SOLVING THE CLIMATE CRISIS: CLEANING UP HEAVY-DUTY VEHICLES, PROTECTING COMMUNITIES

HEARING

BEFORE THE

SELECT COMMITTEE ON THE CLIMATE CRISIS HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

HEARING HELD
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ONE HUNDRED SIXTEENTH CONGRESS

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CONTENTS

STATEMENTS OF MEMBERS OF CONGRESS

WITNESSES

SUBMISSIONS FOR THE RECORD

APPENDIX

SOLVING THE CLIMATE CRISIS: CLEANING UP HEAVY-DUTY VEHICLES, PROTECTING COMMUNITIES

TUESDAY, JULY 16, 2019

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON THE CLIMATE CRISIS,
Washington, DC.

The committee met, pursuant to call, at 10:02 a.m., in Room 2172, Rayburn House Office Building, Hon. Kathy Castor [chairwoman of the committee] presiding.

Present: Representatives Castor, Luján, Bonamici, Brownley, Huffman, McEachin, Levin, Casten, Neguse, Graves, Griffith, Palmer, Carter, Miller, and Armstrong.

Ms. CASTOR. The committee will come to order.

Welcome to the "Solving the Climate Crisis: Cleaning Up Heavy-Duty Vehicles, Protecting Communities" hearing of the Select Committee on the Climate Crisis.

Without objection, the chair is authorized to declare a recess of the committee at any time.

Before we begin, I wanted to first say that we all share in a sense of relief for Ranking Member Graves in the aftermath of Hurricane Barry. We were just talking that thank goodness it wasn't quite the rain event that they had predicted, and we are grateful for that—grateful that there wasn't more storm damage or flooding in New Orleans or Louisiana, because I think they have had their fair share of disasters.

And as sea levels rise and as communities deal with heavier rainfall during storms, we are going to have to partner with our local communities to ensure that they can adapt. We are all in this together. This Congress and this committee will always step up to help people who are hurt by disasters. We want to help communities become more resilient in the face of the climate crisis.

For example, I visited Rep. McEachin's district last week in Virginia, and we were very impressed by the work being done there in the Hampton Roads to Richmond area on resiliency. They are planning ahead for climate impacts and flooding, and they had many recommendations for their Federal partners as we adapt all across the country.

Over the past weeks, our committee has been examining ways to cut carbon pollution. We focused on the electric power sector first. And, fortunately, there is progress in the power sector—so much progress that it is the transportation sector that is now our largest source of carbon pollution. And in recent years, it has been grow-

ing. More than 90 percent of the energy used in transportation still comes from fossil fuels.

In the power sector, the ways to cut pollution at power plants and bring new clean-energy sources onto the grid are relatively straightforward, but vehicles and industrial transport are different. Cars, trains, planes, trucks, buses, and ships all use different technology to move people and goods.

Today, we are focusing on heavy-duty trucks and buses in particular. There are two big reasons that we want to start here.

First, low-income communities and communities of color are hit hard by air pollution from heavy-duty vehicles. That is because of the ongoing repercussions of historic racial discriminatory practices like redlining. The neighborhoods surrounding polluting facilities, including ports and busy highways, they aren't rich. They are home to working people and people of color. And air pollution from these facilities causes asthma, lung cancer, and other ailments. And it is a big reason why the ZIP Code you were born in has such a powerful effect on your health.

Moving heavy-duty transportation to cleaner technologies can help address these ongoing inequities and can improve people's health and help us tackle the climate crisis.

Second, Congress can play a very important role in deploying cleaner trucks and buses. Congress can fund State and local initiatives to secure clean technology, and we can create new tax incentives for innovative technologies. Federal research and development can also bring new engine technology from the lab to the marketplace.

California is currently leading the charge to reduce carbon pollution at its many ports and along highways. Three of our witnesses here today are from California, and they will be able to describe this policy leadership in detail.

For instance, when ships make it to the largest ports in California, they have to tap into shore-side power instead of running their engines. I saw some of this in action when I visited Congresswoman Brownley's district. We went to Port Hueneme a couple months ago. They call themselves the greenest port, and we were impressed. And we have to replicate this now across the country. The aim is to save money on shipping as well as cutting dangerous air pollution.

Ports are also the testbed for heavy-duty truck technology, so the State is funding demonstration projects for zero-emission trucks that move goods from ships, and they are committed to transitioning public transit buses to zero emissions by 2040.

Additionally, we know that children are particularly susceptible to air pollution. In fact, students are exposed to more diesel exhaust inside a school bus than drivers in the cars behind those buses. So California is funding zero-emission school buses, which is something I think we should all be interested in, given the importance of protecting children's health.

Finally, we are not the only country working on this technology. We are in a race with India, with China, with Europe. But with American ingenuity, we can grow our economy, protect our health, and fight the climate crisis. I think this is a very exciting topic be-

cause we know that America can lead the world with well-paying jobs as we transition to clean energy.

At this time, I am happy to recognize Ranking Member Graves for an opening statement.

[The statement of Ms. Castor follows:]

Opening Statement *(As Prepared for Delivery)*

Rep. Kathy Castor (D–FL), Chair

U.S. House Select Committee on the Climate Crisis

Solving the Climate Crisis: Cleaning Up Heavy Duty Vehicles, Protecting Communities

July 16, 2019

Good morning and thank you for joining us. Before we begin, I'd like to say that we all share the sense of relief for Ranking Member Graves and his Louisiana community that the tropical storm did not cause more flooding or serious damage. New Orleans and Louisiana have had more than their fair share. As sea levels rise and as communities deal with heavier rainfall during storms, we must partner with local communities to ensure they can adapt.

We are all in this together. This Congress and this committee will always step up to help people who are hurt by disasters. We want to help communities become more resilient in the face of the climate crisis. For example, I visited Rep. McEachin's district last week in Virginia. We were impressed by the work being done at the local level to plan ahead for climate impacts and flooding, and they had many recommendations for us as they adapt.

Over the past several weeks, our committee has been examining ways to cut carbon pollution from the electric power sector. Fortunately, there is progress in the power generation sector, so much progress that the *transportation* sector is now our largest source of carbon pollution. And in recent years, it has been growing. More than 90% of the energy used in transportation still comes from fossil fuels. In the power sector, the ways to cut pollution at power plants and bring new clean energy sources onto the grid are relatively straightforward. But vehicles and industrial transport are different—cars, trains, planes, trucks, buses and ships all use different technology to move people and goods.

Today, we're focusing on heavy-duty trucks and buses in particular. There are two big reasons we want to start here.

First, low-income communities and communities of color are hit hard by air pollution from heavy-duty vehicles. That's because of the ongoing repercussions of the historical, racially discriminatory practice of redlining. The neighborhoods surrounding polluting facilities, including ports and busy highways, aren't rich. They're home to working people and people of color. Air pollution from these facilities causes asthma, lung cancer and other ailments. And it's a big reason that the zip code you were born in has such a powerful effect on your health.

Moving heavy-duty transportation to cleaner technologies can help address these ongoing inequities, improve people's health, and tackle the climate crisis.

Second, Congress can play an important role in deploying cleaner trucks and buses. Congress can fund state and local initiatives to secure clean technology and we can create new tax incentives for innovative technologies. Federal research and development can also bring new engine technology from the lab to the marketplace.

California is currently leading the charge to reduce pollution at its many ports and along highways. Three of our witnesses are based in California and will be able to describe this policy leadership in detail. For instance, when ships make it to the largest ports in California, they have to tap into shoreside power instead of running their engines. I saw some of this in action at Port Hueneme in Congresswoman Brownley's district a couple months ago.

The aim is to save money on shipping as well as to cut dangerous air pollution. Ports are also a test bed for heavy-duty truck technology, so the state is funding demonstration projects for zero-emission trucks that move goods from ships. And they're committed to transitioning public transit buses to zero emissions by 2040.

Additionally, we know that children are especially susceptible to air pollution. In fact, students are exposed to more diesel exhaust inside a school bus than the drivers in the cars behind the buses. So California is funding zero-emission school buses,

which is something I think we should all be interested in given the importance of protecting children's health.

Finally, we're not on the only country working on this technology. We're in a race with India, China and Europe. But with American ingenuity, we can grow our economy, protect our health and fight the climate crisis. It's an exciting topic because you just know that American can lead the world with well-paying jobs as we transition to clean energy.

Mr. GRAVES. Thank you, Madam Chair, and I appreciate you holding this hearing.

And I want to thank all the witnesses for being here today.

I am looking forward to the opportunity today to talk a bit about opportunities before us—opportunities to reduce energy costs for American citizens, opportunities to diversify energy opportunities for Americans, opportunities to help ensure that we have a clean environment to pass on to our children and generations to come, just better understanding of what opportunities are before us, understanding the state of technology, understanding where we are from a technological capacity perspective to be able to transition into some of these opportunities that perhaps are there for us to produce these cleaner-fuel vehicles, to produce vehicles that perform better, to produce vehicles that reduce energy costs for consumers.

What are the obstacles? What are the obstacles to technology? The chair and I had a meeting recently where we discussed the fact that current conventional fuels, in some cases, have 30 times the energy density as other renewable technologies or battery storage technologies.

So understanding how do we bridge that gap, what are the technological hurdles, and how can we better ensure that our Climate Change Technology Program that is run through the Department of Energy, including various Federal agencies, is focused on the right problems to ensure that we can address the solutions.

What are the consequences to our actions as we transition? As I have mentioned several times, my home State of Louisiana, we have the lowest electricity cost in the United States, nearly 9 cents a kilowatt hour in Louisiana, the lowest cost. How do we continue to transition to this broader portfolio without adversely affecting those that would be impacted the most, the poor in our community?

In that same meeting where we discussed the density of some conventional fuels, some of the experts that we met with indicated that we perhaps are decades away—decades away from having the battery storage capacity for heavy-duty and long-haul trucks and boats and things along those lines. So I am interested in hearing your perspective on where we are with battery storage technology.

I know, Mr. Popple, you all have made tremendous progress in the range of some of the buses that you have produced in recent years, and it really is impressive. But how do we continue building upon those types of successes and wins and, as the chair noted, ensuring that we do this in a manner where America wins?

We had hearings in the Transportation Committee, where I also serve, where BYD, a Chinese bus manufacturer, was coming in—and it appears to be a state-owned enterprise—coming in and knocking out domestic bus manufacturers and being subsidized by the Chinese Government, coming in and assembling buses in California, in some of our own communities, only to undercut price,

knock out domestic production of those same types of vehicles, therefore giving China an advantage. And ensuring that American companies, that American laborers have an opportunity to continue to work in this space.

Clearly, there are opportunities before us. I am looking forward to hearing from each of you where those opportunities are for win-win-wins, where we can have an opportunity to lower costs for Americans, where we have an opportunity to provide more opportunities for energy sources for Americans, and, of course, opportunities to ensure that we have a clean environment for generations to come.

So thanks again to all of you for being here. I am looking forward to your testimony.

I yield back.

Ms. CASTOR. Thank you very much.

Without objection, members have 5 legislative days, 5 business days, to enter an opening statement into the record.

Ms. CASTOR. And now I would like to turn to introductions of our terrific panel today.

Angelo Logan is campaign director for the Moving Forward Network. Mr. Logan is the co-founder of East Yard Communities for Environmental Justice and serves on several organizations working to protect community health, including the South Coast Air Quality Management District Environmental Justice Advisory Group, the I–710 Corridor Advisory Committees, and the Southern California Association of Governments' Goods Movement Task Force, among others.

Michelle Romero is the national director of Green For All, which seeks to build an inclusive green economy strong enough to lift people out of poverty. Prior to joining Green For All, Ms. Romero worked with the University of California president, Janet Napolitano, who she advised on issues at the intersection of politics, policy, and communications. She also spent 5 years leading the Claiming Our Democracy Program at The Greenlining Institute.

Ryan Popple is the president and CEO of Proterra, which manufactures zero-emission battery-electric buses. Prior to Proterra, Mr. Popple was a partner at Kleiner Perkins. He also served as a senior director of finance at Tesla, focusing on strategic planning and technology cost reduction.

And Tony Satterthwaite is a vice president at Cummins, Inc., and president of Cummins Distribution Business. Prior to his current role, Mr. Satterthwaite led Cummins Power Generation from 2008 to 2015. He has worked at Cummins since 1988.

Without objection, the witnesses' written statements will be made part of the record.

With that, Mr. Logan, you are now recognized for 5 minutes.

STATEMENTS OF ANGELO LOGAN, CAMPAIGN DIRECTOR, MOVING FORWARD NETWORK; MICHELLE ROMERO, NATIONAL DIRECTOR, GREEN FOR ALL; RYAN POPPLE, PRESIDENT, PROTERRA, INC.; AND TONY SATTERTHWAITE, PRESIDENT, DISTRIBUTION BUSINESS, CUMMINS, INC.

STATEMENT OF ANGELO LOGAN

Mr. LOGAN. Good morning, Chair Castor, Ranking Member Graves, and members of the committee. Thank you for inviting me here today to testify before you.

My name is Angelo Logan, and I am with the Moving Forward Network, a network of 50 organizations across the country that coalesce to fight for environmental justice and climate justice in and around freight communities, such as ports, rail yards, logistics centers, from Seattle to Savannah, from Mobile to Detroit.

The freight transportation system, otherwise known as goods movement, is a system which moves our products from point of manufacturing to point of consumption. It is the trucks, the trains, the ships, the cargo handling equipment that moves our goods from places like Southeast Asia to the Home Depots across the country.

This system—again, the trucks, trains, ships, cargo handling equipment—predominantly is moved by diesel power. Diesel power or diesel-powered engines produce diesel exhaust. Diesel exhaust is a known carcinogen and a climate pollutant.

The freight system itself contributes approximately 3 billion tons of CO2 worldwide annually. Also, the freight transportation sector accounts for roughly 9 percent of U.S. greenhouse gas emissions and, again, is a major climate pollutant.

To top that off, the freight sector is predominantly in communities of color, working-class, working-poor communities of color. To give you an example of how that impacts folks, African Americans are at risk about three times their proportion of the U.S. population, and Latinos, about two times their proportion.

As an example, the Ports of L.A. and Long Beach, the communities that I live in, are the number-one source of air pollution in the region that is arguably the most polluted region in the country.

With that said, the communities have come together along with the local jurisdictions to really advance a cleaner action plan and actually get the mayors of Long Beach and Los Angeles to commit to a 100-percent zero-emission port complex by 2035.

They have seen, with the local community and local jurisdictions, that resolving this issue of both the environmental justice and climate crisis can be a win-win both in manufacturing, both in moving goods, both in reducing climate impacts and resolving environmental injustice.

With that said, I would like to urge you all to include in your report the following actions:

First, protect the Clean Air Act and the National Environmental Policy Act throughout all legislative actions. Oppose all provisions to any infrastructure bill or surface transportation reauthorization bill. Weakening the Clean Air Act and NEPA would hinder our ability to address climate change.

Second, develop and adopt policy principles for climate legislation that advance climate justice, environmental justice, community

self-determination, and local solutions. Develop a process and policy principles for climate legislation in conjunction with environmental justice groups, similar to that of the House Committee on Natural Resources spearheaded by Chairman Grijalva and Representative McEachin.

Also, provide EPA with the tools and resources needed to meet its mission and play a role in resolving the climate crisis. Appropriation funds can be made to Environmental Justice grants to frontline communities so that they have the resources to promote local solutions and address the climate crisis as they become more resilient. Also add in more resources to the DERA program, focusing predominantly on zero-emission technologies.

Also with that, you should hold EPA accountable in meeting their mission and their legal requirements under the Clean Air Act by holding hearings and holding them to task, specifically for advancing national standards for heavy-duty trucks, ocean-going vessels, and national standards for locomotives.

And with that, I wanted to just say that the Moving Forward Network looks forward to engaging with you all in the future, and we are here to serve you. Thank you.

[The statement of Mr. Logan follows:]

Testimony of Angelo Logan

Moving Forward Network

Before the United States House

Select Committee on the Climate Crisis

"Solving the Climate Crisis: Cleaning Up Heavy Duty Vehicles, Protecting Communities"

July 16, 2019

Good morning Chair Castor and members of the Committee:

Thank you for inviting me to testify today. My name is Angelo Logan and I am with the Moving Forward Network. The Moving Forward Network is a national coalition of over 50 member organizations including community-based groups, national environmental organizations, and academic institutions, in over 20 major U.S. cities, representing over 2 million members, committed to resolving the public health harms created by our country's freight transportation system and achieving environmental justice and climate justice. Importantly, Network members include individuals who live in and work directly with frontline communities.

Freight transportation otherwise referred to as goods movement is a complex system that weaves seaports, freight corridors, rail yards, intermodal facilities, inland ports and logistic centers. Ultimately goods movement is a transportation system that brings materials and goods from the places of origin to the places of consumption, from factories in Southeast Asia to Home Depots across the US. It is the trucks, trains, ships and cargo-handling equipment that transport the things we buy that are produced across the globe.

