>

How can we ensure benefits of EVs are also available to disadvantaged communities and low-income customers? As we move to upgrade the grid and charging infrastructures in low-income communities, what obstacles do you see in terms of making it equitably available and what should Congress do to combat these?

*ANSWER.* PG&E supports incentives and policies that ensure disadvantaged communities and low-income customers can benefit from EVs, including reducing the upfront costs of EVs, ensuring charging options are available in these communities, and working with schools, local transit agencies and fleet operators to electrify medium- and heavy-duty vehicles. California and PG&E have enacted policies and programs that specifically strive to ensure that disadvantaged communities are not left behind in the transition to EVs, and we believe federal policy can complement these activities and accelerate opportunities for these communities to realize the benefits of EVs.

Of note, federal policies that provide point-of-sale rebates and used EV incentives will help lower the upfront cost of light-duty EVs for all customers, including those with limited tax liability. PG&E is working to reduce the overall cost of EV ownership through rebates and specialized electric rates that ensure owning and operating an EV can be cheaper than a gasoline-fueled alternative. In addition to federal tax credits, Californians are eligible for a point-of-sale price reduction of up to \$1,500 for the purchase or lease of a new EV through the California Clean Fuel Reward program.<sup>6</sup> PG&E also offers residential and commercial EV charging rates, that provide predictable, simplified and affordable rates for customers.

Federal policy can also provide incentives such as grants to ensure charging infrastructure is deployed in disadvantaged communities. At PG&E, we are investing more than \$400 million through 2025 in infrastructure investments to expand EV charging, including level-2 charging at workplaces and multi-unit dwellings, public fast charging, charging at schools and parks, and charging for medium- and heavy-duty fleets such as transit agencies and school districts. These charging programs include incentives for, and deployment targets in, disadvantaged communities, helping to ensure customers can equitably access the benefits of EVs. PG&E additionally seeks to install up to 2,000 level-1 and level-2 home chargers for low-income customers by 2023 as part of its Empower EV program.

Finally, disadvantaged and environmentally burdened communities often suffer from poor air quality due to proximity to major transportation corridors (e.g., highways) or industrial areas that see a large flow of fleet vehicles (e.g., ports, railyards, etc.) and can benefit from improved air quality with greater deployment of EVs, particularly electrification of transit buses, school buses, and other fleet vehicles which produce a larger share of air pollution. Federal programs that provide grants and incentives can help advance the development and deployment of medium- and heavy-duty EVs and necessary charging infrastructure in these communities.

The greatest barrier to EV adoption and charging deployment in disadvantaged communities remains the upfront cost of the vehicle and customer charging stations. For some EV charging providers, building charging in disadvantaged communities where EV adoption remains low may not provide a necessary return on investment. A recent study by the California Energy Commission on the distribution of EV chargers found that low-income census tracts have the fewest chargers per capita while high income census tracts have the most.<sup>7</sup> For potential EV owners in these communities, the lack of accessible charging infrastructure—combined with the higher upfront cost of some EV models—can discourage adoption.

To overcome these barriers, Congress should examine opportunities to provide grant funding and other incentives to deploy charging infrastructure in disadvantaged communities. Furthermore, opportunities to reduce the upfront cost of EVs, including point-of-sale rebates and used EV incentives, will help lower the upfront cost of light-duty EVs for all drivers, including low-income drivers who may have limited tax liability.

*Question 8.* I'm proud to represent the Atlanta region, which is serviced by the public transportation system, MARTA. In 2019 the company announced that it would start to replace several diesel buses with zero-emission battery operated models. A shift that I would love to see with both public and private transportation systems across the country. However, I recognize that there are challenges to electrifying buses.

<sup>6</sup> California Clean Fuel Reward, <https://cleanfuelreward.com/>

<sup>7</sup> California Energy Commission, "SB 1000 Electric Vehicle Charging Infrastructure Deployment Assessment" (December 21, 2020), <https://efiling.energy.ca.gov/GetDocument.aspx?tn=236075&DocumentContentId=69078>.

What are some of the barriers to customers who want to electrify their medium and heavy-duty fleets and what is PG&E doing to support?

