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Thank you Chair Norton, Chairman Lipinski, Ranking Members Davis and Crawford and members of the subcommittees for the opportunity to testify today. My name is Jason Mathers. I am the Director of Vehicle and Freight Strategy for Environmental Defense Fund. EDF is a leading international nonprofit organization that creates transformational solutions to the most serious environmental problems. EDF links science, economics, law and innovative private-sector partnerships. With more than 2.5 million members and a global staff of 700 scientists, economists, policy experts, and other professionals, we're one of the world's largest environmental organizations.

### Overview

Now is the time to implement policies that will reduce carbon pollution and set us on a path of net-zero economy wide carbon emissions by 2050. Earlier this year, the Senate Environment and Public Works Committee unanimously approved its version of the Highway Reauthorization Bill and for the first time ever it included a title on climate change. This was a major step in accepting that the problem is real and the title provided some ways to start addressing it. This committee can build on that effort in its version and lock in the certainty needed to unleash public and private investment in the transportation sector, which contributes more than one-third of the nation's carbon pollution annually.

Every mode of freight transportation has a significant pollution footprint and pernicious health impacts on communities near freight facilities and highways. Yet, reducing pollution from freight movement is not primarily a technology matter. It is a matter of political will.

The operational and equipment choices that can drive down air pollutants, including carbon emissions, are well-known. Many are being used today to create business value while improving community health and climate effects. Others will be ready to be scaled over just the next couple of years. The most significant uncertainty is whether we will have the policies in place to reward innovation and recognize the full cost of operating combustion engines.

With Congressional leadership, we can – by the close of this coming decade – make tremendous strides in reducing the nearly 11,000 premature deaths annually that occur from exposure to freight pollution in this country and put the sector on a path to contribute to a 100% clean economy by 2050.

As an environmentalist, father of young children and veteran who cares deeply about the future of this country, I urge us to act.

#### **1. Freight movement has significant impacts on human health and the environment.**

In 2015, 385,000 premature deaths resulted globally from air pollution associated with transportation, with on-road diesel vehicles accounting for half of this impact – by far the largest contributor.

Collectively, on-road diesel accounted for 3.6 million lost years lived and over \$450 billion in economic damage annually.<sup>1</sup> In the U.S., international shipping and on-road diesel – two modes primarily used for moving freight – accounted for nearly 11,000 deaths in 2015. The health impacts of diesel-fueled heavy-duty vehicles are concentrated in urban areas, often in disadvantaged communities close to major freight hubs like distribution centers and port facilities.<sup>2</sup>

EDF has been studying how pollution from fossil-fueled trucks dirty our air at a hyper-local level, leading to more asthma, heart attacks and premature deaths. New sensor technology is allowing EDF scientists to collect data in innovative ways using Google Street View cars and dense stationary pollution detection networks. With the help of our partners, we are better able to see how changes in air pollution lead to harmful health effects that are distributed unevenly.

Our recent analysis in Oakland, California showed that residents living near one particular freeway that is home to much of the city's diesel-fueled traffic were exposed to concentrations of black carbon (soot) 80% higher than those living near a similar road that had less diesel traffic. The more polluted roadway produced 60% more nitrogen dioxide – a lung irritating and smog forming gas.

Combining our Google Street View project data with Kaiser Permanente's electronic health records of over 40,000 people in Oakland, we found that elderly people living in areas with the most elevated traffic-related air pollution had 40% higher risk of heart attack,<sup>3</sup> compared to those in the elderly community living in places with less pollution. This is similar to an individual having a history of smoking.

EDF also looked at air pollution hotspots near the Port of Oakland where diesel-powered ships, trucks and trains transport goods throughout California and across the United States.

- At an intersection near the entrance to the port, EDF found that black carbon levels were more than three times higher than the West Oakland neighborhood average.
- In a West Oakland neighborhood where homes mix with industrial facilities and heavy-duty trucks often fill nearby parking lots, black carbon concentrations were about twice as high as the neighborhood average at certain busy times of the day.
- At a nearby park downwind from a trucking company, air monitors found increased pollution exposure for children and adults playing soccer, football and baseball.