The freight system relies predominately on diesel-powered equipment, which produces diesel exhaust made up of toxins and climate pollutants. Diesel exhaust creates CO_2, a major greenhouse gas. Freight transport worldwide contributes approximately 3 billion tons of CO_2. Black carbon is also a result of diesel exhaust. Black carbon is a fine particulate matter and short-lived climate pollutant that has very high global warming potential—some estimate over 600 times higher than CO_2. The freight transportation sector accounts for roughly 9% of US greenhouse gas emissions and in the next couple of decades, it is expected that ocean going vessels alone will account for about 17% of all man-made carbon dioxide emissions worldwide.

I'd like to give you a sense of who is hit first and worst when we talk about the climate crisis and freight transport. For example, 13 million people live near major

marine ports and rail yards, these communities are disproportionately low-income communities of color and have increased health risks from climate change impacts and the toxic air pollution this industry is responsible for. Epidemiologic studies have consistently demonstrated that children and adults living in close proximity to freight transportation sources have poorer health outcomes, including but not limited to: asthma, poor lung development, and other respiratory diseases; cardiovascular disease; lung cancer; pre-term births and infants with low birth weight; and premature death. Affected by freight transportation, African Americans are a high-risk population that is 3 times their proportion of the U.S. population and Latinos made up two times their proportion. All this to say, freight transport poses a huge climate crisis for the planet and for the local environmental justice communities that have been dealing with the impacts of the air pollution that is causing the climate crisis.

To that end I would like to urge you to take the following actions:

PROTECT THE CLEAN AIR ACT AND THE NATIONAL ENVIRONMENTAL POLICY ACT THROUGHOUT ALL LEGISLATIVE ACTIONS

Oppose all provisions to any Infrastructure Bill or Surface Transportation Reauthorization Bill that would endanger public health by weakening the Clean Air Act and/or the National Environmental Policy Act hindering the ability to address climate change. As you intend to invest in the public's best interest, do not allow those investments to fund projects that will feed the climate crisis. Invest in projects that will be part of the solution to the climate crisis and require the advancement of a true zero emission future. Specifically, providing exemptions of the CAA or the NEPA process to major infrastructure projects, including proposed federal highway projects, channel deepening projects, bridge raising projects, and terminal expansion projects will exempt the opportunities for mitigation, and transparency in these processes, especially where such projects will adversely affect communities already disproportionately impacted by freight and other industrial sources. When NEPA is included in all infrastructure and transportation projects we can ensure that air pollution and climate change impacts are accurately identified, and alternative solutions can be developed and deployed.

DEVELOP AND ADOPT POLICY PRINCIPLES FOR CLIMATE LEGISLATION THAT ADVANCE CLIMATE JUSTICE, ENVIRONMENTAL JUSTICE, COMMUNITIES' SELF-DETERMINATION AND LOCAL SOLUTIONS

To truly address the climate crisis, we must reduce and eliminate air pollution and greenhouse gas emissions at their source, locally in communities that have been disproportionally burdened with toxic exposure for decades and are now the most vulnerable to climate impacts. Frontline communities have the real expertise and true solutions that will solve the climate crisis. Therefore, the process for developing any solution or strategy is paramount. The Select Committee on the Climate Crisis must develop a process and policy principles for climate legislation similar to the House Committee on Natural Resources.

On June 26th, Chairman Grijalva and Rep. McEachin hosted a Congressional Convening on Environmental Justice where they presented the committee's draft statement of policy principles for environmental justice legislation. These principles are a result of a several month process that the committee facilitated an Environmental Justice Working Group.

PROVIDE EPA WITH THE TOOLS AND RESOURCES NEEDED TO MEET ITS MISSION AND PLAY A ROLE IN SOLVING THE CLIMATE CRISIS.

Congress can enact statutes authorizing federal agencies to award grants and impose reasonable conditions on the receipt of federal assistance funds. EPA must have the resources it needs to protect families and communities from the threat of air pollution and the climate crisis. Congress must appropriate a substantial increase of funds to the EPA, both DERA and the Environmental Justice grants program.

The Environmental Justice Grants Programs support communities working on solutions to environmental and public health issues. The programs are designed to help communities address exposure to multiple environmental harms and risks. When appropriating funds Congress can impose conditions and uses of those funds. It is without a doubt that frontline communities across the country, both in freight impacted areas and otherwise need more resources to promote local solutions to address the climate crisis as well as becoming more resilient in the face of climate change impacts that they will face first and worst.

The Diesel Emissions Reduction Act (DERA) authorizes grants to eligible entities for projects that reduce emissions from existing diesel engines. The statute authorizes up to $100 million annually and allows for new funding mechanisms, including rebates. This amount of funds is a drop in the bucket when it comes to the number of heavy-duty vehicles that need to transition to zero emission in the near term. Incentive funding strategies targeting the freight sector need to be developed. While EPA has granted subsidies under DERA to reduce freight emissions, EPA must develop a more targeted strategy for awarding these funds. Funds for demonstration projects should target zero-emission technologies. Technologies that rely on combustion of fossil fuels should not benefit from these funds because they are already capable of achieving much lower standards and will not achieve the transformational change that is required at our freight facilities. Furthermore, funding should be targeted to applicants that meet strict criteria, including, for example, ports with facility-specific emissions inventories that meet meaningful health risk and emission reduction goals.

To the extent funding is meant to accelerate the deployment of technologies that have already been demonstrated, these funding programs should be coupled with regulatory requirements to incentivize early compliance. This combination of regulatory requirements with incentives for early compliance will help the commercialization of technology by providing clear market signals to manufacturers. Without the regulatory component, funding will be inadequate to spur the investment required to take technologies beyond the demonstration phase.

HOLD EPA ACCOUNTABLE TO MEETING ITS MISSION AND LEGAL REQUIREMENTS UNDER THE CLEAN AIR ACT. EPA MUST ADOPT REGULATIONS TO REDUCE AND ELIMINATE EMISSIONS FROM THE FREIGHT SECTOR

Require to the full extent of your authority that EPA take action to address freight pollution. The committee should require timelines, progress reporting and hold regular hearings on the progress of EPA in meeting its legal requirements under the Clean Air Act. It is critical that Congress do everything in their power to hold EPA accountable. Specifically, Congress should require EPA to adopt regulations to reduce and eliminate emissions from the freight sector.

The devastating impacts of freight operations require elevation within EPA. In 2009, EPA's National Environmental Justice Advisory Council (NEJAC) provided 41 recommendations for EPA action. To date, however, EPA has failed to adopt a targeted strategy for reducing emissions from the freight sector to the degree necessary to protect public health and climate change. As a result, the health crises in these communities persist and threaten to get worse with increasing freight activity.

EPA must identify reducing freight-related air pollution as a top priority for the Agency. Tackling such pollution will further the Agency's air quality, climate and environmental justice goals. EPA must adopt new national standards for freight-related sources and provide more guidance to states with freight-related activities in areas that violate national air quality standards and/or produce localized health risks.

EPA must prioritize promulgation of the next generation of national emission standards for freight-related sources. The following national rules should be prioritized within EPA:

- *National Standards for Heavy-Duty Trucks.* EPA's should advance the proposed greenhouse gas emissions standards for heavy-duty trucks encouraging the adoption of incentives for advanced zero-emission technologies and addressing particulate emissions from auxiliary power units.
- *New Standards for Ocean Going Vessels.* EPA should pursue a next generation of NOx and particulate matter standards. Foreseeable technologies and more general engine efficiency improvements hold the potential to reduce NOx emissions by another 90 percent below current standards.
- *National Standards for Locomotive Engines.* EPA should also adopt Tier 5 standards for new locomotive engines. Technologies can achieve significantly lower NOx and PM limits. Moreover, technologies now exist to enable zero-emission track miles. The next generation of standards should reflect the feasibility of these technologies and incentivize development and deployment of advanced zero-emission technologies.

This list of proposed actions is not absolute or complete. As mentioned above the community engagement process of developing solutions and strategies is paramount.

To that end, we encourage the committee's continued engagement with the Moving Forward Network.

Sincerely,

ANGELO LOGAN,
Moving Forward Network.

MOVING FORWARD NETWORK MEMBERS

1. Air Alliance Houston
2. Bay Area Healthy 880 Communities-SL
3. California Cleaner Freight Coalition
4. Charleston Community Research to Action Board (CCRAB)
5. Center for Community Action and Environmental Justice
6. Central California Environmental Justice Network
7. Central Valley Air Quality Coalition
8. Citizens for a Sustainable Future, Inc.
9. Clean Air Council
10. Clean Water Action, Clean Water Fund
11. Coalition for Healthy Ports (NYNJ)
12. Coalition for a Safe Environment
13. Coalition for Clean Air
14. Comite Civico Del Valle, Inc.
15. Diesel Health Project, Inc.
16. Earthjustice
17. East Yard Communities for Environmental Justice
18. End Oil, Inc.
19. Environmental Health Coalition
20. Environmental Integrity Project
21. Global Community Monitor
22. Georgia Research Environmental Economic Network (GREEN) Inc.
23. Harambee House, Inc.
24. Ironbound Community Corporation
25. Long Beach Alliance for Children with Asthma
26. Maryland Institute for Applied Environmental Health, School of Public Health
27. National Nurses United
28. Natural Resources Defense Council (NRDC)
29. New Jersey Environmental Justice Alliance
30. Puget Sound Sage
31. Regional Asthma Management and Prevention (RAMP)
32. Respiratory Health Association
33. Rutgers Robert Wood Johnson Medical School
34. Rutgers University School of Management & Labor
35. Southwest Detroit Community Benefits Coalition/Southwest Detroit Environmental Vision
36. Steps Coalition
37. Sunflower Alliance
38. Texas Environmental Justice Advocacy Services (TEJAS)
39. The Center for the Urban Environment, Thomas Edison College
40. THE NEW SCHOOL
41. Union of Concerned Scientists
42. University of Southern California
43. University of Texas Medical Branch / Sealy Center for Environmental Health and Medicine
44. West Oakland Environmental Indicators Project

Ms. CASTOR. Thank you, Mr. Logan.

Ms. Romero, you are recognized for 5 minutes.

STATEMENT OF MICHELLE ROMERO

Ms. ROMERO. Good morning, and thank you for the opportunity to present solutions today.

My name is Michelle Romero, and I am the national director of Green For All, a nonprofit program that was founded by Van Jones more than a decade ago to build an inclusive green economy strong enough to lift people out of poverty. We are known for our advocacy

on behalf of green jobs and policy solutions that put people to work building a more sustainable future.

Earlier this year, Green For All, in partnership with Clean Energy Works, the Chispa League of Conservation Voters, and Mothers Out Front, launched a campaign called Fuel Change to tackle the transportation-sector emissions that are in our communities and accelerate the transition to a zero-emission future together. We are mobilizing people and resources around the country to bring clean cars, trucks, and buses to the communities who need it most—low-income communities and communities of color overburdened by pollution.

And, this year, we are focusing our attention on school buses. Twenty-five million children in the U.S. ride a bus on their way to get an education. More than two-thirds of our Nation's bus fleets are actually school buses, and 90 percent of those are run on diesel.

We know all of the research, right? Diesel- and gasoline-powered vehicles lead to asthma, cancer, decreased lung function, even cognitive issues like problems focusing. It is hard to learn if you can't breathe. Childhood asthma affects millions of children nationwide, predominantly kids of color, and is a top reason for missed school days. But when asthma strikes, it isn't just the children who are missing school. Caregivers and families spend hundreds of dollars in healthcare costs and have to miss work as well.

And this is completely preventable. New technology exists that does not cause these problems. We ask the committee to put our kids on buses going forward to a clean-energy future. The future is electric, and we should be the leader in electric vehicle manufacturing. Let's give people jobs making smart batteries and smart buses.

Electric buses have zero tailpipe emissions and are cheaper to fuel and maintain. Today's electric school buses can travel up to 155 miles on a single charge.

According to the Union of Concerned Scientists, electric buses also have fewer carbon emissions than diesel, natural gas, and diesel hybrid buses no matter where in the country they are powered from the electrical grid. That means even the cleanest of these alternative buses, the diesel hybrid, generates more than twice as many carbon emissions as an electric bus, making electric buses the clear winner here.

Electric buses can also provide additional benefits through grid-connected storage, and with so many positive benefits, several school districts are already beginning to make this transition. Twin Rivers Unified School District in Sacramento, California, where I live, has the largest electric school bus fleet in the country, with 25 buses. And they are joined by school districts in Chicago, Massachusetts, New York, and Minnesota, each of which has electric school buses.

States like Colorado, Nevada, and Maryland have also advanced policies this year to invest in electric school buses. And I am here to say, these school districts, to actually accelerate this for all communities across the country, are going to need help. Buying an electric bus is still at least double or can be triple the price of a comparable diesel bus.

And that is why Green For All supports the Clean School Bus Act, which was introduced by U.S. Senator Kamala Harris and colleagues, and would encourage the U.S. House of Representatives to introduce similar legislation. The Clean School Bus Act invests $1 billion over 5 years for a Clean School Bus Grant Program that would provide grants of up to $2 million to help school districts replace dirty diesel buses with clean, electric, zero-emission buses.

And, most importantly, it gives priority to applications that serve low-income students, helping us replace the most polluting buses and leveraging other funding to further decrease pollution.

A Federal program like this would be a huge help. And by prioritizing public and private investments to electrify the neighborhoods who need it most, we can ensure a just transition that gives every child a clean and safe ride to school.

In addition to public funding, we can look at inclusive financing programs that are helping low-income energy customers afford the upfront cost of things like building energy efficiency upgrades and apply a similar model to transportation through utility-inclusive financing. With public funding and private financing, we can accelerate this transition.

The only way forward for our country, our children, and our economy is to have a swift and just transition towards a zero-emission future.

Thank you.

[The statement of Ms. Romero follows:]

Michelle Romero, National Director, Green for All, Oakland, California

Testimony Before the House Select Committee on the Climate Crisis

Tuesday, July 16, 2019

Good morning, and thank you Chair Castor, Ranking Member Graves and members of the Committee for this hearing to discuss Solving the Climate Crisis: Cleaning up Heavy Duty Vehicles, Protecting Communities.

My name is Michelle Romero. I am the National Director of Green For All, a program of the Dream Corps, where we work to build an inclusive green economy strong enough to lift people out of poverty.

We are here today because bold leaders like you are looking for solutions that can accelerate our path toward a pollution-free, zero-emission future.

We need to start building this future, and we need to do so immediately.

In 2018, the Intergovernmental Panel on Climate Change released a report[1] indicating that we now have less than eleven years to significantly reduce our emissions to avoid catastrophic global consequences.

We need solutions that tackle our biggest threats to climate change and pollution.

Transportation is now the number one source of carbon emissions in the United States. Fossil-fueled passenger vehicles, heavy duty trucks, and buses are some of the major sources of this pollution[2] with an estimated 150 million Americans living in neighborhoods that don't meet federal air quality standards.[3]

I'm sure we've all, at some point in our lives, driven behind a truck or bus as it belches out huge clouds of black smoke. These vehicles represent the oldest, dirtiest, and most harmful buses still on our roads today. These puffs painted a vivid picture of transportation pollution, but whether we now see black puffs or not, we know that tailpipe emissions pump particulate matter, or PM2.5, into the air we breathe. Particulate matter is a toxic substance so small we can't see it, but so tiny it easily travels into our bodies as we breathe and gets deeply embedded into our lungs. It can never be removed. It simply accumulates until it's so much it affects

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[1] https://www.ipcc.ch/sr15/.

[2] https://www.ucsusa.org/clean-vehicles/fuel-efficiency/heavy-duty-truck-fuel-efficiency.

[3] https://www.epa.gov/environmental-topics/air-topics#air-pollution.

our lung function and respiratory system. It is known to cause premature death, heart disease and lung damage,[4] with children and the elderly being the most vulnerable.

I share this to emphasize that **tailpipe emissions are both a climate problem and a public health problem.** According to the EPA, "Air pollution emitted from transportation contributes to smog and poor air quality, which has negative impacts on the health and welfare of U.S. citizens."[5]

Growing evidence links emissions from diesel and gasoline-powered vehicles to low birth weight, asthma, cardiovascular illness, and even cognitive issues like autism and Alzheimer's. In fact, there are now more premature deaths from traffic-related pollution than traffic-related accidents.[6]

If we don't change our patterns of pollution, our world will continue to change in front of our eyes—from the wildlife we see to the air we breathe, our children will be unable to experience a healthy, safe, or livable environment. And frankly, many children today already do not have a healthy, safe environment.

While pollution impacts all populations, low-income communities and people of color are at the highest risk for transportation-related health conditions.[7] After decades of unfair housing, lending, highway planning, and facility siting practices, these communities find themselves living near busy highways, diesel truck and bus routes, ports and distribution centers—all major sources of transportation pollution.

Research tells us that African-Americans in the United States are 3–4 times likelier to be hospitalized and die from asthma compared to Whites.[8]

Similarly, Latinos are twice as likely to be hospitalized from asthma.

One mother we met with in Las Vegas, Nevada, Ivon Meneses, shared with us about her sleepless nights wondering whether this will be the night her 14-year-old son Jacob will be taken from her, every time she hears him struggling to breathe. They've already been through multiple hospitalizations and at least one near-death experience before when doctors told her he might not make it after having a severe asthma attack.