*ANSWER.* The principal barriers to electrifying medium- and heavy-duty vehicles are the capital and debt costs and availability of electric models in these vehicle classes; understanding and planning for a new refueling paradigm; and the cost and work associated with installation of charging infrastructure.

Increasing federal and state policy certainty regarding a transition to cleaner vehicles as well as technology cost reductions have encouraged more vehicle manufacturers to produce electric versions of fleet vehicles needed for various medium- and heavy-duty purposes. PG&E encourages the Federal government to further this policy certainty and provide incentives for both manufacturers and consumers of these vehicles to help accelerate their financing, production and adoption.

While direct financial support to lower the upfront costs of medium- or heavy-duty electric vehicles is outside of PG&E's supportive scope, PG&E does assist its medium- and heavy-duty fleet customers who are interested in transitioning to electric vehicles by providing education to demystify transportation electrification and learn about available models and purchase incentives. PG&E and electric utilities act as trusted energy advisors that customers seek to learn from, and we very much see this as an opportunity to help our customers transition to cleaner forms of transportation.

PG&E further assists medium- and heavy-duty fleet customers with the installation of charging infrastructure necessary to transition to electric vehicles. Through PG&E's EV Fleet program, PG&E is investing \$236 million through 2024 to help 700+ organizations including school districts, transit agencies and small businesses electrify their fleet operations by supporting infrastructure for 6,500 medium- and heavy-duty EVs. Customers participating in the EV Fleet program can see the upfront costs of electrifying their fleet reduced significantly.

Another concern for fleet operators has been the affordability and predictability of refueling costs. PG&E has developed an innovative business EV rate that replaces demand charges with monthly subscription charges that allow for greater price certainty. This rate provides business customers a rate of \$1.77 per gallon equivalent, which is about 55 percent lower than current gasoline prices in California.<sup>8</sup>

Finally, customers seeking to expand their medium- or heavy-duty fleets should coordinate early with their utility to ensure the grid can effectively meet their charging needs. Large loads associated with medium- and heavy-duty charging can create a capacity gap on parts of PG&E's distribution system. If these capacity gaps exist, PG&E makes upgrades to effectively serve the increased load. To prevent timing issues, early coordination is key. PG&E is also seeking to expand its coordination with large customers, regulators and other knowledgeable parties to identify areas where we could see large influx of vehicle electrification and proactively upgrade those areas of the distribution grid to ensure capacity is available once customers are ready to electrify.

QUESTIONS FROM HON. SCOTT PERRY TO LAURIE M. GIAMMONA, SENIOR VICE  
PRESIDENT FOR CUSTOMER CARE, PACIFIC GAS AND ELECTRIC COMPANY

*Question 1.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

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As a matter of fact, electric vehicles are as old as motorized vehicles themselves.

<sup>8</sup> AAA, "State Gas Price Averages" (April 23, 2021), <https://gasprices.aaa.com/state-gas-price-averages/>.

In 1896—yes, eighteen-ninety-six—Thomas Edison wrote to Henry Ford admitting the electric vehicle had been rendered obsolete by the cheaper, superior alternative, the internal combustion engine:

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Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*ANSWER.* Electrification of the transportation sector will provide benefits for our environment, public health, economy, and energy system—benefits which will be realized by all Americans, not just EV adopters. In California, transportation is the single largest contributor of greenhouse gas (GHG) emissions, accounting for 41% of GHG emissions, while electricity accounts just for 15% of statewide GHG emissions. Electrifying transportation will be necessary to meet science-based targets of reducing GHG emissions to net-zero by 2050 or sooner to avoid the worst consequences of climate change. Already, California is experiencing the impacts of climate change, including heat waves, more frequent and extreme storms and wildfires, drought, and other impacts. These events have resulted in the loss of life and property and will continue to pose safety and financial risks to communities across America unless we can mitigate the impacts of climate change.

Transportation electrification will also improve air quality and public health as EVs do not produce any tailpipe emissions. In California, motorists drive more than a billion miles each day, producing 1,000 tons of smog-forming pollutants.<sup>9</sup> High levels of air pollution can lead to asthma and other respiratory illnesses that especially affect children and seniors, and those living in communities adjacent to highways, ports and rail yards can suffer disproportionate effects.