We are now undertaking a similar analysis in Houston. The people living along the heavily industrialized Houston Ship Channel face higher exposure to air pollution than the region at large.

Freight is a significant – and fast growing -- source of climate pollution. Globally, the sector is on pace to add four gigatons of additional climate pollution per year by 2050. In the U.S., the freight sector will emit 535 million metric tons of carbon dioxide emissions in 2020. This pollution is on pace to increase by another 25 million metric tons annually by 2050.<sup>4</sup>

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<sup>1</sup> Anenberg et al, "A Global Snapshot of the Air Pollution-related Health Impacts of Transportation Sector Emissions in 2010 and 2015," ICCT and Climate & Clean Air Coalition. (2019)

<sup>2</sup> Houston, D, Disparities in Exposure to Automobile and Truck Traffic and Vehicle Emissions Near the Los Angeles–Long Beach Port Complex, *Am J Public Health*. 2014 January; 104(1): 156–164.

<sup>3</sup> Alexeef et al, High-resolution mapping of traffic related air pollution with Google street view cars and incidence of cardiovascular events within neighborhoods in Oakland, CA, *Environmental Health* (2018) 17:38

<sup>4</sup> U.S. Energy Information Agency, Annual Energy Outlook, Table 19. Energy-Related Carbon Dioxide Emissions by End-Use, January 24, 2019.

Within freight, heavy trucks are – by far – the most significant source of climate pollution. The phase two EPA greenhouse gas emissions standards – originally adopted in 2016 with stringency increases in 2021, 2024 and 2027 – are critical in slowing the growth of emissions from this sector. Yet, even with these standards, pollution from freight trucks is projected to increase by 40 million metric tons of carbon dioxide between 2036 and 2050. We must do more to ensure long-term pollution reductions from this sector if we have any hope of reining in climate pollution.<sup>5</sup>

## **2. Solutions exist today to significantly reduce this impact.**

Heavy-duty trucks require specific focus, as the leading source of both local and global air pollutants from freight. Zero-emissions heavy-duty vehicles are increasingly viable, as evidenced by the surge of product announcements over the past two years for trucks including for parcel delivery, urban delivery, yard trucks, and regional trucking. Over two dozen truck models are in production or development. All major original equipment manufacturers and several new entrants have ZEV offerings (see table 1). Reflecting the industry’s interest in a cleaner future, Cummins -- which has engines in 70% of trucks on the U.S. roads – just announced a goal of net-zero emissions in its operations and products by 2050.<sup>6</sup>

While we build for a zero-emission future, we must also push for further improvements from combustion engine trucks. Reducing emissions of nitrogen oxides (NOx) – a precursor to ozone – is critical to providing cleaner air for communities and families across the nation. NOx emissions standards for heavy-duty vehicles were last issued in 2001 and implementation was completed in 2010. In the nearly 20 years since the last standards were promulgated, technology has continued to advance.

It is also clear that additional reductions in ozone forming NOx are needed from the heavy-duty sector. In places like California – where much of the state is hard hit by ozone pollution – heavy-duty trucks still account for 33% of statewide NOx emissions.<sup>7</sup>

Developing technologies, together with the improvement of existing emissions controls, can provide additional cost-effective, meaningful in-use NOx reductions from the nation’s heavy-duty fleet.<sup>8</sup> California is researching the technologies needed to reduce NOx significantly.<sup>9</sup> Other states recognize the need for further NOx controls.<sup>10</sup> EPA announced a Cleaner Truck Initiative to “update standards for nitrogen oxide (NOx) emissions from highway heavy-duty trucks and engines.”<sup>11</sup> EPA should issue standards that leverage the best technology options to reduce NOx emissions and protect human health. The agency should establish a full partnership with California’s Air Resources Board in this effort.