Earlier this year, Green For All put out a call to aspiring artists around the country, to submit lyrics about how transportation pollution is affecting them or their community. We selected four young people to feature in our #FuelChange song and music video.

One of the selected artists is Nehemiah Vaughn. Nehemiah is an 18-year-old African American male who grew up in West Oakland, CA, where diesel trucks idle through neighborhoods on their way to the port and is surrounded on all sides by busy freeways and highways to the point where the neighborhood reeks of the stench of gasoline all day long. In school, Nehemiah was the captain of his highschool basketball team but he ended up having to limit his sports activity because of his asthma. His only other dream was to rap, something he's natural gifted in. Yet, even the breath control needed to rap is a constant challenge and something you can actually hear as he raps:

Let me tell you about my story
about how I used to have my dream
but for some reason, I can't speak
and I can't even breathe.

Like Nehemiah, students across the United States face a similar struggle. Childhood asthma is a serious issue that affects millions[9] of children nationwide and is the top reason for missed school days. In 2013, about 13.8 million missed school days were reported due to asthma.[10] And when an asthma attack strikes, it is not just students who are affected; caregivers miss work[11] and families may spend hundreds of dollars in health care costs.[12]

We must tackle each of these—cars, trucks, and buses—to build a more sustainable future. This includes major investments including in transit-oriented

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[4] https://www.epa.gov/transportation-air-pollution-and-climate-change/smog-soot-and-local-air-pollution.

[5] https://www.epa.gov/transportation-air-pollution-and-climate-change/smog-soot-and-local-air-pollution.

[6] https://ktla.com/2019/04/08/air-pollution-linked-to-more-than-107000-premature-deaths-in-u-s-in-2011-study/.

[7] https://www.niehs.nih.gov/research/programs/geh/geh_newsletter/2016/4/spotlight/poor_communities_exposed_to_elevated_air_pollution_levels.cfm.

[8] https://www.reimaginerpe.org/node/306.

[9] https://www.aafa.org/asthma-facts/.

[10] https://www.cdc.gov/asthma/asthma_stats/missing_days.htm.

[11] https://www.ncbi.nlm.nih.gov/pubmed/28453370.

[12] https://www.aafa.org/cost-of-asthma-on-society/.

development, improving public transportation, and creating bikeable, walkable communities. However, today I will focus my remarks and recommendations primarily on school buses.

SCHOOL BUSES

More than two-thirds of the nation's bus fleet are school buses. There are close to half a million school buses in operation [13] in the United States, and 90% of those are run on diesel.

With over 55% of K–12 students riding school buses everyday,[14] children are especially vulnerable to tailpipe pollution—that's over 25 million kids gaining exposure to known toxins and carcinogens that increase their risk of not only asthma, but cancer and other serious disease.

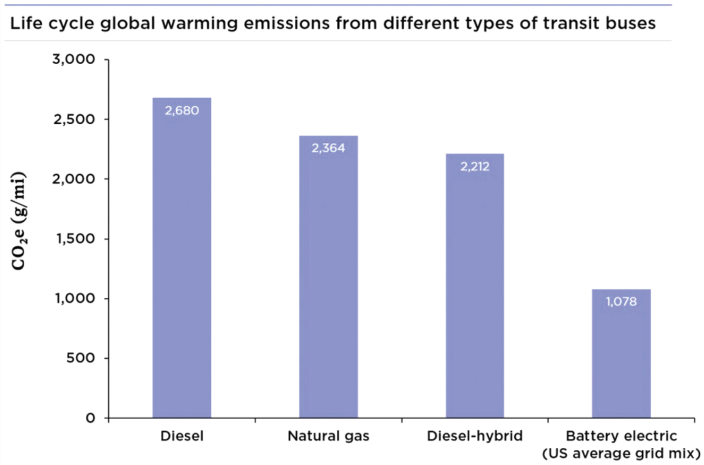
Dirty diesel school buses are basically refineries on wheels. As kids line up alongside the buses waiting to board, the buses spew out soot and particulate matter, seeping into both the air and our children's bodies. As soon as our children are on board, the tiny particles continue to invade their lungs through the windows, potentially harming the immediate and long-term health of our students.

Kids should not have to grow up this way. Pollution is completely preventable. New technology exists that does not cause these problems.

That's why Green For All, with its partners Clean Energy Works, the Chispa League of Conservation Voters, and Mothers Out Front, launched the *#FuelChange campaign*, an effort to accelerate the transition to a clean, zero-emission transportation future, starting in underserved and pollution-burdened communities.

Let's put our kids on zero-emissions, electric buses that don't rob them of educational opportunities and the chance to live a healthy, whole life. Electric buses have zero tailpipe emissions and are cheaper to fuel and maintain, so school districts would save money by leaving their diesel buses behind. And the technology has come so far that today's electric buses can travel a good distance on a single charge. Blue Bird offers electric school buses that get up to 120 miles, and Lion has school buses that get up to 155 miles on a single charge.

According to a Union of Concerned Scientists' analysis, electric buses have fewer carbon emissions than diesel, natural gas, and diesel hybrid buses no matter where in the country the bus charges from the electricity grid.[15] They found that each of these alternative buses (diesel, natural gas and hybrid diesel) generates more than twice as many carbon emissions as an electric bus making an all electric zero-emission bus preferable for addressing both the climate crisis and the health impacts tailpipe emissions are having on our children and communities.



Source: Union of Concerned Scientists. https://blog.ucsusa.org/jimmy-odea/electric-vs-diesel-vs-natural-gas-which-bus-is-best-for-the-climate

[13] https://education.stateuniversity.com/pages/2512/Transportation-School-Busing.html.
[14] https://www.atu.org/work/school.
[15] https://blog.ucsusa.org/jimmy-odea/electric-vs-diesel-vs-natural-gas-which-bus-is-best-for-the-climate.

Electric school buses can also provide additional benefits through grid-connected storage. School buses are parked and unused most of the day and during peak months like Summer, when they can offer a solution to the problem utilities face now of generating more renewable power than the grid can capture and store for later use.

With so many positive impacts, several school districts are already implementing this cutting-edge solution.

Twin Rivers Unified School District in Sacramento, California was the first school district to buy an electric bus, and now has the largest electric school bus fleet in the country with 25 electric buses.[16] The District's own website lists the benefits of these buses as being:

- Healthier—Clean air for our children, teachers, parents and neighbors.
- Safe—Built and tested with high back seats and seat-belts.
- Cleaner—Zero engine emissions.
- Great Performance—Proven in all types of terrain and weather.
- Cost Savings—Electric buses can reduce fueling costs of a vehicle by over 40%.
- Quieter—Electric school buses are much quieter, allowing drivers better communication with and oversight of students.

Twin Rivers USD has seen a cost savings of between $8,000 and $15,000 on energy and maintenance costs.[17] In these difficult times for underfunded schools around the country, that is money that can be put toward the education of our children and retaining high quality teachers. According to their transportation director Tim Shannon, Twin Rivers USD has set a goal to transition at least 30% of their fleet in the next 3 years.

Twin Rivers is joined by school districts in Chicago, Massachusetts, New York, and Minnesota all with electric buses. In 2017, Lakeville, Minnesota became the first Midwest school district to have an electric bus. Community members say that the bus makes its rounds so quietly that it plays music when it travels under 15mph so that children can hear it, one of many state-of-the-art safety features on the new fleets.[18]

We need school districts across the United States to adopt this mission and we need your help to make that happen.

For most school districts, the biggest challenge to implementation is cost. While many schools and transit agencies have the will and the desire to transition their fleets, the upfront cost is a major impediment to the transition.

Buying electric is still at least double or triple the price of a comparable diesel bus, approximately $120,000 more. If we can help schools overcome the upfront cost, we can accelerate the transition and reap immediate benefits.

An electric bus is cheaper to fuel and maintain with operating costs for an electric bus at approximately 19 cents per gallon compared to 82 cents per gallon for a diesel bus.[19] Furthermore, as battery technology improves and the market grows to scale, we'll see much more competitive pricing in the near future.

TO REACH THE SCALE OUR PLANET NEEDS, AND AS QUICKLY AS WE NEED IT, WE WILL NEED A COMBINATION OF FUNDING AND FINANCING.

That's why Green For All supports The Clean School Bus Act, introduced by U.S. Senator Kamala Harris, along with Senators Dianne Feinstein (CA), Jeff Merkley (OR); Cory Booker (NJ); Tina Smith, (MN); Bernie Sanders (VT); and Catherine Cortez Masto (NV).

This legislation would help schools serving low-income neighborhoods make the down payment to go from dirty diesel to zero-emission electric buses and give kids a clean, safe ride to school.

If passed, The Clean School Bus Act would:

- Provide grants of up to $2 million to replace diesel school buses with electric school buses, invest in charging infrastructure, and support workforce development
- Give priority to applications that serve low-income students, replace the most polluting buses, and leverage the funding to further decrease pollution and emission including through partnerships with local utilities

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[16] http://www.twinriversusd.org/Students--Families/Transportation-Services/Electric-Vehicles-/index.html.

[17] https://sacramento.cbslocal.com/2018/11/04/electric-school-bus-fleet-leaving-green-footprint-on-twin-rivers-school-district.

[18] https://www.betterenergy.org/blog/first-electric-school-bus-comes-minnesota.

[19] Government Technology "Electric Buses Are Not Only Clean but Less Costly to Run" https://www.govtech.com/workforce/Electric-Buses-Are-Not-Only-Clean-but-Less-Costly-to-Run.html.

• Authorize $1 billion over five years at the Department of Energy to fund a Clean School Bus Grant Program to spur increased adoption of this clean technology.

WE ENCOURAGE THE HOUSE TO INTRODUCE SIMILAR LEGISLATION TO THE CLEAN SCHOOL BUS ACT AND SUPPORT AN EVEN LARGER FUNDING COMMITMENT.

A federal program like the one proposed by the Clean School Bus Act would be a huge help. And **by prioritizing public and private funds to electrify the neighborhoods most in need, we can ensure a just transition that gives every child has a clean, safe ride to school.**

By Clean Energy Works estimates, it would take at least $6 billion to cover the upfront cost barrier to electrify just 10% of the nation's school bus fleet over the next 5 years. That's where additional funds and financing are needed.

We have seen successful green financing programs before. In more than half a dozen states, inclusive financing programs help low-income energy customers afford the upfront cost of building energy efficiency upgrades. If we apply a similar model to public school transportation, utility investments could help school districts electrify their fleets more quickly.

In Lakeville, Minnesota, for example, the cost of their electric bus was provided through a financing partnership between Green River Energy and Dakota Electric Association—a model we can replicate in other cities and school districts.

It is time to prioritize the health of our communities and the health of our planet. School bus electrification will allow for cleaner air to breathe, and a cleaner world to live in.

The only way forward for our country, and for our children, is a speedy transition toward a zero-emission future. Thank you.

Ms. CASTOR. Thank you, Ms. Romero.

Mr. Popple, you are recognized for 5 minutes.

STATEMENT OF RYAN POPPLE

Mr. POPPLE. Thank you.

Chairwoman Castor, Ranking Member Graves, and distinguished members of the select committee, on behalf of Proterra, thank you for the opportunity to testify at today's hearing. I applaud your leadership in focusing today on the climate crisis and on the role that heavy-duty vehicles can play in helping to solve that crisis.

My name is Ryan Popple, and I am the CEO of Proterra, a leader in the design and manufacture of zero-emission, heavy-duty, electric transit buses. We also provide technology solutions to power other heavy-duty electric applications such as school buses and over-the-road motorcoaches.

Our vision, one that I am passionate about, is to provide clean and quiet transportation for all. Our buses are deployed throughout the United States, heavily in California but throughout the rest of the 50 States as well. And just as importantly, those buses are designed, engineered, and manufactured in the United States.

I am honored to appear before you today to discuss the urgency of reducing emissions caused by heavy-duty transportation. I would like to summarize my written testimony by making the following few points.

First, transportation is a leading contributor to U.S. carbon emissions. According to the EPA, greenhouse gas emissions from transportation account for approximately 29 percent of total U.S. greenhouse gas emissions. It is therefore critical that we begin to reduce this dangerous level of transportation pollution.

Second, communities across the United States struggle to address the harmful effects of air pollution. What makes this situation worse and troubling is that there are areas, particularly disadvantaged communities, that bear a disproportionate share of the

air-pollution burden. Exposure to particulate matter is linked to a range of severe health issues, including heart, lung, asthma, and upper respiratory problems.

Third, Proterra electric transit buses that are currently serving our communities, airports, and universities are already making a significant difference in addressing these and other issues. Every time a Proterra electric bus with zero tailpipe emissions replaces a diesel bus, greenhouse gas emissions are reduced by approximately 230,000 pounds and noise pollution is significantly lessened. Our buses have displaced more than 50 million pounds of greenhouse gas emissions, and we have helped transit customers save money on fuel and spare parts.

I applaud this committee's focus on solving the climate crisis, a topic that we take seriously at Proterra. In order to improve public health, it is critical that we prioritize electrifying heavy-duty vehicles in the United States and we make zero-emission battery-electric technology available to all U.S. communities.

Electrifying transportation, however, does more than just clean up the environment and improve public health; it helps boost the economy by creating good-paying jobs. We employ more than 500 employees in California and South Carolina, and we have also helped create jobs indirectly through our supply base, like our composite suppliers in Iowa who help build the body of our bus.

We have come a long way in a short period of time. We can do more with your help. I have detailed several policy suggestions in my written comments, but I would like to specifically mention the following three.

Number one, reauthorize the Low-No program and increase funding. The Federal Transit Administration's Low or No Emission Program has been responsible for accelerating hundreds of electric buses, but the funding has been limited. If we are serious about delivering cleaner mobility solutions to all communities, we should significantly increase appropriations for this program in particular and make this a national priority. We would like to see the FAST Act reauthorized and the Low-No program reauthorized at higher funding levels.

Number two, we would like to see transit agencies incentivized to transition to the most efficient forms of bus technology. Under current funding levels, the Federal Government will pay up to 85 percent of the cost of a new bus, which includes buses that run on fossil fuels. We suggest that Congress prioritize that funding for transit technologies that are the cleanest and the most efficient to operate.

And, finally, like my colleague, we would encourage you to implement grant programs for other heavy-duty vehicle sectors. Senator Kamala Harris and colleagues recently introduced the Clean School Bus Act to accelerate the electrification of school bus fleets. This bill authorizes grants of up to $2 million to replace diesel school buses with electric school buses. We support it and urge Congress to pass it and appropriate funding.

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

[The statement of Mr. Popple follows:]

Ryan Popple, CEO, Proterra

Written Testimony Before the U.S. House of Representatives

Select Committee on the Climate Crisis

"Solving the Climate Crisis: Cleaning Up Heavy Duty Vehicles, Protecting Communities"

July 16, 2019

Chairwoman Castor, Ranking Member Graves, and Members of the Select Committee, on behalf of Proterra, thank you for the opportunity to testify at today's hearing focused on "Solving the Climate Crisis: Cleaning Up Heavy Duty Vehicles, Protecting Communities."

I am Ryan Popple, CEO of Proterra, a leader in the design and manufacture of zero-emission, heavy-duty electric transit buses and technology solutions to power other heavy-duty, electric applications such as school buses and coach buses. Our vision, one that I am passionate about, is to provide clean, quiet transportation for all. Today, Proterra has received more than 700 awards of buses from communities in 36 states, District of Columbia, and 2 Canadian provinces, and we have delivered more than 300 Proterra electric buses. Our buses are deployed in traditional red states and blue states, urban areas and suburbs, big cities and small communities, and even rural areas. Proterra products are proudly designed, engineered and manufactured in the United States and we currently employ more than 500 employees in our three offices in Silicon Valley, Greenville, South Carolina and Los Angeles.

I am honored to appear before you today to discuss the urgency of reducing greenhouse gas emissions caused by heavy-duty transportation. In order to properly address the world's climate crisis and improve public health it is critical that we prioritize electrifying heavy-duty vehicles in the United States and make zero-emission, battery-electric technology available to all U.S. communities. We have begun to achieve these goals today with American-made, zero-emission heavy-duty public transit buses and can make significant strides by expanding electric powertrains into adjacent sectors, such as school buses and over-the-road motor coaches.

Transportation is widely considered the number one contributor to U.S. carbon emissions. According to the EPA,[1] greenhouse gas emissions from transportation account for approximately 29 percent of total U.S. greenhouse gas emissions, making it the largest contributor of U.S. GHG emissions. According to the same report, between 1990 and 2017, GHG emissions in the transportation sector increased, in absolute terms, more than any other sector. It is critical that we begin to reduce this dangerous level of transportation pollution.

Communities across the United States struggle to address the harmful effects of air pollution. Exposure to particulate matter is linked to a range of severe health issues, including premature death for those suffering from heart or lung disease, heart attacks, irregular heartbeat, aggravated asthma, decreased lung function and increased respiratory symptoms (EPA[2]). According to the American Lung Association, more than four in 10 people in the United States live in counties that have unhealthy levels of ozone or particle pollution, which is around 141.1 million Americans.[3] Children and teenagers are among the most vulnerable populations.