The transition to electric vehicles isn’t just an environmental priority, it’s also a generational and transformational opportunity for the United States to generate new jobs and drive economic output. As our nation seeks to recover from the COVID-19 pandemic and economic downturn, EV manufacturing and charging infrastructure buildout could create thousands of domestic jobs, adding to the more than 266,000 American jobs already supported by the alternative fuel vehicle industry.<sup>10</sup>

EV owners will also benefit from lower lifetime fuel and maintenance costs. EVs are less expensive to operate than gasoline-powered vehicles, primarily due to fuel cost savings because electricity is less expensive than gasoline on an equivalent cost basis. Customers using one of PG&E’s residential EV rate plans pay as low as \$1.60 per gasoline gallon equivalent—60% less than the current average price of \$3.98 per gallon of gasoline in California.<sup>11</sup>

EVs will even provide economic benefit to electric customers who do not choose to adopt them—namely through more affordable electric rates. As additional demand is added to our grid, the fixed costs of upgrading and maintaining the grid

<sup>9</sup> California Air Resources Board, “Drive Clean CA.Gov,” <https://driveclean.ca.gov/why-drive-clean>.

<sup>10</sup> National Association of State Energy Officials and Energy Futures Initiative, “2020 U.S. Energy & Employment Report,” <https://www.usenergyjobs.org/>.

<sup>11</sup> AAA, “State Gas Price Averages” (April 23, 2021), <https://gasprices.aaa.com/state-gas-price-averages/>.

will be spread over more kilowatt hours, which will help lower costs for all customers. This is particularly true when EV users are incentivized to charge during off-peak periods.

Greater EV adoption will also provide PG&E more flexibility to manage the grid in a way that promotes better resilience and reliability. In our service area, there is an increasing penetration of solar resources available in the morning hours—when demand is lower—and an increase in electricity demand in the afternoon and evening hours when the sun is down. Smart charging and incentives to EV owners to recharge during those peak solar hours will allow us to utilize more renewable energy and shift demand in a way that benefits all grid users.

Given the multiple, economywide benefits of EVs, PG&E supports federal incentives and investments including for research and development that will help accelerate deployment of charging infrastructure, reduce the upfront costs of EVs, and ensure EVs integrate successfully onto the electric grid.

*Question 2.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER.* PG&E agrees that market-based incentives and collaboration are essential to support the expansion of transportation electrification. The broader transportation electrification ecosystem includes policy makers as well as market participants such as automakers, EV charging companies, battery and component manufacturers, technology providers, utilities, and host sites for EV charging. Coordination and partnerships amongst private and public sector actors in this ecosystem help ensure deployment of EVs and charging infrastructure proceeds in an efficient, equitable manner that best meets customers' needs and demands. Federal policy to incent this transition in EV markets will help drive down the costs of EVs, expand charging infrastructure and encourage greater customer adoption.

QUESTIONS FROM HON. PETER A. DEFAZIO TO TOM LEWIS, P.E., J.D., NATIONAL BUSINESS LINE EXECUTIVE FOR CLIMATE, RESILIENCE, AND SUSTAINABILITY, WSP USA

*Question 1.* Mr. Lewis, your testimony references the “Envision” system, a framework for evaluating the sustainability and resilience of transportation projects.

Do you think a similar model can or should be used by the U.S. DOT, State DOTs, MPOs, or transit agencies when making funding decisions?

Are there any changes to federal procurement requirements that would facilitate the adequate consideration of resilience and climate benefits in transportation projects?

*ANSWER.* Yes, the inclusion of standards and models that directly address sustainability and resilience concerns and inform project selection, funding and implementation should be a part of all types of projects—and this applies to transportation as well as other types of infrastructure. Taking such measures makes sense from many different perspectives—natural resource management, energy policy, and prioritizing and protecting the large investments made in infrastructure nationally from extreme events and/or changing environmental conditions possible with climate change.

The American Society of Civil Engineers (ASCE) expects to publish the Standard Requirements for Sustainable Infrastructure Standard in late 2021 through the American National Standards Institute (ANSI) process. Once it is launched, this standard should be used to better inform and implement infrastructure development, specifically including the procurement process associated with infrastructure projects. These are consensus-based standards designed for transportation projects, supported by years of scientific and calibrated on actual transportation projects. Similarly, incorporating or at the very least incentivizing the use of a broad infrastructure rating system like Envision from the Institute for Sustainable Infrastructure (ISI) will help the government ensure that the right projects are being done, as well as being done right when it comes to sustainable and resilient infrastructure.