Solutions also exist for international shipping. International shipping can meet its target of at least halving its emissions by 2050, and can unleash trillions of dollars of investment opportunities in sustainable industrial infrastructure – particularly in developing countries – by using clean fuel such as

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<sup>5</sup> U.S. Energy Information Agency, Annual Energy Outlook, [Table 19. Energy-Related Carbon Dioxide Emissions by End-Use](#), January 24, 2019.

<sup>6</sup> Gibson, London, [Cummins' most ambitious environmental plan yet targets net-zero emissions by 2050](#), Indianapolis Star, November 15, 2019

<sup>7</sup> CARB presentation at Board Hearing, “[Update on the Proposed Federal Phase 2 GHG and Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles](#),” Sacramento, July 23, 2015

<sup>8</sup> CARB, upcoming “Draft Technology Assessment: Lower NOx Heavy-Duty Diesel Engines.”

<sup>9</sup> California Air Resources Board, [Staff White Paper: California Air Resources Board Staff Current Assessment of the Technical Feasibility of Lower NOx Standards and Associated Test Procedures for 2022 and Subsequent Model Year Medium-Duty and Heavy-Duty Diesel Engines](#), April 2019

<sup>10</sup> Marin, Arthur, Statement On the U.S. Environmental Protection Agency (EPA) Cleaner Trucks Initiative, Northeast States for Coordinated Air Use Management (NESCAUM), November 13, 2018

<sup>11</sup> U.S. EPA Press Office, [EPA Acting Administrator Wheeler Launches Cleaner Trucks Initiative](#), November 2018.

“green” ammonia, as long as the fuel is produced using untapped renewable potential without increasing fossil fuel use.<sup>12</sup> The International Maritime Organization (IMO) must act quickly to bring in legally enforceable measures to its April 2018 commitment to reduce the sector’s greenhouse gas pollution by at least 50% by 2050 compared to 2008 levels, and to start reducing total emissions.

Demand for air freight is expected to grow, especially with the dramatic increase in package delivery services. At the most local level, some shippers are starting to use drones. At the international level, the International Civil Aviation Organization (ICAO), the UN body that sets standards for international flights, has capped the net carbon emissions of these flights at 2020 levels, and adopted a four-pillar strategy, including new technologies, operational efficiencies, alternative fuels, and a carbon offsetting and reduction system for international aviation (“CORSIA”). While considerable work remains to be done to ensure that CORSIA is implemented with integrity, it is already spurring investment in lower carbon innovation. The aviation industry has asked ICAO to adopt a long-term goal for the industry, and we respectfully suggest that goal should be zero climate impact by 2050.

There are also operational approaches that can reduce emissions today. EDF worked with leading companies to document three broad opportunities to reduce freight pollution.

*Get more out of every move:* We are using only 43% of the capacity of our freight trucks on the road today, between empty miles and underutilized ones. Capturing just half of this under-utilized capacity would cut freight truck emissions by 100 million tons per year and reduce expenditures on diesel fuel by more than \$30 billion a year.<sup>13</sup>

A high profile example of further increasing truck productivity comes from Walmart. The company set a goal of doubling its freight efficiency between 2005 and 2015. In 2015, the company delivered 1 billion more cases and drove 460 million fewer miles than in 2005 by improving truck loading.<sup>14</sup>

Colgate and Kimberly-Clark demonstrated how companies can collaborate to reduce the number of trucks on the road. The two companies pooled trips to CVS. Instead of each sending partially full trucks to CVS, the companies worked to co-load their freight on the same trucks. The result was less pollution, fewer trucks, and increased levels of service for CVS.<sup>15</sup>

*Choose the most carbon-efficient mode of transportation:* Typically, the more carbon intensive option for transportation is also the most expensive. Air freight emits 47 times more carbon per ton-mile than container ships, while costing 6.5 times more.<sup>16</sup> Because rail is about 3.5 times more fuel efficient than trucks, companies can lower costs at least 15-20% with intermodal rail based primarily on fuel savings.<sup>17</sup>

Ocean Spray was shipping products by truck from a manufacturing facility in New Jersey to a Florida distribution center. Both Ocean Spray facilities were a short distance from rail yards used by a competitor, Tropicana, which shipped orange juice north from Florida in special refrigerated boxcars, via CSX Rail. These boxcars often traveled empty back to Florida. Tropicana’s third party logistics provider

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<sup>12</sup> Ash, N. and Scarbrough, T., ‘Sailing on solar: Could green ammonia decarbonise international shipping?’, Environmental Defense Fund, London, 2019.