We know that there are areas that bear a disproportionate share of the air pollution burden. Some communities are often exposed to higher levels of air pollution because they are located near freight centers and heavily traveled roadways and residents often lack the resources to relocate. According to a recent Union of Concerned Scientists report that analyzed air pollution from vehicles in California, on average, African American, Latino, and Asian Californians are exposed to more particulate matter pollution from cars, trucks and buses than white Californians. Further, the lowest-income households in the state live where particulate matter pollution is 10 percent higher than the state average, while those with the highest incomes live where particulate matter pollution is 13 percent below the state average. Not surprisingly, households earning less than $20,000 a year and people who don't

[1] "Sources of Greenhouse Gas Emissions." United States Environmental Protection Agency, last updated on 29 April 2019, www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#transportation.

[2] "Health and Environmental Effects of Particulate Matter (PM)." United States Environmental Protection Agency, last updated 20 June 2018, www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm.

[3] "State of the Air® 2019." American Lung Association, 2019, https://www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2019-full.pdf.

own cars suffer vehicle pollution levels about 20 percent higher than the state average.[4]

Beyond air pollution, Americans are also suffering from noise pollution. Constant traffic noise can lead to greater stress, anxiety, high blood pressure, heart disease, depression and compromised sleep quantity and quality.[5]

Electric transit buses serving our communities, airports and universities are making a significant difference in addressing all of these issues. Every time a Proterra electric bus with zero tailpipe emissions replaces a diesel bus, greenhouse gas emissions are reduced by approximately 230,000 pounds and noise pollution is lessened. To date, Proterra vehicles in revenue service have displaced more than 49 million pounds of greenhouse gas emissions. Additionally, transit customers save money on fuel and maintenance.

Vehicle powertrain technology is undergoing a transformational shift away from the internal combustion engines of the past to battery-electric technology. In just a few short years we have seen the growth of electric transit buses globally. In 2017, around 13 percent of the total global municipal bus fleet was electric.[6] The United States is poised to be a global leader in this emerging market, bringing the next wave of transit innovation directly to communities across the U.S. But this movement is not just about protecting the environment. It is about creating good-paying jobs and boosting the clean energy economy. Electric vehicle technology is creating the manufacturing and engineering jobs of today and tomorrow, such as electricians, advanced manufacturing factory workers, EV service and maintenance workers, and battery technicians. Further innovation by EV companies positively impacts adjacent industries. For example, Proterra partners with TPI Composites to manufacture our pioneering composite body for Proterra transit buses. TPI recently opened a factory in Newton, IA and added headcount to support the growing demand of electric buses. Additionally, by investing in battery-electric technology, America will lessen its dependence on foreign oil and leverage its innovative spirit to develop clean, green technology that outperforms traditional diesel vehicles.

As you can tell, I am an EV and public transit enthusiast. It is why I took this job more than 4 years ago. It is critical that we reduce harmful emissions that are intensifying the world's climate crisis. We have a viable, market-driven solution that can help drive change right now and, when deployed at scale, will positively impact our environment and our public health.

But we could use additional help.

In my opinion, the single biggest accelerant in this space has been the Federal Transit Administration's Low or No Emission Vehicle Program (LowNo), which has been responsible for funding hundreds of electric transit buses. But the funding has been limited. LowNo was funded at $55M per year in the last surface transportation reauthorization bill, the Fixing America's Surface Transportation (FAST) Act. We are grateful that the House and Senate Appropriations Committees have provided supplemental funding for this program over the last two fiscal years. If we are serious about delivering cleaner mobility solutions to *all* communities, we should significantly increase appropriations for this program in particular and make this a national priority. Let's ensure that there is increased funding to enable all Americans to ride in an emission-free and quiet electric vehicle.

In addition to the above, we respectfully request that this Committee consider other actions to help all communities transition to a cleaner mobility future:

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[4] "Inequitable Exposure to Air Pollution from Vehicles in California." Union of concerned Scientists, February 2019, https://www.ucsusa.org/clean-vehicles/electric-vehicles/CA-air-quality-equity.

[5] "Environmental Noise Pollution in the United States: Developing an Effective Public Health Response." Monica S. Hammer, Tracy K. Swinburn, and Richard L. Neitzel, 2014. Environmental Health Perspectives 122:2 CID: https://doi.org/10.1289/ehp.1307272.

[6] "Electric Buses in Cities: Driving Towards Cleaner Air and Lower CO2." Bloomberg New Energy Finance, 29 March 2018.

I. Surface Transportation Bill Reauthorization. The Fixing America's Surface Transportation (FAST) Act expires at the end of Fiscal Year 2020. We urge Congress to reauthorize the surface transportation bill and, specifically, reauthorize the LowNo Program at higher amounts due to increasing demand, thus ensuring that the grant awards are sufficient for meaningful EV deployments and distributed in diverse regions throughout the country. This might be the perfect vehicle to fold in the Green Bus Act, which would require all new buses purchased with FTA funds be zero-emission beginning on October 1, 2029 and give preference under the LowNo Program to transit agencies that have completed full fleet transition plans to zero emission vehicles. Thank you for your leadership on this initiative Congresswoman Brownley.

II. Comprehensive Infrastructure Bill. We're pleased that both the Administration and Congress have indicated that infrastructure is a priority. We call on Congress to put forth a comprehensive infrastructure bill that includes funding for heavy-duty electric vehicle fleets and the accompanying EV infrastructure.

III. Incentivize Transit Agencies to Transition to Zero-Emission Buses. Under current funding levels, the federal government will pay up to 85% of the cost of a new bus, which include buses that run on fossil fuels. We suggest that Congress keep the existing federal share for zero-emission transit buses, but reduce it for diesel (40%), CNG (50%) or diesel-hybrid buses (60%).

IV. Grant Programs For Other Heavy-Duty Vehicles. Senator Kamala Harris and colleagues recently introduced the Clean School Bus Act to accelerate electrification of school bus fleets. The bill authorizes grants of up to $2 million to replace diesel school buses with electric school buses, invest in charging infrastructure and support workforce development. The bill would also give priority to applications that serve lower-income students, replacing the most polluting buses. We support it and urge Congress to pass it and appropriate funding.

V. Expansion of the ATVM Loan Program. The Advanced Technology Vehicles Manufacturing Loan Program is administered by the Department of Energy. One of its goals is to improve the use of advanced technologies in cars and components manufactured in the United States. But manufacturers of heavy-duty vehicles—such as electric public transit buses—are ineligible to apply for the low-interest loans. My understanding is that there is approximately $16B remaining in this Program, having successfully helped companies such as Tesla, Nissan and Ford. Congress should amend this Program to allow companies like Proterra to be able to apply for loans that will help them invest in R&D and product development.

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

Ms. CASTOR. Thank you.

Mr. Satterthwaite, you are recognized for 5 minutes.

STATEMENT OF TONY SATTERTHWAITE

Mr. SATTERTHWAITE. Chairwoman Castor, Ranking Member Graves, members of the select committee, thank you for inviting me here today and for your interest in clean technologies for heavy-duty vehicles. My name is Tony Satterthwaite, and I am the president of the distribution business at Cummins.

Like you, we know climate change is a significant threat to our world and to our business, and Cummins has always been committed to improving technology in our industry. Today, I would like to tell you a bit about that journey as well as what we think may be possible in the future.

First, let me tell you about Cummins. We are a 100-year-old company founded and headquartered in Columbus, Indiana. And in those 100 years, we have become the largest independent producer of both diesel engines and diverse power solutions in the world. In the United States, we have approximately 27,000 employees, and we have manufacturing facilities in 9 States.

Because I have the opportunity to work with our customers every day, I see firsthand the challenges they face. Most of our customers buy heavy-duty vehicles for commercial return. A truck owner needs to be able to purchase a vehicle that is capable of doing the job required, has low operating costs, and can be purchased for a price that allows the truck owner to still make a profit at whatever work he or she is doing.

Cummins doesn't make vehicles, but our engines and components are in many of the trucks you see on the road in a wide range of applications, including trucks and buses of all sizes. This is also another thing that makes the commercial vehicle sector unique: It is not one market. It is lots of markets with customers who need vehicles to do a wide variety of jobs. What is right for one customer won't necessarily be right for the next customer.

Since the Clean Air Act Amendments of 1990, Cummins has been on a journey to reduce emissions from diesel engines. More than 30 years ago, we developed solutions that enable us to meet standards that reduce particulate emissions in the diesel engine by 90 percent and NOx by 95 percent while improving fuel efficiency. In fact, it would take 60 of today's clean diesel trucks to equal the emissions from a single truck sold in 1988.

But even with that progress, we don't believe we are done. Cummins and other truck and engine manufacturers are currently working with EPA and the California Air Resources Board about how much farther we can go to further reduce NOx and particulate matter.

With respect to climate change, in 2009 Cummins began working with regulators to determine the best way to establish fuel efficiency standards for commercial vehicles, because improving fuel economy is the best way to reduce CO2 emissions from vehicles. We have always supported those standards, and truck and engine manufacturers like Cummins and other stakeholders are hard at work to develop products that meet these new standards. Department of Energy programs like SuperTruck are critical to develop the technologies to make that happen.

Which brings me to where we are today. As we look to the future of the heavy-duty transportation sector, we don't believe there will be one technological solution that will meet all needs. While diesel technology has captured most of the commercial vehicle market in the past, we see a future where diesel, natural gas, battery electric, and even fuel cell and sustainable fuels power our products. How and where they are applied depends on a variety of factors, including technology capability, cost, and infrastructure availability. And, frankly, we don't know which ones will win.

We think clean diesel will remain an important technology for many of our customers for a long time. This is especially true for applications that require a lot of power and reliability. Of the alternatives to diesel, natural gas is the most mature, reliable solution available today that can reduce greenhouse gases, NOx, and particulate matter.

Our latest natural gas engine is certified to California Air Resources Board's Optional Low NOx emissions standard, which is 90 percent lower than current EPA and CARB 50 State standards. However, limited fueling infrastructure remains an important bar-

rier to increased usage in many heavy-duty applications for natural gas.

Cummins is also invested heavily in our electrified power. We have committed to investing $500 million and have launched our first battery-electric powertrain this year in city and school bus applications.

There are challenges to the adoption of battery technologies for the heavy-duty transportation sector. Improvements are needed in energy density, charging time and infrastructure, and cost. Continued investment by the Department of Energy can help us solve these issues faster.

In addition to these technologies available today, Cummins is also investing in a variety of other fuels and technologies, including fuel cells powered by hydrogen and natural gas and engines that can run on a variety of sustainable fuels.

Cummins is committed to investing in an energy-diverse future where our customers have a broad portfolio of power options so they can choose what works best for them.

Thank you for the great honor and privilege to speak to you today.

[The statement of Mr. Satterthwaite follows:]

Written Statement of Tony Satterthwaite, Vice President, President—Distribution Business, Cummins Inc.

Hearing on Solving the Climate Crisis: Cleaning Up the Heavy-Duty Vehicles, Protecting Communities

U.S. House of Representatives Select Committee on the Climate Crisis

July 16, 2019

Chairwoman Castor, Ranking Member Graves, and members of the Select Committee, thank you for inviting me here today and for your interest in clean technologies for heavy-duty vehicles. My name is Tony Satterthwaite and I am President of the Distribution Business at Cummins. We have been committed to improving technology in our industry. We embraced regulations more than 20 years ago and developed solutions that enabled us to meet standards that reduced particulate emissions in the diesel engine by 90 percent, and NO/x/ by 95 percent while improving fuel-efficiency. Today, I'd like to tell you a bit about that journey, as well as what we think may be possible in the future.

CUMMINS INC.

Cummins Inc. is a 100-year-old company founded and headquartered in Columbus, Indiana. Since 1919, we've become the largest independent producer of both diesel engines and diverse power solutions in the world, and we've done this through constant technological innovation and by bringing our customers the right power solution at the right time for each unique application.

We also manufacture and supply highly complex components to the transportation and power solutions industries such as turbochargers, fuel systems, filters and aftertreatment systems - all of which has enabled us to build high-performing and efficient products meeting global emission standards.

Cummins products are in a wide range of applications including small passenger trucks, tractor-trailers that move goods across the country, pick-up and delivery trucks, as well as transit and school buses. You will also find our products in refuse trucks, mining equipment, oil-and gas operations, passenger trains and tug boats. Our products also generate electricity in applications from mobile power systems that support our military to critical backup power systems that keep data centers and hospitals up and running 24 hours a day, seven days a week. National Landmarks that many Americans see every day, like Wrigley Field and the Statue of Liberty, also rely on Cummins for their backup power needs.

Simply put, our products need to be dependable and reliable to help our customers do the work they need to do, whether that is hauling critical goods across the country, or delivering our most precious cargo: our children to school. They also need to work hard, capable of carrying very heavy loads and performing in extreme conditions.

We have more than 62,000 employees globally and operate in over 190 countries throughout the world. In the United States, we have manufacturing facilities in Indiana, Minnesota, New York, North Carolina, South Carolina, Tennessee, Wisconsin, California and Oregon. In addition to our manufacturing operations in the United States, we also own all our distributor branches with locations in almost every state.

INNOVATION AND THE ENVIRONMENT

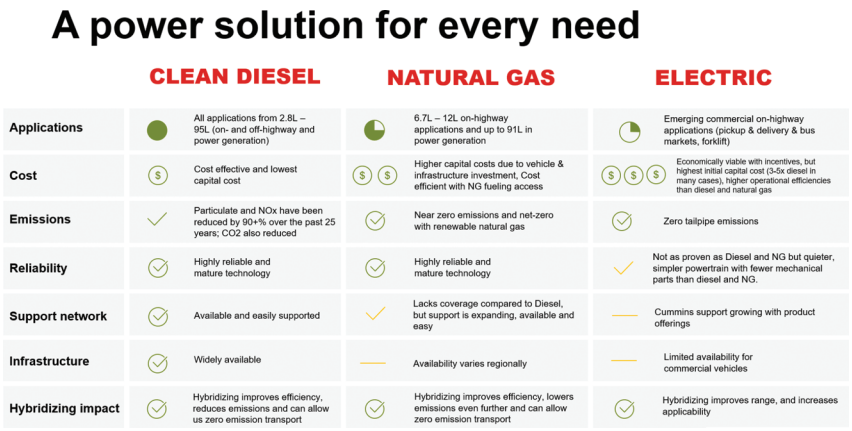
The hearing today is well-timed as we are at the forefront of change in the heavy-duty vehicle industry. We are providing a wider variety of products for our customers that are cleaner, more efficient and cost-effective than ever before.

Cummins has long acknowledged that our company is only as strong as the health of our communities. Nearly four decades ago, Cummins made the decision to embrace tough environmental standards and to use our technological expertise and innovation to drive our business and improve communities, in contrast to the industry approach at the time. In 2006, we set our first facility energy and greenhouse gas goal and joined the U.S. EPA Climate Leaders program—firmly stating our commitment to address climate change. In 2009, Cummins technical and policy leaders wrote a white paper for the National Academy of Sciences addressing the regulation of greenhouse gases in commercial vehicles that served as an important reference for regulators. Recently, in November 2018, EPA announced the Cleaner Trucks Initiative (CTI), which will include a future rulemaking to establish updated standards to address NO/x/ emissions from highway heavy-duty trucks and engines. We strongly support this initiative. This year we are releasing our next companywide sustainability plan including science-based climate goals. Our commitment to addressing the environmental impact of our products and facilities is ingrained in our mission, vision, values and culture.

ENERGY DIVERSITY

As we look to the future of the heavy-duty transportation sector, we see a sector that is highly complex and one in which we don't believe there will be one technological solution that will meet all needs. Our customers buy heavy duty vehicles for commercial return; they are part of their livelihoods and must be capable of doing the job required at a price that is reasonable. We think clean diesel will remain an important technology for many of our customers for a long time. We will continue to work with regulators to make diesel even cleaner and more efficient than it is today. At the same time, in some applications natural gas or electrified power will make the most sense based on the job to be done or the location where the vehicle is operating.

While diesel technology has captured most of the market in the past, we see a future where diesel, natural gas, battery electric, and even fuel cell and sustainable fuels power our products. The three primary fuels and technologies for heavy-duty vehicles are diesel, natural gas and electric. How and where they are applied depends on a variety of factors. Below is a chart which demonstrates some of the core attributes most important to our customers including technology capability, cost and infrastructure availability.



Diesel—Cummins continues to be a leader in clean diesel technology and understands that for many markets, diesel engines will be the best solution for decades to come. Clean diesel is the combination of today's ultra-low sulfur diesel fuel, advanced engines and effective emission controls. Together, these elements result in a highly efficient engine, which can achieve extremely low emissions and reduce greenhouse gases (GHGs). Clean diesel benefits from low upfront costs and an existing and mature infrastructure. Combining clean diesel and hybrid technology provides additional fuel efficiency; further improving air quality and reducing carbon footprints, and even enabling a zero emissions operating mode within city limits.