When it comes to transportation, the USDOT and state and local transportation agencies in particular can also leverage more specialized tools such FHWA's Infrastructure Voluntary Evaluation Sustainability Tool (INVEST), and the Greenroads rating system to ensure that transportation projects are designed for long-term resilience and adaptability. The National Cooperative Highway Research Program (NCHRP) through the National Academies of Science Transportation Research Board (TRB) also expects to publish this year a guide on Mainstreaming System Resilience Concepts into Transportation Agencies that was led by WSP USA in collabo-

ration with other transportation system resilience experts through an NCHRP project and funding.

It is vitally important to encourage Project Sponsors, such as local public works agencies, state DOTs and transit agencies, to use such standards, tools, and guides to monitor and measure sustainability, resilience, and climate benefits starting from the initial project planning and development process, through procurement, construction, and maintenance and throughout the asset lifecycle. For transportation programs and projects, USDOT can send a clear message to the project sponsors that their request for funding and approvals will be evaluated based on evidence that the project has been developed in accordance with industry benchmarked sustainability, resilience, and equity standards and considers the entirety of the period when the asset will be in service. Requiring grant applicants or funding recipients to meet sustainability and resilience criteria and/or to design to sustainable and resilient infrastructure standards will lead to funding “shovel worthy” projects that are more sustainable, resilient, and equitable in their design and delivery, as mentioned in my testimony.

Further, USDOT does not need to and should not act alone to prepare the country for a sustainable, resilient, and equitable future. Infrastructure serves communities and facilitates the economy. Transportation and infrastructure planning is also intricately linked with and can impact land use planning and housing policy, amongst other sectors. Through innovative programs like the Partnership for Sustainable Communities which brought USDOT together with HUD and EPA, USDOT has recognized its critical and interdependent role in the future of the communities in which it invests transportation infrastructure dollars. Interdisciplinary efforts like these can continue to have a necessary impact.

Finally, I reiterate that federal procurement policies are a powerful tool to shape aspects of project selection and design, including at the state and local levels. The “power of the purse” is an opportunity for the government to establish expectations for project sponsors seeking the use of federal monies, and the new ASCE Standard Requirements for Sustainable Infrastructure Standard coming out in late 2021 should be broadly leveraged accordingly to result in more sustainable and resilient infrastructure projects. Without clear requirements in the procurement solicitation and evaluation process for delivering sustainability, resilience, and equity outcomes throughout the project lifecycle, it is incredibly difficult to construct, operate and maintain a sustainable infrastructure project and system. ESG principles (Environment, Social, and Governance) are becoming an explicit tenet in how the private sector and government conduct their business and should also be considered during procurement and throughout the infrastructure project lifecycle.

By requiring project applicants to follow the tenets of such programs and justify instead why their investments are not sustainable or not resilient (rather than the other way around, as is done currently) infrastructure funding allocated today can make a change for decades into the future. Policies and requirements are powerful tools for change, and such considerations should definitely be a part of transportation project decisions moving forward.

*Question 2.* Mr. Lewis, one of the former Administration’s proposed changes to the environmental review process is intended limit the consideration of cumulative effects, such as climate change, in the environmental review process.

Given the cost of climate change to the government and the economy, do you believe it is appropriate that a NEPA analysis consider the impact of a proposed project on the climate?

*ANSWER.* Yes, it is appropriate and very beneficial to include the impacts of transportation projects relative to climate considerations as an element of NEPA. The NEPA process is a powerful, structured delivery process that has provided a framework for projects for decades. Explicitly including climate concerns would be beneficial.

Cumulative impacts analysis is a well-understood method for identifying a project’s effects in the context of other project’s effects that has been part of NEPA analyses for decades. Experienced NEPA practitioners are readily able to assess a project’s impacts on climate change (emissions) through cumulative effects, however federal agencies can do more to provide guidance on how these assessments should be prepared. Prior to the September 2020 changes to the environmental review process, the structure established over many decades of NEPA provide a basis to further the assessment of cumulative effects and climate change as well as environmental justice. It is familiar to NEPA practitioners both from the preparation of NEPA documents as well as their assessment and affirmation of NEPA records of decision that underpin agency actions to approve and fund projects.