<sup>13</sup> Russell D. Meller, Kimberly P. Ellis, Bill Loftis “From Horizontal Collaboration to the Physical Internet: Quantifying the Effects on Sustainability and Profits When Shifting to Interconnected Logistics Systems” Final Research Report of the CELDi Physical Internet Project, Phase I. September 2012.

<sup>14</sup> Mathers, Jason, The Fast and the Furious: A Company’s Guide to Reducing Transportation Emissions, a webinar for the Climate Collaborative. June 2017.

<sup>15</sup> Logistics Management, Getting from Me to We: Creating a Shared Distribution Infrastructure, June 2014.

<sup>16</sup> Simchi-Levi, David, Operations Rules, 2010, Massachusetts Institute of Technology.

<sup>17</sup> Kane Is Able, Look Who’s Riding the Rails, 2013.

(3PL) saw an opportunity for collaboration and proposed that Ocean Spray operate an intermodal lane from New Jersey to Florida that would put Tropicana's empty cars to use. By going from truck to rail and taking advantage of ready rail capacity, Ocean Spray cut transportation costs more than 40% for that lane and reduced greenhouse gas emissions by 65%.<sup>18</sup>

*Demand cleaner equipment:* Companies using freight services have a responsibility to push for the cleanest equipment available.

Anheuser-Busch is deploying 21 Class 8 battery-electric trucks. It is also testing Class 8 fuel cell trucks.<sup>19</sup> The company set a goal to convert its long-haul dedicated fleet to renewable powered trucks by 2025.<sup>20</sup>

IKEA is insisting on zero-emission home deliveries from its carriers. It is demonstrating this model in five cities during 2020 and will expand it globally for 2025.<sup>21</sup>

### **3. The United States of America would benefit by immediately adopting these solutions**

By leading a transition to a freight industry for a 100% clean economy, the U.S. will be well positioned to retain and expand manufacturing jobs. Automotive manufacturing employs a million U.S. workers.<sup>22</sup> These jobs occur across the country<sup>23</sup> and support both the domestic and export market. Manufacturing zero-emission heavy-duty vehicles can provide good paying, union jobs.<sup>24</sup>

Global markets will see much of the growth in the size of the truck fleet over the decade ahead.<sup>25</sup> If the U.S. invests in developing zero-emission trucks, our manufacturers will be well positioned to serve these markets. Conversely, failure to invest in these trucks risks disadvantaging U.S. manufacturers in the global marketplace where other markets -- notably China and the European Union -- are already investing in their domestic manufacturing capacity for zero-emission heavy-duty vehicles.

In addition to reducing the healthcare costs associated with diesel pollution, families stand to see lower costs of goods. The average U.S. household spends \$1100 a year to fuel heavy-duty trucks.<sup>26</sup> These costs are paid through higher prices at the store. Zero-emission trucks will significantly reduce fuel costs, while also lowering the total cost of ownership.<sup>27</sup>

### **4. The U.S. Congress should pass policies that increase the adoption of these solutions today and invest in the development of solutions that can further drive progress over the next decade.**

Given the outsized pollution impact of trucking, I will focus on that sector for recommendations on how the U.S. Government can help accelerate a transition to a net-zero emissions future.

Despite the recent zero-emission truck product announcements, the pace of progress remains much too slow. At our current pace of adoption, diesel trucks will still account for more than half of the trucks on

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<sup>18</sup>Bradley, Peter, [Collaboration bears fruit](#), DC Velocity, May 2013.

<sup>19</sup>Transport Topics, [Anheuser-Busch, Nikola, BYD Complete First Zero-Emission Beer Run](#), November 21, 2019.