This decade, the 4.9 million new-technology diesel trucks on America's roads have removed more than 26 million metric tons of NOx and 59 million metric tons of carbon dioxide from the air. Currently, across the United States, more than 36% of all Classes 3-8 registered commercial trucks are of the newest, near-zero generation diesels, and that number grows each year.

We are not done innovating to make diesel engines cleaner and more efficient. Truck and engine manufacturers like Cummins and other stakeholders are hard at work to develop products that meet EPA and NHTSA's Phase 2 Greenhouse Gas Standards for commercial vehicles. When fully implemented those standards will lower CO2 emissions by approximately 1.1 billion metric tons; save vehicle owners fuel costs of about $170 billion; and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program. Our ability to meet these goals is supported by cooperative research programs like the SuperTruck program at the Department of Energy. As mentioned above, we are also actively working with EPA, CARB and other stakeholder to take near-zero emissions diesel engines closer to zero through a new engine standard for NOx.

Natural Gas—Where infrastructure exists or can be expanded, natural gas is a mature, reliable solution available today that can reduce GHG, NOx, and PM. Renewable natural gas expands on these benefits. While the initial purchase price of a natural gas vehicle is higher than a diesel vehicle, its operating costs are comparable or less than conventional diesel technology.

Cummins Westport has been the leader in providing low emission and efficient natural gas engines to some of this country's largest private and municipal transit and refuse fleets, and on-highway truck and school bus properties reaching global sales of over 60,000 natural gas engines in 2015. Since 2002, Cummins Westport has offered emission leading natural gas engines, meeting or exceeding the most stringent North American engine emission limits set by the US Environmental Protection Agency (EPA).

However, natural gas use is not a viable choice for many heavy-duty applications due to limited infrastructure. Vehicles that return to base daily, like refuse trucks, port vehicles or city buses are ideal applications for natural gas. Given that natural gas vehicles can cost and weigh more than conventional diesel vehicles, policies like the federal excise tax and weight limits can also reduce consumer adoption of these vehicles.

Battery Electric—Electrified Power is the newest of Cummins' business segments bringing together all the company's electrification resources with a view to supporting all the segments where Cummins traditionally operates today. Cummins can

use a range of cell chemistries suitable for pure electric, hybrid and plug-in hybrid applications.

The adoption of electric vehicle systems for heavy duty transportation is dependent on the availability of charging infrastructure capable of meeting the energy demands of heavy-duty applications. Emissions requirements, government incentives and cost also play a part. A city bus is a great example of an application where electrification technology works today. The duty cycle, with frequent stops and starts, is ideally suited for electrified powertrains and makes this technology viable for reducing emissions in traffic congested areas. Material handling applications are being electrified, reducing emissions in ports, distribution hubs and warehouses. And while the energy density of batteries continues to improve, it is not yet viable for all applications. Currently, the weight of batteries negatively impacts payload capacity, making electric trucks impractical for many applications. Creating hybrid technologies that combine diesel and electric can be part of the solution to help meet regulatory requirements for some applications.

From an economic standpoint, customers will need an electric vehicle system that offers an acceptable return on investment; battery prices must progress to a reasonable level that allows for payback, without the use of incentives. Improvements to charging infrastructure, advances in cell chemistry that allow for increased energy density in combination with fast charging, and greater modularity of battery packs will all help accelerate the adoption of electric and hybrid vehicles. Continued investment in these areas by the Department of Energy can accelerate this development.

In addition to these technologies available today, Cummins is also investing in a variety of other fuels and technologies:

Hydrogen and Fuel Cell—Globally, we see increased focus on hydrogen- based technologies and infrastructure. Advancements in fuel cells have made the technology more suitable for commercial use. Improving proton-exchange membrane (PEM) and Solid Oxide (SOFC) fuel cell technology performance characteristics, life, efficiency and cold weather capabilities could make fuel cells a credible alternative for commercial and industrial applications. The application of PEM fuel cells to commercial vehicle applications is exciting, particularly those applications with productivity or longer daily range needs that cannot be accomplished by batteries. Joining the Hydrogen Council Executive Committee has provided a great platform for Cummins to collaborate with experts and companies with a similar vision of the future. Cummins is participating in the Costa Rica hydrogen ecosystem project by sponsoring a hydrogen fuel cell bus. Phase 1 of the project demonstrated technical feasibility and Phase 2 aims to demonstrate financial viability. Phase 2 will feature a Cummins electric powertrain and a fuel cell electric powertrain in two buses.

Other Alternative Fuels—Cummins is investing in enabling its engines and generator sets to use fuel sources that would otherwise be considered waste products, delivering robust power even with fuels like landfill and digester gases. Capturing landfill gas or biogas for processing into fuel suitable for vehicles or gensets has significant benefits. Biomethane - obtained by purifying biogas - that is used as fuel in place of fossil fuels effectively produces less GHG than the fuel it replaced. Biogas can provide a clean, easily controlled source of renewable energy from organic waste materials, replacing fossil fuels with a sustainable carbon neutral fuel option, while can reducing external fossil fuel dependence and promoting energy security.

POLICY LEVERS

Public policy plays an important role in facilitating this energy diverse future for the heavy duty sector. We think the best policies are ones that don't pick winners and losers but focus on desired outcomes. The best technology to solve for a problem today may not be the best in six months or two years - that's why technology neutral policy, free of technology-forcing mandates, is important to ensure communities and customers can continue to make the best choices to meet their performance, commercial and environmental needs and let the technologies compete to determine market solutions.

Federal investment and tax policy also play an important role in spurring innovation. Robust and consistent investment in research and development and investment through grants and public-private partnerships is essential to provide market certainty for consumers, fleets, dealers, manufacturers and suppliers participating in the transition to cleaner technologies.

Encouraging adoption of low-emissions technologies infrastructure investment is critical. Congress should invest in battery electric vehicle charging as well as hydrogen and natural gas fueling infrastructure to help accelerate adoption of these technologies.

Finally, Congress, communities and customers should support low or no-carbon, sustainable fuel choices. The rise of multiple fuels means a poly-fuel future, but each fleet has unique needs. It is important for suppliers to continually produce more sustainable, low or no-carbon fuels, vehicle technologies, and infrastructure that measurably improve well-to-wheels climate impacts and address other relevant sustainability impacts and benefits.

CONCLUSION

The heavy duty vehicle industry is facing significant change and more is needed to meet our global energy and environmental challenges. Cummins is committed to investing in an energy diverse future where our customers have a broad portfolio of power options—including clean diesel, natural gas, electrified power and even fuel cell technology—so they can choose what works best for them. Enacting policies that promote the power of choice for every market will help ensure that this country and every community within it has the proven technology necessary to meet air quality and climate goals and serve the economy.

Thank you again, for the great honor and privilege to speak to you all today. If I can provide any information to you on behalf of Cummins Inc. I would be honored to discuss this issue or any other issue with you or your staff.

APPENDIX

Policy Recommendations

As the Committee prepares policy recommendations to address the Heavy-Duty industry, energy diversity can be addressed and encouraged in the following ways:

1. Funding

Cummins supports robust funding for the Highway Trust Fund (HTF) to ensure dedicated funds for maintaining and improving highway, bridge and transit infrastructure. The following recommendations will ensure energy diversity and parity across all vehicles with a commitment to reliable and consistent funding of the HTF and modernizing the truck fleet with the cleanest, safest available vehicles.

- Policy Recommendations
  - Repeal the 100-year-old 12% federal excise tax on Heavy Duty trucks to incentivize new truck purchases which modernize truck fleets.
  - Support a mechanism for equal contribution to the HTF by drivers of all vehicles regardless of power source such as a Vehicle Miles Travelled (VMT) tax.
  - Encourage greater public-private partnerships by implementing investment tax credits, raising the cap on private activity bonds and increasing flexibility for the TIFIA program for surface transportation projects so public project sponsors and private investors have the fullest possible range of financing options available.
    - Congress should authorize Qualified Tax Credit Bonds for surface transportation projects under Section 54A of the tax code.
  - Extend tax credits that promote energy efficiency and diversity: the fuel cell vehicle tax credit, alternative fuels tax credit, the alternative fuel refueling infrastructure tax credit, and the energy production tax credit (Secs. 6426, 30B, 30C, 45 and 48).
  - Ensure favorable treatment of R&D expenditures in the Internal Revenue Code (IRC), including a robust R&D Tax Credit and a fair and efficient system of cost recovery for R&D expenses.

2. Innovation

Leadership in innovation is one of the most important factors for future of US manufacturing. Innovation makes the country and its businesses more productive, dynamic and competitive. At Cummins, innovation is ingrained in our culture, mission, vision and values. Our commitment to innovation dates back a century, to when Clessie Cummins first applied inventive ideas to improvements that advanced the diesel engine. These recommendations seek to increase support for foundational R&D and position America to compete and thrive globally in the innovation race, and pursue innovation inclusively.

- Policy Recommendations
  - Funding for ARPA-E, EERE, and specifically the DOE Vehicle Technology program is valuable and should be increased and set to grow at 4 percent per year adjusted for inflation, reversing nearly a decade of decline.
  - Support the Fueling America's Security and Transportation (FAST) with Electricity Act to provide a 30% federal tax credit for electric transportation options beyond passenger cars; provide a 30% federal tax credit for recharging and

refueling stations and provide loan guarantees to support capital investments in associated domestic manufacturing capacity.

3. Transit and Passenger Rail

Investing in US transportation infrastructure can greatly improve the efficacy and use of public transit and passenger rail. This investment can encourage ridership, promote ease of access and make regional mass transit more sustainable for communities and the environment. Increasing public funding for bus, commuter and passenger rail systems will release private investments to expand capacity, reduce highway congestion, link rural and suburban communities safely and mitigate the impacts to our environment.

- Policy Recommendations:
  - Provide predictable, dedicated and sustainable funding for capital investment in bus, commuter and passenger rail systems.
    - Include a Phase II of the Alternative Fuel Corridors (AFC) program which supports infrastructure for alternatives to gasoline like natural gas and hydrogen powered vehicles.
    - Include Diesel Exhaust Fluid as a component of AFCs at rail yards to increase adoption of EPA Tier 4 clean locomotives.
    - Provide matching funds to states for installation of clean re-fueling infrastructure along 10 major AFC's annually through 2030.
  - Reauthorize the Diesel Emissions Reduction Act (DERA).

Ms. CASTOR. Thank you very much.

Now we are going to move to members' questions. I am going to hold off until probably closer towards the end, so I would like to recognize Ms. Bonamici for 5 minutes.

Ms. BONAMICI. Thank you very much, Chair Castor and Ranking Member Graves.

And thank you to our witnesses.

This is a good conversation we are having today. We know that the transportation sector is a large contributor of anthropogenic greenhouse gas emissions. And we know that the hazardous air pollutants, particularly from diesel engines, disproportionately affect our vulnerable communities.

In my home State of Oregon, they have recognized the public health risks of diesel trucks. The legislature just recently passed a bill to phase out older diesel engines with newer models by 2025 in the Portland metro area. And earlier this year, Daimler Trucks North America announced that it is going to begin manufacturing electric Freightliner trucks in Portland. They will be on the road by 2030. And these are important first steps to help mitigate the pollution from heavy-duty vehicles.

In northwest Oregon, the district I am honored to represent, our mass transit agency, TriMet, recently launched their first all-electric buses, powered by 100-percent wind energy. TriMet estimates that the bus will reduce greenhouse gas emissions by 100 to 140 tons per year compared to their diesel fleet. The renewable-powered buses ease congestion and reduce air pollution as they smoothly cruise through the Northwest. It is very exciting. The transition, of course, benefits the environment but also the health and well-being of the communities.

And I really encourage colleagues here today—you know, we heard about the costs, especially with things like buses. We need to consider, as well, the cost savings in terms of healthcare, job loss from people who are suffering from health conditions. So let's keep that in mind as we are crafting ideas and policies.

Mr. Popple, you made several suggestions in your testimony about policy. What would be the best thing that Congress could do

to incentivize the rapid deployment of zero-emission trucks and buses? And where do we need more research and development, investments in research and development, as well, to support our transition away from diesel to clean technologies?

Mr. POPPLE. Well, thank you, Congresswoman. I appreciate the question.

I think the most important thing that we can do is continue with the programs that already exist. So I would say the number-one priority, from my perspective, would be to make sure that we have a long-term transportation bill, so a renewal of the FAST Act and continue the Low-No program.

The reason that is so important is because there are applications that are relatively easy to electrify, like city buses and school buses. And what we typically see in bus and truck is the technology starts in depot-based vehicles like buses, it is perfected, and then it is transferred to trucking. So we saw that with natural gas and with propane. I think we are going to see the same thing in electric.

So if we want momentum towards zero-emission heavy-duty vehicles, I think it is important to keep the momentum we already have on the applications where it makes sense today.

Ms. BONAMICI. And do we need more research and development in any particular areas?

Mr. POPPLE. Absolutely. I think one of the new frontiers that we are eager to explore is this intersection between transportation and the grid. And the Department of Energy and the Department of Transportation should be seeking ways to create joint programs specifically around vehicle-to-grid technology.

Ms. BONAMICI. Right.

Mr. POPPLE. These are big batteries, and they enable the grid to be more resilient. For example, after a storm or an earthquake or a fire, electric school buses or city buses could be putting power back on to a down grid. That technology still needs research and development.

Ms. BONAMICI. Terrific. Thank you.

Mr. Logan, I co-chair the bipartisan House Oceans Caucus, and I really appreciate your testimony mentioning that by 2050 ocean-going vessels alone will account for about 17 percent of emissions worldwide without significant efforts to decarbonize.

And the electrification of the maritime industry is happening gradually. We know it is happening in Europe. Norway is leading the way. But in the United States, we are falling behind our international allies.

I represent a district that is bordered by the Columbia River and the Pacific Ocean. I invite you all to visit. It is beautiful. But I am very concerned, obviously, about the effects of emissions from diesel-powered engines on our waterways and ecosystems.

So what are the current barriers to electrifying the global shipping fleet? And how can we incentivize meaningful emissions reductions for the maritime industry?

Mr. LOGAN. So I think the biggest obstacle is the fact that this is a sector that is regulated internationally. And so really having Congress urge our representatives that sit in those bodies to really step up and push the international community to advance tech-

nologies in ocean-going vessels, that, along with incentives, I think can move us light-years ahead of where we are today.

Ms. BONAMICI. And I mentioned Norway. Are there other places that are really out in front in this transition?

Mr. LOGAN. I would have to get back to you on that.

Ms. BONAMICI. Thank you.

I yield back.

Ms. CASTOR. Thank you.

Mrs. Miller, good morning. You are recognized for 5 minutes.

Mrs. MILLER. Thank you, Chairman Castor and Ranking Member Graves.

And thank all of you all for being here today.

The transportation industry in West Virginia is critical to ensure that our goods can make it across the Nation and around the world. West Virginia has the sixth-largest highway system in our country. My hometown of Huntington has one of the largest inland water ports in the Nation. That along with our trucks and our rail help ensure that West Virginia natural resources are able to power the world.

Mr. Satterthwaite, can you talk about what Cummins has done under the EPA Phase 1 greenhouse gas rule and what you plan on doing under Phase 2?

Mr. SATTERTHWAITE. Thank you, Congresswoman, for the question.

Cummins has worked collaboratively with the EPA over many years. Starting in 2009, as I said, we were engaged with the development of the first round of Phase 1 greenhouse gas. We have now come to an agreement, the industry and EPA, on Phase 2 greenhouse gas, which will further lower greenhouse gas emissions of heavy-duty vehicles through 2027.

These reductions are significant. Today's diesel engines are cleaner than ever. And through the latest generation of cleanest trucks on the road, we have reduced—59 million tons of CO_2 has been eliminated since 2011 on the basis of improvements in diesel-engine greenhouse gas emissions.

Mrs. MILLER. Can you discuss how Cummins has helped innovate in the heavy-duty transportation sector to increase energy diversity and help protect the environment?

Mr. SATTERTHWAITE. Cummins, as I mentioned in my testimony, has been investing in many technologies.

We believe the best way to make short-term improvement in air pollution and greenhouse gas is to implement quickly improvements in diesel technology that have already been brought to market through programs like DERA and other programs that actually encourage customers to invest in newer vehicles and retire older vehicles.

We have also made investments in battery-electric and fuel-cell technologies that we believe are a part of the future. And we continue to make those investments and believe there are parts of the commercial vehicle market where they are very appropriate and even economic at the current time.

Mrs. MILLER. So, basically, you don't rely on just one type of technology.

Mr. SATTERTHWAITE. That is correct, ma'am.

Mrs. MILLER. Okay.

How would a technology-forcing mandate hinder innovation in the heavy-duty sector?

Mr. SATTERTHWAITE. A technology-forcing mandate would require customers to use a technology that might not be appropriate for their specific application.

And this is what we believe—the commercial vehicle market, the heavy-duty transportation sector has a wide variety of customer needs, from long-haul, over-the-road trucking, to short-term pickup and delivery, to the rail system. And we believe each of those applications in the future may benefit from a different technology, all with the intention of driving towards a cleaner and better future, but not all from a single technology.