Improved analysis of a project's climate profile can serve as a tool for communicating the importance of resiliency and the need to address climate change head on. This is an area that can be improved and made more useful as a metric to ensure that climate change and equity are integral to the decision-making process. CEQ and federal agencies can provide more specific criteria and methodology guidance to make these existing elements of NEPA more effective. Additionally, CEQ and federal agencies can consider encouraging agencies to include climate change goals and activities in the Purpose and Need statement for NEPA documents in order to indicate when the project's goals are oriented around climate action. This framework can introduce documented requirements for resilience that may not be a part of current baseline approach methods. As federal agencies reassess recent changes to the environmental review process, the time is ripe to consider providing practitioners with additional standards, guidance and tools such as those identified in response to question number one above to conduct these reviews.

QUESTION FROM HON. NIKEMA WILLIAMS TO TOM LEWIS, P.E., J.D., NATIONAL BUSINESS LINE EXECUTIVE FOR CLIMATE, RESILIENCE, AND SUSTAINABILITY, WSP USA

*Question 3.* Mr. Lewis, thank you for sharing WSP's innovative approaches to a more sustainable future. In your testimony you mentioned that our national approach to repairing and maintaining transportation infrastructure must urgently consider new ideas on how we design, manage, and invest to achieve both resilient and adapted standards as we transition to a low or net zero carbon economy that cognitively responds to the impact of carbon and other GHG emissions on communities.

How are we to re-evaluate existing infrastructure to achieve sustainability and resiliency that considers equity and social justice impacts in the design and development?

*ANSWER.* Generally speaking, I refer you to my answer to question number one above from Chairman DeFazio regarding the incorporation and leveraging of modern standards, systems, guides and other tools to better select, fund and implement sustainable and resilient infrastructure projects—specifically and importantly including during procurement activities.

More specifically in answer to “the how” question, the key will be to broaden the considerations of investment in infrastructure to consider the entire period when the asset will be in place, its operation, the maintenance and repair requirements, and how these considerations should drive different decisions in the planning or design phase. This should include how future changes in community, economy, or technology may be considered now to ensure appropriate investments today. This broader, future oriented, perspective is not a part of traditional practices, so is the high-level basis of what needs to change. We should no longer be looking at historical conditions, or past ideas, to guide investments. We should be looking to implement new methods that enable better decisions.

Importantly, potentially affected communities should be engaged at the beginning of project planning to inform the planning and implementation process regardless of the project type. Equity, when implemented effectively, is more enabling than traditional environmental justice perspectives that focus on the proportionality of impacts. Equity in investments should be toward providing equal opportunities to transportation service, regardless of income level or work type/location.

With respect to achieving sustainability and resilience through repairing or maintaining existing infrastructure, we need to find ways to make a better case to provide adequate repairs to infrastructure that is failing. Federal investments in infrastructure have often been followed by the imposition of maintenance requirements on states and in many cases these states are very resource constrained and unable to keep up with the maintenance backlog. As we work towards ensuring a state of good repair, considerations of how to improve and modernize the aging infrastructure should include whether there are opportunities through these programs to also make improvements that address past environmental or social harms as well as address future climate change impacts and make facilities more resilient to damage/impacts, thus limiting the disruption costs to users. Every project that is begun to restore or replace existing infrastructure should evaluate opportunities to promote a more equitable distribution of project benefits and be designed to withstand the challenges of rising seas, stronger storms, and more extreme weather.

QUESTIONS FROM HON. MICHAEL GUEST TO TOM LEWIS, P.E., J.D., NATIONAL BUSINESS LINE EXECUTIVE FOR CLIMATE, RESILIENCE, AND SUSTAINABILITY, WSP USA

*Question 4.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* The basic premise of a VMT tax is to delink transportation funding only from a gas tax and instead distribute costs to all users equitably for those users of the highway system. Highway drivers that use only electric powered vehicles, as an example, are providing no revenue to maintain the highway network.