<sup>20</sup>ABInBev, [Climate Action: Anheuser-Busch Drives Leadership in Clean Energy](#), February 14, 2016

<sup>21</sup>Peters, Adele, [Ikea is quickly shifting to a zero-emissions delivery fleet](#), Fast Company, September 2018.

<sup>22</sup>U.S. Bureau of Labor Statistics, [Automotive Industry: Employment, Earnings, and Hours](#), September 2019

<sup>23</sup>BlueGreen Alliance, [VISUALIZING THE CLEAN ECONOMY: THE AUTOMOTIVE SECTOR](#).

<sup>24</sup>Dean, S., [Unionizing L.A. bus workers and their CEO come together over fighting climate change](#), Los Angeles Times, Nov 2019

<sup>25</sup>McKinsey & Company, "ROUTE 2030 – A Regional View of Truck Industry Profit Pools," (2018)

<sup>26</sup>Cooper, Mark, [PAYING THE FREIGHT: THE CONSUMER BENEFITS OF INCREASING THE FUEL ECONOMY OF MEDIUM AND HEAVY DUTY TRUCKS](#), Consumer Federation of America, August 2015

<sup>27</sup>California Air Resources Board, [Advanced Clean Trucks Total Cost of Ownership Discussion Document Preliminary Draft for Comment](#), February 2019.

the road in 2050.<sup>28</sup> Federal policy leadership will be critical to accelerate the uptake of zero-emission vehicles, which would drive down carbon emissions; reduce air pollution, especially in urban communities; and strengthen a cornerstone manufacturing base that provides well-paying jobs. EDF urges Congress to enact policies that ensure zero tailpipe emission vehicles account for at least 30% of new heavy-duty vehicles sales nationally by 2030.

A well-designed policy can advance four objectives that collectively will determine the impact and pace of adoption for zero emission trucks and buses. These objectives are:

- Encourage the production of zero-emission heavy-duty vehicles.
- Increase the demand for zero-emission heavy-duty vehicles.
- Ensure public expenditures drive just and equitable outcomes.
- Support the development of appropriate charging infrastructure.

#### Encourage the production of zero-emission heavy-duty vehicles.

Policy can create the long-term certainty necessary to stimulate production investments from truck manufacturers and component suppliers. The federal government also has an important role in catalyzing the development and scaling of advanced technology solutions through robust R&D investments. The U.S. Congress could advance this objective by:

- Launching a heavy-duty version of the Advanced Technology Vehicles Manufacturing Direct Loan Program. Through the Advanced Technology Vehicles Manufacturing Direct Loan Program, the U.S. Government provided direct loans for light-duty vehicle manufacturers to produce fuel efficient cars. This program supported the production of over 4 million advanced technology vehicles and invested \$8 billion into American auto manufacturing. A similar program would enable manufacturers to expedite bringing ZEV trucks to market.
- Increasing and expanding R&D funding for heavy-duty vehicle technologies. Through the DOE Office of Energy Efficiency and Renewable Energy, the U.S. Government supports critical research into advanced vehicle technology. The Super Truck program, for example, has played a critical role in accelerating the introduction of vehicle efficiency solutions. Increased funding could be targeted at technology advancements such as enhancing charging systems and advancing battery design to enable lighter, more energy-dense, and lower-cost batteries.

Additionally, the U.S. EPA should strengthen emission standards for heavy-duty vehicles. The EPA regulates greenhouse gas and criteria emissions from heavy-duty vehicles. The current GHG program standards increase in 2021, 2024 and 2027. However, criteria emissions standards have not changed since 2010. Technology advancements, including the emergence of zero-emission solutions, necessitate a significant strengthening of this program.

#### Increase the demand for zero-emission heavy-duty vehicles.

Another critical policy lever is to bolster market demand for those vehicles. The U.S. Congress could advance this objective by:

- Expanding the Low or No Emission Vehicle Program. Transit buses are largely purchased with funding contributions from DOT's Federal Transit Administration (FTA). FTA's Low or No

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<sup>28</sup> EDF analysis: Extrapolated annual market growth rates Bloomberg New Energy Finance projected for each sector in its 2019 EV Outlook report. EDF assumed 12 year turn over cycle and that the 2050 fleet volumes per sector reflect 2019 mix.