Mrs. MILLER. Thank you.

Does cost play a major role in businesses' decisions to utilize specific technology?

Mr. SATTERTHWAITE. I believe so. I believe cost plays a major role. And I think all businesses consider cost, both OPEX, as we say, operating cost, and CAPEX, capital cost. And some of the tradeoffs we are talking about is the tradeoff between capital cost and operating cost for every business.

Mrs. MILLER. So what other major factors do businesses rely upon when deciding which type of power is best to utilize?

Mr. SATTERTHWAITE. In the customers that I work with, one of the first things that they worry about is reliability and support. Does the technology work, and when it doesn't, can I get it fixed quickly and easily and effectively?

That is essentially what my part of the business at Cummins does. We repair products in the field. And it is a common conversation with customers and a concern they have. Again, they have business to do, they have work to do every day. And new technologies are interesting for them; what they really want to do is reliably run their business.

Mrs. MILLER. Absolutely.

What technology do you see the industry mainly relying upon in 10 years from now?

Mr. SATTERTHWAITE. One of the things I like about the future is it is hard to predict. And at Cummins, we don't know. And so our approach has been to invest in a portfolio of technologies and to understand how each of those technologies—their relative benefits, their relatives costs, and understand how the industry might evolve.

We do not believe there will be a single technology winner in the future. Our view of the future of the heavy-duty transportation sector is it will be a multi-technology, multi-fuel industry in the future. And so we are trying to become a major player across that portfolio.

Mrs. MILLER. All of the above. Thank you so much.

I will give back my 5 whole seconds.

Ms. CASTOR. Thank you very much.

Ms. Brownley, you are recognized for 5 minutes.

Ms. BROWNLEY. Thank you, Madam Chair.

And before I begin, I wanted to ask unanimous consent that a copy of CALSTART's Federal policy which has just come out and

their recommendations on medium and heavy-duty vehicles and calling for a national clean truck and corridor initiative be added to the record.

Ms. CASTOR. Without objection.

[The information follows:]

Submission for the Record

Representative Julia Brownley

Select Committee on the Climate Crisis

July 16, 2019

CALSTART

National Clean Truck and Corridor Initiative

FEDERAL INVESTMENT TO DRIVE CLEAN TRUCKS AND CORRIDORS—THE TIME IS NOW

While essential to the nation's goods movement industry, trucks are also one of the nation's largest single sources of air pollution, greenhouse-gas emissions, and users of diesel fuel. Given the scope of the trucking industry, the resulting impacts are felt in every region and impact every resident. Fortunately, technology can provide solutions that address these issues, while making the trucking sector even stronger. A new national effort focused on expanding clean truck highway corridors and incentivizing the deployment of clean trucks will not only contribute to compliance with clean air standards, it would also expand domestic vehicle and component manufacturing and highway corridor construction jobs while providing U.S. based vehicle manufacturers a competitive global advantage. Transforming the trucking industry will require a three-pronged approach including vehicle acquisition incentives, Research, Development and Demonstration (RD&D) and new (alternative fueling/charging) highway infrastructure. CALSTART and its 200 plus member companies are calling for a national Clean Truck and Corridor Initiative that would promote U.S. energy independence, climate security, domestic advanced manufacturing, job creation and healthier lives.

The timing is right for a National Clean Truck and Corridor (infrastructure) Initiative. Over the past decade the costs of electric propulsion systems, including batteries, have come down dramatically. The performance of fuel cell technologies has improved significantly and engines using low carbon fuels have now achieved ultra-low NOx emission levels. Under the Trump administration, the U.S. Environmental Protection Agency (EPA) has announced plans to further strengthen pollution standards for trucks and buses. Concurrently, global companies are making major investments and are beginning to deploy zero emission commercial vehicles around the world. China currently has the lead with more than 300,000 electric trucks and buses operating in major cities today. This industry is still nascent, and the United States, its manufacturers and suppliers, can be leaders, producing thousands of jobs while enabling the entire country to meet the federal air quality standards established in the late 1970's.

For the United States to lead in this sector, the Clean Truck and Corridor Initiative could provide investments in three critical areas. First, there is a need to bring existing zero, and near-zero emission products to the market which can be accomplished through purchase incentives, using a model proven to be successful in several states. Second, there is a need to assist U.S. manufacturers and suppliers in developing the next generation of technology so that zero and near-zero emission trucks and buses can be available in a larger number of segments and applications. Third, there is a need to expand corridors with zero emission refueling and recharging stations. Together, these three program elements would transform trucking and position U.S. companies to grow and compete globally. Further detail on these three categories is provide below.

HELPING FLEETS TRANSITION TODAY—PROVIDING A NATIONAL PURCHASE INCENTIVE

The zero- and near-zero emission truck market is rapidly growing, offering several technology options for fleets. While having a higher upfront purchase price, zero to near-zero emission trucks are proving to have a lower total cost of ownership over the life of the vehicle. Similar to the zero-emission passenger car market, incentives

are needed to jump-start the zero- to near-zero emission truck market to encourage fleets to purchase these advanced and cleaner vehicles. A federal incentive program could transform this industry in the next 5-10 years, build a stronger domestic industry that provides high quality manufacturing jobs, while dramatically improving air quality along congested freight corridors. An investment of $20 billion over six years could replace more than 400,000 diesel fueled trucks with near-and-zero emission trucks by 2025.

A voucher incentive program (VIP)[1] to incentivize clean truck purchases has proven effective in large regional markets because of its streamlined 'point of sale' discount approach. In Illinois, New York, and California voucher incentives have led to the purchase of more than 6,000 battery-electric, fuel cell, hybrid, and ultra-low NOx natural gas vehicles.

Zero- to near-zero emission trucks that are currently available or are soon to become commercially available include:

- Hybrid-Electric cargo vans, delivery trucks, and utility "bucket" trucks;
- Low NOx Natural Gas refuge, drayage, and long-haul trucks;
- Battery-Electric delivery, regional and yard trucks;
- Class 7-8 Battery Electric Drayage trucks; and
- Hydrogen fuel cell long haul tractor-trailers.

Federal incentives in these targeted areas—where early market success is most likely—would help build volumes and lower costs over the next 5–7 years. Once greater economies of scale are achieved, Federal incentives would not be needed and could be scaled back and eventually eliminated.

Recommendation: Create a grant program within the CMAQ program to establish a Voucher Incentive Program. Require States to administer the grant program using current programs as models.

RESEARCH, DEVELOPMENT & DEMONSTRATION—MAKING TOMORROW'S TRUCKS BETTER

To transform the goods movement industry in the next 10 years, federal funding is required to support the research, development and demonstration (RD&D) of advanced technologies to make high-efficiency, zero-emissions, and longer-range technologies more affordable and viable. RD&D investments would help U.S. companies develop a diversity of high-quality products and be in a better position to compete in the global truck and bus market which exceeds $1 trillion in annual revenue. Based on analysis done for state agencies, CALSTART projects a need for federal RD&D investment of about $250 million/year from 2020 to 2025. Approximately 30-40% of the funds should be allocated to technology development and demonstrations, and the remaining 60-70% would be allocated to major pilot deployment projects where both fleets, suppliers, and manufacturers can test and improve the product. Most of the funds should be focused on the larger trucks that consume the bulk of the fuel in the market.

While we recommend that these RD&D funds be predominately spent on RD&D to advance the truck industry, Congress should include language so that some of the funds could be used for two related purposes. Zero emission transit buses are rapidly gaining market share in the United States. Additional RD&D investments in zero emission buses would help address key issues such as performance in cold weather and infrastructure resilience. In addition, the technology development of the Maritime Administration should be boosted to $10 million year to leverage the technology being deployed in near- and zero emission buses and apply it to the near-shore marine vessel sector.

[1] A Voucher Incentive Program (VIP) is a streamlined process that applies the vehicle incentive at the point of purchase. Under a VIP program, the manufacturer pre-qualifies its vehicles with the entity managing the program and vendors are approved to submit voucher requests on behalf of purchasers. A voucher is redeemed to the vendor once all paper work is submitted and the vehicle is delivered to the purchaser. Fleets greatly prefer this process over the costly and lengthy process that includes 9-12 months of proposal development and review, award selection, and contract negotiations. Fleets also prefer the VIP process over tax credits as their true monetary value usually gets lost in corporate accounting and does not impact the budgets of most fleet directors.

Recommendation: Provide $250 million in additional annual funding for FHWA, FTA and MARAD research, development and demonstration programs to support technology development for clean trucks, buses and nearshore marine vessels.

EXPANDING CLEAN CORRIDORS—ALTERNATIVE FUEL INFRASTRUCTURE TO ENABLE CLEAN TRUCKING

Expanding our national alternative fuel corridors is critical to enabling clean vehicle adoption. Through the Federal Highway Administration's Alternative Fuel Corridor Designation Program, 46 states including the District of Columbia have submitted nominations for corridors for 100 interstates, 76 US highways and state roads, of 135,000 miles across all fuels (electric, hydrogen, natural gas and propane as selected by the local jurisdiction). While this designation allows for highway signage, significant gaps in charging and refueling infrastructure exist. Less than one percent of the truck stops in the country have zero-emission fueling stations.

Trucks stop operators, utilities, and third-party providers are eager to build the truck power infrastructure of the future, and federal investment would play a vital and catalytic role. Federal funding would significantly leverage and encourage additional investments from the utility and private sectors. A key outcome of this investment would be a new or revamped network of truck stops providing 100 percent domestic clean fuels and energy for our nation's trucks. Unlike today, the truckers taking part in this program would no longer need to rely on imported fuel, thereby lowering the nation's trade deficit and supporting domestic jobs.

Based on initial estimates, we anticipate the total investment needed to convert the nation's trucking infrastructure to zero or near-zero emission fuels to be between $50–100 billion over the next decade. Federal investment of $20 billion over that time period would leverage non-federal investment on a 4:1 basis.

Recommendation: Expand the current FHWA Alternative Fuel Corridor program to not only designate corridors but to establish a grant program for the installation of alternative fuel infrastructure. Authorize the grants in lieu of tax credit of the Treasury Department Section 1603 program.

SUMMARY—TARGETED OUTCOMES

If the U.S. Congress were to move forward with the proposed National Clean Truck & Corridor Initiative, there would be major benefits in the near- and long-term future for the country. Below are some of the expected outcomes from such a program:

- Nationally, NOx emissions, the primary source of air pollution in urban areas, would be reduced by 150,000 tons and due to cleaner truck product availability, the nation would be in a strong position to be in full compliance, for the first time, with the federal air quality standards that were established in the late 1970's;
- Diesel fuel consumption would be reduced by 19 billion gallons by 2025, and the U.S. would be on a trajectory to eliminate imported diesel by the end of the decade, thus reducing the trade deficit and contributing to a declining geopolitical significance of oil producing nations that don't share our values;
- Total greenhouse gas emissions from the trucking sector would decline by 72 metric tons by 2025, placing the U.S. in a leadership position and supporting the commitments made under the global climate accord established in 2016;
- Fleets would save approximately $20 billion in fuel costs by 2025, with savings projected to expand exponentially from 2026-2035 as the market for zero- and near-zero emission trucks grow; and
- U.S. truck makers and suppliers would be increasing their market share and in a strong position to compete globally.

For further information on this concept, please contact CALSTART's Alycia Gilde, Director, Fuels and Infrastructure at agilde@calstart.org.

Ms. BROWNLEY. Thank you.

Mr. Popple, I wanted to thank you first for, at least in your written testimony, highlighting my Green Bus Act. I appreciate that very much. And I have a bill that says that any buses purchased with Federal funds be zero-emission by 2029. And it also increases funding for the Low and No Emission that you made reference to in your public testimony. So I thank you for that, and I hope that I can get members of the committee to sign on to my bill.

In the staff report—and we have great staff. The staff report states that, while there are 300 electric transit buses in the United States, there are 2,250 electric transit buses in Europe and 421,000 electric buses in China.

So I wanted to ask you, what do you think it is going to take in the United States to be a global leader? You made reference in your testimony that we have that opportunity to be a global leader. We seem to be terribly behind at the moment. But what is it going to take for us to truly be a global leader?

Mr. POPPLE. Thank you for the question, Congresswoman.

I think the status of our progression towards more advanced technologies in the medium and the heavy-duty sector has a lot to do with our Nation's traditional focus on the light-duty sector. So a lot of our policy early on and innovation early on was focused on cars. I think the U.S. has the best electric vehicle technology. We have the best battery technology. We have the best engineers. And we are just starting to apply that to the heavy-duty sector.

I also think that other countries that have already done this demonstrate that there isn't technology risk or science risk in taking sectors like buses and completely electrifying them. We just need to focus on it and set tougher standards for emissions for those sectors like China and Europe have.

Ms. BROWNLEY. And with regards to CNG buses, I am just curious—I know, Ms. Romero, you talked about our school buses. I was a school board member way back in the day, and I know that our fleet, at that point in the early 2000s, were transitioning to CNG buses from traditional diesel buses.

Do we have any idea, when we talk about our bus fleet, you know, what percentage is CNG? I understand that zero emissions is where we need to go, but there are somewhat cleaner buses out there than diesel buses. And I don't have any sense of, in terms of school buses, you know, what percentage are CNG. I know that the Federal Government had offered some opportunities back in the early 2000s.

Ms. ROMERO. Yeah. I don't have the exact statistics for compressed natural gas buses. But I do know that, out of the nearly 500 million school buses on the roads in the U.S., about 90 percent of those are run on diesel—so it is still very significant—and about 60 to 65 percent of our public buses.

Ms. BROWNLEY. And the cost comparison between an electric bus and a CNG bus, does anybody have any data on that?

Ms. ROMERO. It can still be about twice—go ahead.

Mr. POPPLE. On the transit side, we see a basic diesel bus around a half a million dollars; a CNG bus can be up to $600,000; and hybrids and electrics are $700,000 to $800,000.

Ms. BROWNLEY. Thank you.

And, Mr. LOGAN, in your testimony, you talked about the good things that are happening in Long Beach and L.A. and bringing the environmental justice community together along with leadership in both cities.

I also know that in the Port of Los Angeles and Long Beach they have required that trucks utilizing the port meet certain clean emissions standards, and they have progressively gotten stricter

over time. And I think they have made some, you know, major improvements to that.

Can you talk about, you know, lessons learned around that initiative and what the Federal Government could do to incentivize more of that? I have 11 seconds—10 seconds left.

Mr. LOGAN. Absolutely.

So I think one is just coupling incentives with mandates through, for instance, at the Ports of L.A. and Long Beach, within their leases, requiring the shippers to go to lower-emission trucks and eventually to zero-emission trucks.

I think the lesson learned is that it was done, that we were able to do that, that the sky did not fall, that business continued to move forward and there was profit to be made, and folks are actually being able to implement the program without any blips in the system.

Ms. BROWNLEY. Thank you, Madam Chair. I yield back.

Ms. CASTOR. Thank you.

Mr. Armstrong, you are recognized for 5 minutes.

Mr. ARMSTRONG. Thank you, Madam Chair.

Commodity-based economies like North Dakota, we like trucks, we like pipelines, we like rails, we like everything. The geographic distribution of agricultural products and natural resources and energy production necessitate the transportation of products to consumer States—New York, Texas, California, Oregon—from States that are production States. And as far as I know, we look at availability, reliability, and cost.

We already suffer from a bigger basis differential on our agricultural products in North Dakota. We have a discount for transportation on oil and natural gas. And I think it is important that when we have this conversation we talk about it in the scenario of—we talk about all-of-the-above energy, but we like all-of-the-above transportation as well.

So as we continue to do this and move forward, we also see repeated opposition to pipelines and rail transport, which are also necessary to move our products. Rail transport accounts for just over 2 percent of the global greenhouse gases. Pipelines, right around the same, just over 2 percent. But, I mean, last month, we passed an amendment on the floor of the House that essentially banned the transportation of liquefied natural gas by rail across this country. I mean, we constantly see different States across the country fighting against putting pipelines in the ground, which, regardless of how you feel about everything else, it is a cleaner, safer way to move a lot of this transportation.

So, Mr. SATTERTHWAITE, what is the timeline for bringing heavy-duty electric vehicle technology to the market, specifically, like, Class 8 or higher?

I mean, we are talking about buses, and I am going to get into infrastructure if I have enough time. But, I mean, we need to move heavy product, whether it is cows, grain, or oil and natural gas.

Mr. SATTERTHWAITE. I hope I am not disappointing you by saying I don't know when.

Mr. ARMSTRONG. No. I thought that would be the answer.

Mr. SATTERTHWAITE. Currently, we see three major challenges to implementing battery-electric technology in heavy-duty trucks.

The first is energy density of batteries. Essentially, in order to have a tractor head that would have the same range and the same power as today's diesel engine and fuel tank, we would need to increase by weight a factor of three to five in order to accommodate enough batteries to give that same power and that same range. And so that is both a cost and a weight penalty in the trucking industry.

So improvements in energy density of batteries are one of the significant things that has to happen before battery-electric technology can play a significant role in heavy-duty trucks.