To your question, you should note that a study conducted by a group called RUC West analyzed the financial impacts of a road usage charge (RUC) for urban and rural drivers in eight western states and found that rural drivers will likely save money under RUC schemes or a VMT tax. Using estimates of vehicle-miles traveled (VMT) by geographic area, vehicle registrations, and gas tax revenue data, researchers determined the per-mile fee required to potentially replace current state gas tax revenues. RUC West research projects that, on average, rural households will pay 1.9%–6.3% less and urban households will pay 0.3%–1.4% more state tax in a RUC system than they currently pay in state gas tax. Ranges reflect the differences from state to state.<sup>1</sup>

These findings are due to two key factors:

1. While rural residents will travel longer distances to reach urban areas, they tend to chain trips together. Meaning, a rural resident will combine a trip to the grocery store, the pharmacy, doctors appointments, etc. into one single trip as opposed to urban or suburban residents who will take each of those trips independently. The rural driver will actually travel less distance than their urban or suburban counterparts due to chaining trips together.
2. Rural drivers tend to drive less fuel-efficient vehicles. Should states who are exploring VMT programs choose to provide a credit to all motor fuel taxes paid, then rural residents may actually pay less in a VMT than their urban or suburban counterparts.

In general, I believe a VMT tax is a way to more equitably distribute highway costs to all users and should be a consideration for funding.

*Question 5.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* The high costs of maintaining the highway system is requiring some infrastructure owners to make hard decisions on managing assets, including closure of roads and bridges that are expensive to maintain or repair/replace. These closures are limiting access, increasing mileage driven, increasing costs for those having to drive longer distances, and causing an increase in emissions due to the longer trips. The entire situation imposes costs that are undesirable.

Better long-term investments in roads and bridges, including the leveraging of private investment to supplement and be synergistic with government funding, could benefit communities and business in rural areas and reduce emissions, in three primary ways. First, roads and bridges maintained at a state of good repair are safer and more efficient for vehicles to drive on, thus reducing overall fuel consumption. Secondly, investments made in roads and bridges with improved resilience perspectives as part of design and implementation requirements will reduce the likelihood of outages and requirements for costly repair. Finally, fully including sustainable practices as part of design and implementation would help facilitate better use of limited natural resource, and reduce effects including construction-related emissions and other environmental impacts as described in my testimony regarding California High Speed Rail.

<sup>1</sup> Financial Impacts of Road User Charges on Urban and Rural Households (RUC West in cooperation with ODOT).

Wise infrastructure investment could reduce/eliminate the requirements for facility closure, reduce costs associated with associated detours, and provide for more sustainable approaches to project delivery and ensure a more resilient future for assets.

QUESTIONS FROM HON. SCOTT PERRY TO TOM LEWIS, P.E., J.D., NATIONAL BUSINESS LINE EXECUTIVE FOR CLIMATE, RESILIENCE, AND SUSTAINABILITY, WSP USA

*Question 6.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

If this cooperative effort is to succeed, it will cause great harm to America's prosperity and security.

While it appears nearly everyone testifying before the Committee today—and much of the broader corporate community—has accepted and embraced the radical, whole-sale approach to rapidly electrify our transportation sector, historical and recent consumption trends indicate that your consumers—and our constituents—don't share this warm embrace.

These concerns will grow to disdain as the costs of all consumer goods continues to skyrocket.

The near universal acceptance that electrification is inevitable must be met with the proper historical context—the electric vehicle is NOT some emerging technology that will breakthrough if enough taxpayer money is spent.

As a matter of fact, electric vehicles are as old as motorized vehicles themselves. In 1896—yes, eighteen-ninety-six—Thomas Edison wrote to Henry Ford admitting the electric vehicle had been rendered obsolete by the cheaper, superior alternative, the internal combustion engine:

“Electric cars must keep near to power stations. The storage battery is too heavy . . . Your car is self-contained—carries its own power plant—no fire, no boiler, no smoke and no steam. You have the thing. Keep at it.”

125 years after this exchange, EVs are still plagued by largely the same deficiencies relative to ICEs—a lack of range, higher costs, and a lack of battery capacity per pound.

More recent concerns about battery life-span, the diminished range of aging batteries, and the propensity for aging batteries to erupt in flames add to consumer weariness.