Emission Vehicle Program provides competitive grants for state and local governments to purchase zero and low emission transit buses and infrastructure. Given that electric buses are a viable option for much of the fleet and will further expand their appeal as battery costs continue to fall, this program should be expanded significantly.

- Passing the Green Bus Act. EDF supports the Green Bus Act, introduced by Rep. Brownley, which would increase the funding for this program from \$85 million in 2019 to \$900 million in 2029 and require all new transit buses to be zero emission by 2029.
- Expanding the Diesel Emissions Reduction Act (DERA). DERA, which was first enacted in 2010, funded a highly popular and bipartisan set of projects that protect human health and improve air quality by curbing diesel emissions. It is currently funded at \$75 million a year. A significant increase in this program to support the replacement of old diesel vehicles with ZEVs could help increase fleet turnover and get more ZEVs on the road as quickly as possible.
- Suspending the federal excise tax on zero-emission trucks. New heavy-duty trucks pay a 12% federal excise tax to provide funding for the Highway Trust Fund. This tax is based on the purchase price of the vehicle and therefore exacerbates the upfront cost discrepancy between diesel and ZEV vehicles, as the more advanced technology in ZEVs -- which leads to significantly lower operating costs - currently results in higher upfront costs than diesel vehicles. Policymakers should waive this tax for ZEVs through the mid-2020s, when the upfront costs of diesel and ZEVs are expected to start to converge.
- Enacting the Clean School Bus Act. The Clean School Bus Act – which has been introduced in both the House (Rep. Hayes) and the Senate (Sen. Harris) – would authorize \$1 billion over five years at the Department of Energy to fund a Clean School Bus Grant Program, which would award funding on a competitive basis to replace existing school buses with ZEV models. Several manufacturers are already producing quality ZEV buses, including Thomas and Blue Bird. EDF encourages these policies because the electrification of these vehicles will help reduce children’s exposure to harmful diesel emissions while reducing GHG emissions.

Ensure public expenditures drive just and equitable outcomes.

The pernicious health impacts of diesel trucks disproportionately impact low income communities and communities of color. Policies should prioritize replacing combustion vehicles with ZEVs in these communities. The U.S. Congress could advance this objective by:

- Prioritizing deployments within front-line communities. Grant programs that support the adoption of ZEVs, such as the Low/No Emissions Vehicle Emission program for transit buses and the DERA should give preference to vehicle deployments within highly impacted communities.
- Creating a commission to develop strategies to transition drayage trucks to ZEVs. Drayage trucks – which transport goods over short distances, for example, hauling cargo in and out of ports and rail yards – are often old and poorly maintained. The low-speed, high idling operation of these vehicles exacerbates the shortcomings of diesel emission control equipment. These vehicles also operate in densely populated areas. The combination of these factors results in drayage trucks being a significant contributor to poor air quality in numerous major metro areas. ZEV demonstrations are currently underway, but while the technology is ready, several systemic barriers remain to the wide-scale adoption of ZEVs for drayage. These include the lack of charging infrastructure to serve drayage drivers and few financing options for drayage operators seeking ZEVs. Given that the performance requirements of drayage operations pair well with the EV drivetrain, and the urgent need to drive down pollution around ports and rail yards, a federal commission should be established to develop recommendations for transitioning these vehicles to zero emissions by 2030.