Mr. ARMSTRONG. And I think that is important, because we just talked about infrastructure and layout, but one of the things we have to talk about is road restrictions. And, I mean, we talk about infrastructure packages, but those are borne by local, State, and county—or, I mean, counties when we do this.

We had an oil boom in western North Dakota. We had one of the largest infrastructure packages in our history. But one of the things that we required western counties to do was to bring their roadway to a higher threshold so we didn't have to go back and fix every road 2 years later. I mean, there is always maintenance, but—so, when we are talking about that, I mean, this essentially moves the needle all across the country on road load. I mean, am I right?

Mr. SATTERTHWAITE. If you force electric technology into heavy-duty, over-the-road trucks, then you will need to address all the other infrastructure—roads, weights, battery charging stations. And so there is an awful lot of impact on the infrastructure if you force the technology.

I think, again, if you put a mandate out there that says we want to reduce greenhouse gas emissions moving the same freight the same distance, the question is, what other technologies are available and how can the market respond to that, including addressing infrastructure questions.

Mr. ARMSTRONG. And I don't disagree with that. And I think it also includes—I mean, competition breeds low—the problem with all of this is eventually it gets passed on to the consumer. I mean, farmers and ranchers have been doing this for 200 years, longer than that in my State, and they have never seen inputs go down, they have never seen the cost of transportation go down.

And as we continue to bring this up, we talk about all of those things, but if we push this too fast at the same time as we are excluding other modes of transportation, then the cost to the producer and the cost to the consumer is going to go up.

Mr. SATTERTHWAITE. I agree. And, in effect, instead of a technology-forcing mandate, I think you are trying to warn against mode-of-transportation-forcing mandates. And I do agree, there are more efficient ways to move certain types of goods around the U.S. than the heavy-duty trucking industry. It has become very efficient, but there is no doubt, there are more efficient ways to move certain commodities.

Mr. ARMSTRONG. Yeah, depending on where you are trying to get them, absolutely.

Thank you. I yield back.

Ms. CASTOR. Mr. Neguse, you are recognized for 5 minutes.

Mr. NEGUSE. Thank you, Madam Chair.

Today's topic is such an important aspect of the conversation around fighting climate change, given, as the chair articulated, that the transportation sector really is the largest source of greenhouse gas emissions in the United States.

There were a few references to the State of Colorado in the testimony. I happen to represent Colorado's Second Congressional District. And at the State level, I am very proud that Colorado was the 11th State, the first landlocked State, to adopt the Zero Emission Vehicle, or ZEV, program, following California's lead, which will ensure that 9 percent of vehicles sold in Colorado by 2025 are plug-in, hybrid, and electric. This rule alone is estimated to prevent 2.2 million metric tons of carbon dioxide and save our State $1.1 billion.

At the Federal level, I just want to note, I am very proud to support efforts happening in this chamber to drive down the transportation emissions as well. And, in particular, I want to applaud the leadership of my good friend and colleague from California, Mr. Levin, for introducing the Zero-Emission Vehicles Act, or the ZEV Act. And I am proud to be an original cosponsor on that bill.

Just to give you a sense of why this matters a great deal to me and to the folks that I represent, in my home State of Colorado, some folks might be familiar with the struggles we have had with respect to air quality in the Denver metro area. Denver experiences what is known as a brown cloud, so a layer of smog over the city, caused by weather patterns and local sources of pollution, including transportation.

And just this past March, just 3 months ago, Denver's air quality index, at one point, was at a level three times worse than Beijing. That is sobering and underscores the need for this committee and this Congress to take drastic and, I think, significant action and really show leadership on this front.

And so, again, I appreciate the testimony of the witnesses today and appreciate your willingness to engage in this important conversation.

Ms. Romero, I wanted to follow up on some of the points you made in both your written testimony and in your oral testimony.

As reported by the IPCC in 2018, we only have 11 years to make drastic cuts in our emissions in order to avoid irreversible global consequences from climate change.

You mention in your testimony the impact that tailpipe emissions and greenhouse gases have on children, negatively impacting their health and contributing to greater rates of asthma.

With transportation as the number-one source of carbon emissions in the U.S. and the fact that 55 percent of K-through-12 students take a bus to school every day, there is a distinct need to eliminate the pollution our kids are exposed to when they ride diesel buses to school every day. You mentioned some of the efforts that have happened in my home State of Colorado on this front.

I am curious if you could expound on what you described in your testimony of ways in which we could further incentivize the electrification of diesel buses and other steps that you might recommend we take as a Congress.

Ms. ROMERO. Yeah. Thank you for the question.

You know, to mobilize the resources we need to make this transition, it is going to take a combination of public funding and private finance. Our partners at Clean Energy Works estimates that it would take $6 billion to cover the upfront cost barrier to electrify just 10 percent of the Nation's school bus fleet over the next 5 years. So, in short, we really need that combination of public funding and private financing. But it is possible, right?

I heard another witness talk about, you know, making sure that there is a fair playing field for different types of fuels. We have been propping up the fossil fuel industry for decades.

And, Ms. Brownley, you asked, you know, what is it going to take to be a global competitor? It takes investing in cutting-edge technology. You know, when you have the iPhone 8, 9 and 10, you don't want the iPhone 4, 5 and 6 anymore. We have the technologies here; we need to deploy these solutions.

And so it is about equaling the playing field and helping school districts bridge the gap for that upfront cost so that they can benefit from the fuel and maintenance cost savings.

Mr. NEGUSE. Thank you. Thank you, Ms. Romero.

And thank you, again, to the witnesses today.

And I would yield back the balance of my time.

Ms. CASTOR. Mr. Palmer, you are recognized for 5 minutes.

Mr. PALMER. Thank you, Madam Chairman.

Mr. Satterthwaite, based on your experience with Cummins, do you think a single energy solution, like going all electric, will be able to meet the various needs of your customers?

Mr. SATTERTHWAITE. Thank you for the question, Congressman. No, I do not.

Mr. PALMER. Do you think consumers have some needs that are better served by traditional sources and some demands that are better served by electric? Is there some balance there?

Mr. SATTERTHWAITE. I believe so, specifically today. As I have said a couple times, I think the future is uncertain, but today I think there are certain applications where battery-electric technology is capable, available, and economic. Not all.

How that changes over the future, I think, is what makes my life interesting and my day job very interesting. Will the right technology for the future be cleaner diesel? Natural gas? Fuel cells? Battery-electric? This is what we work on every day. And, frankly, there isn't an answer right now.

Mr. PALMER. We build CNG-powered trucks at Autocar in my district for trash trucks. And, obviously, their power demands for those type trucks are smaller than some of our bigger freight-transfer trucks. And I do have some concerns about this effort to go to 100-percent renewable and how that would impact not only the reliability of the system but also the cost for electric vehicles. It is not free.

Mr. SATTERTHWAITE. It is not free.

And I would say that the customers that I talk to share those concerns. Most of the customers I speak with have an interest in figuring out how to get to a lower-carbon, a lower-polluting operation of their own, and yet they are also worried about is the technology ready, is it appropriate for them.

And in the meantime, we in the industry continue to make improvement to the diesel engine, improvements to the natural gas engine, which continue to take carbon out of the air and reduce pollution on an annual basis through working with the EPA and CARB.

Mr. PALMER. Well, it is not going to completely remove carbon from—even if we go to 100-percent renewables and 100-percent electric vehicles, it is not going to completely remove carbon from the atmosphere.

I want to talk about another aspect of this, and I think Congressman Armstrong touched on it a little bit, and that is the weight aspect of this. And I am concerned about going to pilotless vehicles and how that is going to impact our infrastructure.

Because most of us—and I know nobody in this room texts while they drive, but even if you are not distracted, you are varying your position in a lane. You change lanes, but even if you stay in the same lane, you don't stay in the same spot. If we add to the weight of freight vehicles and we go to pilotless vehicles, they are going to be in one spot. And it is going to basically rut the aggregate that we are now using.

Do you see that as an issue, a problem, particularly in your industry?

Mr. SATTERTHWAITE. Sir, I am afraid you may have gotten out of my area of expertise in terms of trucks and roads. I don't know.

I think, to the earlier Congressman's comment, I do think the infrastructure of this country, the roads in particular, will need to be addressed, and heavier trucks definitely will have an impact at some point. I am not an expert and really able to comment on exactly how that is going to happen.

Mr. PALMER. That is something that I have been focusing on, been working on. Down at Auburn University, they have a center where they are testing various types of aggregate. They have a big test track. And one of the interesting things is that—one of my concerns is how do we clean up the coal ash. And they are using coal ash now as part of the aggregate. You don't lose any of the heavy metals, they don't leach into the ground, but it hardens the asphalt, and I think that is going to be a big deal.

As of today—and this will be my last question—there are more than 30 counties in California that are out of compliance with not just one but multiple Federal air quality standards in the Clean Air Act despite all of the regulations that California has in place. There are numerous other California counties that are in violation of one of the air quality standards. And many have been out of compliance for decades, and it is unclear when, if ever, some will come into compliance. For reference, Alabama does not have a single county out of compliance.

So my question would be, does it make sense to apply more regulations to the transportation industry when that doesn't appear to be working in heavily regulated States like California?

And this is EPA data I have here.

Mr. SATTERTHWAITE. I think it is a responsibility of industry and Cummins sees it as a responsibility of industry to continue to improve technology to have better outcomes for all American citizens.

I do think there is scope, and the EPA is appropriate to continue to push the industry on what it is capable of and asking us to deliver better for the American people across the country.

Mr. PALMER. Be smarter.

I yield back.

Ms. CASTOR. Mr. Huffman, you are recognized for 5 minutes.

Mr. HUFFMAN. Thank you, Madam Chair.

This is a great conversation. I want to thank the witnesses and thank the chair for setting this up.

And I am interested in the technology we are talking about. Those of us who think we are in a climate crisis, many of us believe we have to start identifying areas in which we simply don't need to burn fossil fuel because we have alternative technology that can help us move forward.

And what I am trying to understand—and I want to start with you, Mr. Satterthwaite, because you are really at the fulcrum of these heavy vehicles that have always relied on internal combustion and fossil fuels—is whether we can reimagine that technology in a way that doesn't burn fossil fuel.

And I am not talking about natural gas, because, as I take a look at that, I don't think we have time for fake solutions. And, quite honestly, yes, it has less of a carbon profile in the burning end of the system, but if you add in the fugitive methane, which we think is somewhere between 1 and 9 percent, at 3½-percent methane loss, it is just as bad as coal.

So, if we are serious about this crisis, we've got to identify places where we don't need to use fossil fuel and move on to new, clean technologies.

Can we do that with the type of heavy vehicles that you have been such a leader in working on, if we decide that we just have to go beyond fossil fuel to clean technology?

And let me just say that I have worked with Cummins in the past when I was a California legislator. I know you are innovators. I worked with a division of yours called Cle-Air that did these wonderful retrofit devices for school buses that dramatically reduced the particulate matter. So I am impressed with your track record in this area. I just want to hear your thoughts on whether we can reimagine this technology.

Mr. SATTERTHWAITE. Thank you, Congressman. I will say that much of Cle-Air's work was funded by the DERA act. So I just wanted to make sure you knew that that is how that work was done in California.

I would argue Cummins is reimagining the future. If you look across the industry, last year, the first company to show an electric truck was Cummins. And so we are currently trying to do exactly that, imagine what a future would look like in a very different state. And part of the challenge, of course, is we are trying to do this economically at both a capital cost and an operating cost level.

So we are asking ourselves all those questions. We strongly believe the future will be multi-technology; it won't a single technology. And yet, in the path to get there, we will need to make improvements today and in the future.

And I think what I don't want to miss is the opportunity to make improvements today, in light of trying to, you know, go for gold, if

you will, with zero emissions in the future and ignore the opportunity to make significant emissions reductions today.

Mr. HUFFMAN. But I think I am hearing you say there is nothing about these heavy vehicles and heavy equipment that you have been powering that precludes going to fossil-free technology?

Mr. SATTERTHWAITE. At a certain point in time, at a certain cost, at a certain reliability. But the technology is developing. I would argue to say it is not fully developed, but it is developing. And there are many forces in the industry that are pushing it. And Cummins is also with those forces, moving it along as well.

Mr. HUFFMAN. Appreciate that.

Mr. Popple, the other concern I have about this climate crisis is that we are way behind some other countries that seem to be taking it much more seriously. We have seen the numbers on electric buses. China is light-years ahead of us on deploying this technology.

I recently took a trip to Sweden as part of the Transportation and Infrastructure Committee. They are reimagining their highway system to address some of the limitations of electrifying heavy trucks. And they are piloting some charge-as-you-drive technologies, where the actual transportation infrastructure of the country would help solve the problem of battery density and battery weight.

What can we do in this country to reclaim the mantle of leadership in this crisis when we talk about heavy vehicles like buses and trucks?

Mr. POPPLE. Thank you for that question, Congressman.

I think we really should focus on economic productivity and return to that being the focus of the investments we make. I think there is a false tradeoff that is depicted between clean innovation and economic efficiency.

On the bus side, on an apples-to-apples basis, if you power a bus with an electric system, you use 2,000 watt-hours per mile. If you use diesel, you use 10,000 watt-hours per mile. So those countries that have already moved past legacy technologies in some of their transportation systems, they have 8,000 watt-hours per mile of free economic value to put into a data center or put into industry.

The other thing I would mention is that, from a light-weighting perspective, some of the sectors are already getting there, where the electric vehicle is at the same weight or lighter than the combustion vehicle. So a Proterra battery-electric bus with a carbon-fiber body is lighter than a CNG bus.

So, as long as we make sure, as my colleague pointed out, that the technologies are ready to go and have reached product market fit, there are huge economic productivity gains to be had.

Mr. HUFFMAN. Great. Thank you.

I yield back.

Ms. CASTOR. Mr. Carter, you are recognized for 5 minutes.

Mr. CARTER. Thank you, Madam Chair.

And thank all of you for being here.

Ladies and gentlemen, I have the honor and privilege of representing the First Congressional District of Georgia, which includes the whole coast of Georgia. It is over 100 miles of pristine coastline. And it includes two major seaports, the Port of Savan-

nah, which is the second-busiest container port on the Eastern Seaboard, as well as the Port of Brunswick, which is the number-two roll-on/roll-off port in the country.

The Port of Savannah is one of the fastest-growing ports in the world. In fact, for a short period of time there, they were the third-fastest-growing port in the world. Only two ports in China were growing faster.

I mention that because obviously they are growing at a very high rate of speed, but they are also taking great initiatives in saving fuel. In fact, the Georgia Ports Authority has saved over 2 million gallons of fuel annually just by electrifying their ship-to-shore cranes. And if you take all of the initiatives together, they are saving nearly 7 million gallons of fuel annually, which is significant, particularly for these growing ports.

And one of their most critical benefits is that they have two first-class railroads right there on the ports, in the container port in Savannah, which really helps tremendously.

You know, one of the initiatives, if you will, that the President has spoken about and that we in Congress have been speaking about is the infrastructure initiative. And, certainly, that is very important.

I will direct this question to you, Mr. Satterthwaite, but, at the same time, anyone chime in here.

Improving our infrastructure, particularly improving our roads and bridges, how would that make heavy-duty vehicles more efficient and, in turn, cleaner?

Mr. SATTERTHWAITE. Thank you for the question, Congressman.

I think the impact of infrastructure, particularly roads and bridges, on the heavy-duty industry, I think is in a couple of areas.

One is that the sad state of our roads leads to more breakdowns and more customers who face interruptions to their business. Because, frankly, who of us hasn't driven over a pothole and popped a tire someplace. And if you are driving an 18-wheeler rig, that is not only dangerous, it also stops that load and interrupts that wheel of commerce from moving. So making improvements will, initially at least, improve the efficiency with which goods move across the U.S.

I think the next step is then what it enables us to do and how we use those investments. There are some countries around the world who are investing—as the Congressman said in Sweden, about changing how they think about the infrastructure. If you are upgrading it, I believe we may as well think long-term and ask ourselves what other types of improvements would we put in the infrastructure. Rather than just replacing what is there, how do we build for the future?

So I think both those activities have big opportunity to improve the efficiency of our industry.

Mr. CARTER. Great.

Well, let me mention, I was also on that trip to Sweden and witnessed the same thing that Jared witnessed, and it is very innovative and certainly something we need to be looking at.

I want to also mention about my district—obviously, I am very proud of the district, but it also has a large rural area. South Georgia, rural south Georgia, is a large geographic area. And I believe

some of my colleagues up here mentioned also about the effect that this might have on rural areas. And I want to make sure the rural areas aren't left behind. I want to make sure that they are included, because, you know, they have—make sure they have a seat at the table, because they have a big need for these heavy-duty vehicles.

And how can we help them? What kind of challenges do you see? And, again, I will direct this to anyone who wants to jump in. But what kind of challenges do you see the rural communities having when compared to the urban cities in reducing emissions?

Ms. ROMERO. Yeah, I mean, I will just jump in here. Thank you for the question.

Based on my experience in working with some of the rural communities in California, you know, a lot of these communities don't have access, really, to local hospitals or even just to government services to do their regular business, you know, update and renew their driver's license and all of that sort of thing—right?—because the metropolitan areas are so far away.