Until these fundamental issues are resolved, American consumers will not adopt electric vehicles voluntarily as demonstrated by EV's anemic market share and the continual failure to meet projected sales figures.

At the height of the Obama administration's taxpayer handouts for EV companies, he predicted there would be 1 million EVs on the road by 2015—a figure that wasn't reached until the end of 2018.

Over the past decade, the EV industry received \$43 billion in federal subsidies and tax incentives to manufacturers and consumers—plus state and local incentives—and electric vehicle sales made up only 1.9 percent of US retail car sales in 2020.

Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*Question 7.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER TO QUESTIONS 6 & 7.* As an infrastructure and planning firm, we work in the best interest of the communities we work for and respond to current conditions while also remaining at the leading edge of our industry. We do not establish policies, or create the market, we merely help to facilitate the needs of the communities we serve and help to provide for a sustainable, resilient, and efficient economy.

This has been the case from the beginning as we helped to develop/implement national transit and highway systems as they were put in place to serve the citizens based on the best technology available at that time. We do see indications of a need to adjust the systems put in place to accommodate petroleum powered vehicles and find ways to create similar infrastructure for developing technologies, like electric vehicles or hydrogen fueled systems, that seem to be growing in interest and market

share. The commitment of major US vehicle manufacturers to expand the roll out of electrical vehicles into the future seems to indicate the need for a response.

The transition to better EV infrastructure, bolstered by federal policy support suits both needs as identified in your two questions. First, the rapid deployment of EV infrastructure supports this developing and expanding technology, leads to reduction of particulate pollutants and greenhouse gases and has intangible public health and environmental quality benefits that cannot be achieved through the continued use of ICE vehicles. So, I believe it to be a responsible use of tax dollars.

The automobile industry has indicated its commitment to electrification, which is a different condition from the past, unprecedented in fact. Most recently, GM released a commitment to only sell zero emission vehicles by 2035. Federal policies and programs that support this transition will be bolstering an industry with real momentum and providing a cleaner and healthier environment for future generations. The market is changing, the provision of a support network through targeted infrastructure spending would indicate a path to success.

QUESTION FROM HON. PETER A. DEFAZIO TO CHARLES HERNICK, VICE PRESIDENT OF POLICY AND ADVOCACY, CITIZENS FOR RESPONSIBLE ENERGY SOLUTIONS

*Question 1.* Mr. Hernick, your testimony supports provisions included in the Senate Environment and Public Works Committee's proposed Carbon Reduction Incentive Program and alternative fuel infrastructure grants, along with the Republican-proposed resilience-focused "PROTECT" grants. The House-passed bill H.R. 2 includes similar provisions on carbon reduction, alternative fuel corridor grant fueling, and infrastructure resilience.

Would you encourage the Republicans on the Committee to support those similar efforts in the House?

*ANSWER.* Yes. As noted in my written and previously submitted testimony. The Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Grant Program (Sec. 7001 of H.R. 7248 STARTER Act; Sec. 1407 of S. 2302 ATIA) would allow states to make resiliency improvements and help protect roads and bridges from natural disasters such as hurricanes, floods, wildfires, and mudslides. CRES supports this grant program as a good example of cooperative federalism, which is a hallmark of American environmental and transportation policy. The federal government can improve resiliency outcomes by empowering states and municipalities to make locally appropriate infrastructure investments.

QUESTIONS FROM HON. MICHAEL GUEST TO CHARLES HERNICK, VICE PRESIDENT OF POLICY AND ADVOCACY, CITIZENS FOR RESPONSIBLE ENERGY SOLUTIONS

*Question 1.* Research has shown that the demand for travel has grown due to urban sprawl and low fuel costs that have allowed individuals to work in urban centers but commute long distances to town. We have discussed expanding transit systems and more efficient pedestrian travel to account for that. But as we know, there are also rural communities that require travel to get to school or work in their rural communities. We have discussed a proposed Vehicle Miles Travelled (VMT) Tax to promote more efficient collection of highway users in fees. Rural citizens are going to be the most against this and disproportionately affected in the short run.

Would you be able to discuss how a VMT may be beneficial to rural Americans?