### Support the development of appropriate charging infrastructure.



A well-developed charging network is essential to accommodating large-scale deployment of electric vehicles of all kinds. This infrastructure should be deployed in such a way as to effectively alleviate range anxiety, mitigate expensive unnecessary grid upgrades, and facilitate greater integration of renewable energy. To achieve a robust charging network, Congress should direct the Department of Transportation (DOT) and the Department of Energy (DOE) to work with states to define a comprehensive national EV charging infrastructure plan. Such a plan should, among other things, detail how Congress should:

- Create a grant program to help states and municipalities develop and implement charging programs. Provide technical assistance to states regarding technology choices, purchasing practices, infrastructure options, and siting.
- Create a grant program to incentivize commercial fleet operators and owners of large, non-government-owned parking facilities, to install charging stations.
- Create tax incentives for private companies to develop employee and customer charging opportunities. Reward companies that tie their charging networks to renewables, local storage, and utility providers' demand response programs.
- Create a federal revolving loan fund for the purchase and installation of EV charging infrastructure. Such a fund could be targeted at state and local governments and multijurisdictional transit agencies. Separate portions of the funds should be dedicated to creating infrastructure designed for use by light-duty and by heavy-duty vehicles. Large trucks and buses will have significantly different charging patterns than light-duty vehicles. These vehicles will have larger batteries, use most of their capacity daily, and be mainly recharged at centralized facilities while also using some opportunity charging during their daily operations. Providing funds specifically for infrastructure for this class of vehicle would help offset costs associated with charging equipment, facility upgrades and grid improvements necessary to power large fleets.
- Research, develop, and fund best practices for depot charging. Given their distinct needs and patterns from light-duty vehicles, heavy-duty electrification would benefit from dedicated research into how to manage the charging load of these vehicles. DOE should identify opportunities for heavy-duty vehicle electrification through a report similar in scope to the National Plug-In Electric Vehicle Infrastructure Analysis it conducted in September 2017. DOE should then make grants available to realize the opportunities identified in that report.
- Enact an investment tax credit for large-scale storage. Opportunities to enhance the use of renewables-based charging and to facilitate and encourage grid integration can be multiplied exponentially if Congress were to increase incentives for the deployment of large-scale storage. The goal would be to develop and advance in Congress and in willing states policies to achieve additional emissions reductions through the integration of electric charging infrastructure with local grids. Such initiatives would focus on policies that:
  - Encourage the use of renewable energy and storage solutions to power charging stations – This work is a critical component of ensuring that electrification actually delivers the maximum potential emissions reductions; and
  - Demonstrate the use of smart charging infrastructure, storage, and EV batteries to reduce utility grid impact through advanced services such as time of use rates to reduce peak demand, as well as balancing and ancillary services using “virtual power plants.” Leveraging the flexibility in these technologies can provide significant additional emissions reductions by, for example, alleviating the need for fossil fuel based short duration generation.



## Conclusion

The challenges facing the U.S. and the world in reducing pollution, including climate pollution from the transportation sector are significant. However, EDF's work, and that of many of our partners and colleagues in the private sector, in universities, and in research centers underscore the fact that the solutions -- most notably the electrification of heavy-duty vehicles -- are cost-effective and technologically feasible. While freight is a major source of air pollution, solutions are at hand, and Congress should act to provide the needed support to make the transportation sector a part of a 100% clean economy. Doing so will help to bolster our manufacturing base, create jobs, and position the U.S. to export solutions globally, while equitably reducing health impacts to communities and showing global leadership in fighting climate change. The Senate took the first step in the process and included a climate title in its highway reauthorization bill, now the House can build on that foundation to create investment certainty for businesses, towns, states, and the federal government.

Sample EV Models from Original Equipment Manufacturers					
Manufacturer	Truck Model	Photo	Duty Cycle	Fleet Piloting	Production
Freightliner	eCascadia		Regional Haul	Penske Truck Leasing and NFI	<a href="#">2021</a>
Volvo	VNR		Regional Haul	NFI	<a href="#">Late 2020</a>
Peterbilt	579EV		Regional Haul		<a href="#">Low-volume late 2020</a>
Xos	ET-One		Regional Haul		
Navistar	eMV		Urban Delivery		<a href="#">Early 2021</a>
Daimler	eM2		Urban Delivery	Penske	<a href="#">2021</a>
Peterbilt	Model 220EV		Urban Delivery		<a href="#">Low-volume late 2020</a>