*ANSWER.* CRES does not support a Vehicle Miles Traveled tax. Annual odometer readings would be vulnerable to rollback devices or manipulation changing a car's mileage readout. Alternatively, using a GPS tracker to monitor the distance a car travels would be an invasion of privacy by the Federal government. Both approaches would be a logistical nightmare to implement on all cars across the country every year.

*Question 2.* Across much of rural America, there are closed roads and bridges that are creating longer trips and commutes for families, drivers, and delivery systems. The longer these trips are, especially compounded by something like a heavy logging area that is running trucks constantly in and out of that area, or daily parcel services, or school buses, the more emissions occur.

How would long-term and robust investment in our roads and bridges across rural America best address emissions in rural America?

*ANSWER.* Investing in infrastructure is an investment in America. CRES believes Congress should leverage private investment in clean energy with public infrastructure and incentives—not grow government into sectors traditionally led by the private sector and states. To that end, earlier this year our sister organization CRES

Forum ran a multi-million campaign called: Let's invest in US.<sup>1</sup> We have also prioritized specific infrastructure priorities in our recommendations from the 117th Congress.<sup>2</sup>

Simply keeping roads and bridges in good condition is in itself a way of reducing emissions. According to a 2019 study led by Rutgers university, keeping roads and highways in good condition with preventive maintenance can reduce emissions by up to 2 percent; save drivers between 2 and 5 percent because of lower fuel consumption and vehicle maintenance and repair costs; as well as help transportation agencies cut spending by 10 to 30 percent.<sup>3</sup>

QUESTIONS FROM HON. SCOTT PERRY TO CHARLES HERNICK, VICE PRESIDENT OF  
POLICY AND ADVOCACY, CITIZENS FOR RESPONSIBLE ENERGY SOLUTIONS

*Question 3.* I sincerely hope this hearing serves as a wakeup call to the American people about the degree to which our Nation's political and corporate elites are marching in lockstep behind President Biden's Green New Deal—and promise to electrify the transportation sector against the will of the American consumer.

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Throwing helicopter money at charging infrastructure fails to rectify these underlying issues and thus will not spur widespread voluntary adoption by consumers.

Can anyone please explain to my constituents:

How this is a responsible use of their tax dollars; or

*ANSWER.* CRES does not support the Green New Deal. The Green New Deal is a “greatest hits” of liberal policy that all intersect at climate change that would dangerously expand the reach of government. Conservatives can lead a principled approach to climate change. To that end, our sister organization CRES Forum, has put forward Eight Conservative Climate Policy Directives to inform better, lasting and

<sup>1</sup> See online at: <https://letsinvestinus.com/>

<sup>2</sup> Available online at: <https://citizensfor.com/wp-content/uploads/2021/02/CRESO-0026-PC-US-CST-December-2020-Retainerver43.pdf>

<sup>3</sup> Available online at: <https://cresforum.org/climate-policy-directives/>

significant policies that will protect the planet and our future economic growth for generations to come.

As noted, corporate America is quickly moving forward on climate-friendly practices, which is a testament to their read of the current market conditions. Government intervention in the economics of those markets would inevitably skew them and make it much more difficult for business leaders to make well-informed decisions.

*Question 4.* What is so unique about the EV sector that fosters the unfounded belief that central planning will work this time when every previous attempt has failed?

*ANSWER.* CRES does not support central planning by the federal government. The transportation sector is the largest source of domestic greenhouse gas emissions and is one of the most difficult to decarbonize. Therefore, it requires an all of the above approach including increasing fuel efficiency by scaling up innovation instead of imposing federal mandates, better utilizing alternative fuels, such as hydrogen, and electrification. A singular focus on electric vehicles by government is not advisable. CRES supports federal policy in all three categories: efficiency, alternative fuels, and electrification.

Today, EVs account for a small percentage of total vehicle sales in the U.S. However, EVs are more cost effective each year, their range is improving, and the industry is working hard to communicate their benefits to the public on a voluntary basis. These trends should be encouraged.

It is worth nothing that these benefits do not apply only to urban settings. While there is an initial cost involved in the purchase of a new electric vehicle, over the long run, rural households are actually expected to enjoy higher savings than urban households, given that they drive and repair their vehicles more often.

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