And so, in Huron, California, where my friend Rey Leon is the mayor, there is a 7,000-person town that takes 4 hours for them just to get to the nearest public hospital, because they have to take three buses. That is 4 hours one way; it takes 4 hours back, with an hour to schedule your doctor appointment, right?

So we do need to invest in public transportation in these areas and bringing buses to these areas. I am sure that there are some rural communities where the range will be more of a challenge, right?

But, in Huron, what they are doing now is electric ride-share programs that the community has led to help connect people to services with clean-vehicle technology that doesn't pollute these areas.

Mr. CARTER. Well, thank you very much for your answer. And I do hope that we will remember the rural communities. This is extremely important for them as well.

Thank you, Madam Chair, and I yield back.

Ms. CASTOR. Thank you.

Mr. McEachin, you are recognized for 5 minutes.

Mr. MCEACHIN. Thank you, Madam Chair. And thank you for holding this hearing today.

And I am grateful for all the witnesses for coming today.

As we have discussed, the transportation sector is now the largest source of greenhouse gas emissions, and auto emissions powerfully affect air quality and public health. Air pollution and climate change, both direct effects of tailpipe emissions, affect all Americans, but they disproportionately impact low-income communities, communities of color, and other vulnerable populations.

Protecting these communities from dangerous air pollution and from the worst impacts of climate change is a moral imperative. I want to use my time to explore how we can best meet that responsibility.

And, Mr. Logan, sir, if you don't mind, I will start off with you.

Mr. Logan, environmental injustices in general and disparities in air pollution exposure in particular are a direct result of poor policymaking, and they cry out for a policy solution.

For instance, I have the honor of sponsoring legislation to ensure the Federal Government considers the true impact of greenhouse gas emissions in a cost-benefit analysis. I believe that when we talk about the cost of fighting climate change, we also need to consider the public health costs of doing nothing.

What might the full and fair accounting look like in practice? How can Congress promote it? And how can we ensure that we are mindful not just of how much good we do but also whom we help?

Mr. LOGAN. Great. Thank you.

So, first, I want to say that action needs to be taken, and action needs to be taken now. We know that we are in a climate crisis, and so actions definitely need to be taken.

There is cost to transitioning to zero emissions, for sure. But there are costs of the impacts of the climate crisis, whether that is in agriculture or whether that is in public health in our communities. It is paramount that we look at resourcing communities that are disproportionately impacted.

One of the reasons that we have the impacts in these communities is because that is where the activities are, this is where the operation is, in port and freight communities specifically.

So, when we look at environmental justice, climate justice, through that lens and through the lens of equity, we need to make that we are investing in these communities to uplift them so that we can transition in a smart and just way.

Mr. MCEACHIN. Thank you.

Ms. Romero, in your testimony, you mentioned that vehicle pollution is linked with asthma. Childhood asthma, of course, is the top reason for missed schooldays nationwide. It can significantly affect children's quality of life and, in rare cases, can prove fatal.

What is the best way for Congress to protect children from this harmful pollution? And how do we ensure that the benefits are concentrated in the communities that suffer the most?

Ms. ROMERO. Yeah. Look, African Americans are three to four times more likely to be hospitalized and die from asthma.

And I think, you know, what it is going to take—I heard Mr. Carter and other members really speak about the progress that we have made on cleaner fuels and, you know, making steps forward, with a sense of pride, and I could feel that.

I think, though, if anyone has watched a game of basketball, when you have made the shot and you are sitting there holding your hands up after you have made the shot, being proud, and you stand there just a little too long, the rest of the team has already taken the ball and scored on you, right?

So I think that I just want us to remember that we should be proud for the progress that we have made but we have a whole heck of a lot further to go, especially on the timeline that the IPCC report is telling us. And so we really need to accelerate and invest significant resources.

Mr. MCEACHIN. I like that analogy. Thank you.

Mr. Popple, I heard people say that electric vehicles are only for wealthy individuals. Can you explain why people who do not own cars should be interested in the electrification of transportation and how even they would benefit from this trend?

Mr. POPPLE. Well, thank you for the question, Congressman.

One of the reasons why I first got involved with Proterra after starting my career in electric vehicles at Tesla Motors was that I saw the opportunity in the fleet-vehicle sector for us to deploy clean, electric vehicle technology into the most accessible form of transportation.

So there are vehicle categories, specifically public transit buses and city buses, that are predominantly utilized by lower-income families. But we should also not forget about the fact that, whether you own a vehicle or not, you are paying the health cost of the truck or bus or car that drives past you.

So I actually think that some of the best applications for EV go into the most utilitarian types of vehicles.

Mr. MCEACHIN. Thank you for your answer.

And, Madam Chair, I am now giving you 10 seconds back. I yield back.

Ms. CASTOR. The chair thanks you.

The ranking member is recognized for 5 minutes.

Mr. GRAVES. Thank you, Madam Chair.

Mr. Logan, let me ask you a question. You are in charge of climate for the whole country. We give you a billion dollars. What do you do?

Ms. ROMERO. It is going to take a lot more than a billion dollars, right? It——

Mr. GRAVES. I know, but——

Ms. ROMERO. Is going to take all of that.

Mr. GRAVES. Mr. Logan, what do you do?

Mr. LOGAN. So I would say the same point. A billion dollars is a significant amount of money, but we definitely need to go beyond that globally and in the United States.

But couple that, you know, really feeding that into incentive programs, couple it with regulatory measures, I think that that gets——

Mr. GRAVES. Incentive programs to do what?

Mr. LOGAN. To deploy zero-emission vehicles, especially in the heavy-duty sector.

I think, to the point that, you know, not one particular technology is going to get us to where we need to be, zero-emissions is definitely needed. We definitely need to move toward zero-emissions, whether that is fuel cell or other types of technology. But there is a cost to doing nothing, right?

And electric vehicles is an over-100-year-old technology. Over 10 years ago, we put a robot on Mars. We can do this. We have the technology, we have the know-how, and we have the innovation.

Again, with regulatory measures, backed up with incentive programs, we can get there.

Ms. ROMERO. And if I can add, as important as the "what" is the "where" and the "who." And so I would take that billion dollars and I would prioritize underserved and pollution-burdened communities, whether urban, rural, et cetera, so that we can help these clean-technology companies actually break through the market barriers.

It is easy for the early adopters. It is easy for the rich guys on the coasts—right?—to afford the Tesla as a toy car. That is not what we are talking about. We are talking about a green economy

that benefits every American all across the country, starting with those who need it most.

Mr. GRAVES. You know, the thing that just—it is fascinating to me. I heard, Mr. Popple, you said that we need to look at economic productivity. And the way that I view that is, we have to do economic analysis: What is the best bang for the buck? What is the best return on investment for the tax incentives we are providing, for the R&D dollars, for all of the capital investments and incentives that we are providing?

And I hear people sitting here just saying zero-emissions heavy trucks is what we need to do, when I am not sure that—look, we have a finite amount of cash, we have a finite amount of incentives that we can do. And I want to make sure that we are investing our dollars and our limited resources in the incentives and in the products that are actually going to generate the best solutions.

And I heard my friend Mr. Huffman—Mr. Huffman, you still here? Good. You said—and I wrote it down, so it is going to come back up at Resources Committee, I promise—we don't have time for fake solutions. You might count on it; it is coming back up.

And you also talked about China, and you said China is beating us. Look, I think it is important for us to talk about the fact that, look, the United States, we have reduced emissions by nearly a billion tons. China has increased, during that same period of time, 4 billion tons. So I am not sure what they are beating us on. They are not.

We had a hearing in the T&I Committee on BYD. They are beating us on stealing our technology. That is what they are beating us on. They are beating us and they are undercutting domestic companies, like Mr. Popple right here, that are trying to employ American jobs and not have state-owned enterprises that are coming in and distorting the economics.

Mr. Satterthwaite, let me ask you a question. You laid out a chart, and it is interesting. You have clean diesel, natural gas, electric. You talk about how you have these extraordinary reductions. And to throw out one of the figures that is in your testimony, you talk about the Phase II greenhouse gas standards for commercial vehicles. When fully implemented, those standards will lower CO2 emissions by approximately 1.1 billion metric tons.

The United States, I said that we have reduced our emissions by a billion tons. That is greater than the next—I used to say 11; now it is 12—12 countries combined—combined.

Why is it, Mr. Satterthwaite, that you don't see all these companies just coming to you and just saying, hey, I want electric trucks? Why is that not happening?

Mr. SATTERTHWAITE. Thank you for the question, Congressman.

I think that customers are concerned. Most of our customers are conservative in their business approach. They want to invest in products and particularly in products that they are confident are going to work for them and help their business be successful.

And I think the two biggest concerns about electric heavy-duty trucks right now are weight, which is a function of battery density; range, which is also a function of energy density and batteries; and then reliability and charging infrastructure.

Imagine you are a truck company. You buy an electric truck to do business in L.A., and that truck needs to go to Reno, Nevada. And there is no charging station in Reno, or there is a charging station that takes 8 hours to charge that truck. So what does the driver do for those 8 hours?

So these are practical concerns that our customers have about infrastructure, about technology readiness, and also about cost.

Mr. GRAVES. Thank you.

Madam Chair, I want to say that, look, when we move forward—I agree with what all of our objectives here are; I agree—we need to be careful.

Russia and Massachusetts have to import gas—excuse me. Let me try that again. New York and Massachusetts have to import gas from Russia. California has had to increase their oil imports from Saudi Arabia and others. And as we talked about the other day, the electrical grid is going to require two to three times the electricity to move to EV vehicles in this new economy.

We need to make sure that we are planning in a way that actually allows us to achieve these goals with current technology.

Thank you.

Ms. CASTOR. Thank you.

Mr. Casten, you are recognized for 5 minutes.

Mr. CASTEN. Thank you very much, Chair Castor, and to all our panelists. Really appreciate you all coming here today.

You know, I think I won't belabor the point. A lot of people have mentioned how the transportation sector is now the largest source of greenhouse gas emissions. My view is that that is in no small part because it really requires a different set of policies from other sectors.

The electric sector, the industrial sector are dominated by capital-intensive assets that run most of the time. The operative question on those sectors is, what is the variable cost of energy? The transportation sector is dominated by capital-intensive assets that are parked most of the time. And the operative question is, what is the cost of capital in that space? And I think sometimes we assume that we can do the same tools everywhere, but they are not the same tools.

However, I would submit to you that the principles that have to guide good climate policy are the same everywhere.

And I really liked your comments, Mr. Satterthwaite, when you called for technology-neutral and goal-dependent decarbonization strategies in the transportation sector. I would suggest that that is true everywhere. To Mr. Graves' point, we do have finite capital. Markets will allocate capital accurately and efficiently if we define the goal. We get in our way all the time when we start recommending paths.

And there is also the reality that lowering carbon dioxide emissions is awesome, fun, and addictive once you start, because—and this is complicated, so I am going to say this real slow so everybody gets it—people don't give away fuel for free. So if you burn less fuel, you save money. That requires an investment, but you make money on investments. And in places that have done this, we have seen them adopt this and move along and go from there.

And that is essential, to make sure that our climate policies focus on accelerating capital investment, and then recognize that, once you own an efficient vehicle, once you own an efficient power plant, once you own a solar panel on your roof, you tend to operate it all the time because it is cheaper, it is more efficient, and if you are fortunate enough to own an electric car, it is super-fun to drive, way more fun than the other car you have.

So, you know, that is in part why I introduced H.R. 2025 to permanently extend the alternative refueling property tax credit for investments in EV charging and other alternative fuel. This is a real hard investment for the private sector to make, but once you get that infrastructure out there, it is a catalyst to move other investments forward.

I want to thank Chairman Neal and Chairman Thompson for including an extension of that tax credit in the Taxpayer Certainty and Disaster Relief Act of 2019.

Mr. Popple, as we consider a potential infrastructure package, can you help understand why it is important that the Federal Government make investments in EV charging infrastructure?

Mr. POPPLE. Thank you, Congressman, for the question.

I think certain types of EV charging infrastructure require Federal investment because you have a period of underutilization for infrastructure, and so you end up with a market failure. It is difficult for a private business to have patient enough capital, and you also have to be able to take a little bit of risk for some of those charging stations in terms of knowing where to put them.

However, on the fleet vehicle side, what I think is quite interesting is that there is no risk in terms of where that infrastructure should go and whether or not it will be economically utilized. That is one of the reasons why we have never had a charging infrastructure problem with our markets. We don't have a chicken-and-egg problem because our customers buy the same number of chickens and the same number of eggs as they need to do that fleet vehicle job.

I agree also with your point on the fact that once you get started with this technology you embrace it and you want to go further with it. We have had dozens of cities throughout the U.S. voluntarily, on their own, from the bottoms up, after they have implemented some electric buses, they have passed an action plan to go to 100-percent electric buses.

So for some sectors where the category is ready, once you get it started, it takes a momentum on its own, and the customer will take it from there.

Mr. CASTEN. Thanks.

So I want to shift. Since its inception in 2007, the Advanced Technology Vehicle Manufacturing Program has helped drive a whole lot of investment through direct loans to automotive or component manufacturers for re-equipping, expanding, or establishing facilities for the domestic production of fuel-efficient, advanced-technology vehicles. I think the numbers to date are: It has supported over 4 million advanced-technology vehicles and upwards of $17.7 billion in remaining loan authority.

However, a 2018 report from Energy Futures Initiative entitled "Leveraging the DOE Loan Program" notes that current statutes

prevent the program funds from being used to invest in medium- and heavy-duty vehicles, even though they account for almost 25 percent of the greenhouse gas emissions in the transportation sector.

Madam Chair, I would like to ask unanimous consent to enter this report into the record.

Ms. CASTOR. Without objection.

[The information follows:]

Submission for the Record

Representative Sean Casten

Select Committee on the Climate Crisis

July 16, 2019

ATTACHMENT: *Leveraging the DOE Loan Program*. Energy Futures Initiative, 2018.

The report is retained in the committee files and available at: https://docs.house.gov/meetings/CN/CN00/20190430/109329/HHRG-116-CN00-Wstate-FosterD-20190430-SD003.pdf.

Mr. CASTEN. And, Mr. Popple, I was pleased to hear you call to amend the program to allow companies like Proterra to be able to apply for loans.

We would welcome from you and/or Mr. Satterthwaite, as you think about low-carbon solutions in the transportation sector, how important is it that the Federal Government provide access to lower-cost financing options?

Mr. POPPLE. Well, I think it can be extremely important in terms of starting a market, but what we have seen on the battery-electric bus side is, once it is proven out, private capital steps in.

So we had recent example where Mitsui has announced a $200 million program to finance batteries for our sector, but you often need the Federal Government to at least initiate it.

Mr. CASTEN. Mr. Satterthwaite.

Mr. SATTERTHWAITE. I would support Mr. Popple. I think starting and getting some of these early starts and early wins in the infrastructure, charging infrastructure, and alternate fuel, refueling infrastructure, is an area where the Federal Government can play a very big part.

Mr. CASTEN. Thank you.

And I yield back.

Mr. HUFFMAN. Madam Chair, would you entertain a unanimous consent request, please? A report from the Rhodium Group and also a recent E&E News report.

This is, unfortunately, in response to my friend Ranking Member Graves' victory lap on our recent emissions reductions. The victory lap is over, and these reports show that in 2018 our emissions began rising again. They are projected to continue rising.

So, sadly, we don't have a lot of laurels to rest on. And I think these reports, if you will enter them into the record, will help correct that impression.

Ms. CASTOR. Without objection.

[The information follows:]

Submissions for the Record

Representative Jared Huffman

Select Committee on the Climate Crisis

July 16, 2019

ATTACHMENT: Harvey, Chelsea. "CO2 Emissions Reached an All-Time High in 2018." E&E News, 6 December 2018.
The article is retained in the committee files and available at:
https://www.scientificamerican.com/article/co2-emissions-reached-an-all-time-high-in-2018/
ATTACHMENT: Houser, Trevor; Pitt, Hannah; Hess, Hannah. *Final US Emissions Estimates for 2018*. Rhodium Group, 31 May 2019.
The report is retained in the committee files and available at:
https://rhg.com/research/final-us-emissions-estimates-for-2018/.

Ms. CASTOR. And, Mr. Luján, you are recognized for 5 minutes.

Mr. LUJÁN. Thank you, Madam Chair.

Mr. Popple, you said that the next wave of transportation technology isn't just about driving down emissions but also, I quote, "creating good-paying jobs and boosting the clean-energy economy."

Proterra could be a model for growing the manufacturing of heavy-duty vehicles in the country, with an eye toward reducing emissions and protecting working men and women. Are you working with communities and unions to hire family-supporting jobs that reduce emissions?

Mr. POPPLE. Absolutely, Congressman. I appreciate the question.

We work very closely on the infrastructure side with labor groups like the IBEW. They tend to be one of the best sources of high-voltage, trained, skilled labor.

We are a young manufacturer. We have about 500 employees. So we are still evolving through what our long-term structure will be in terms of our relationship with labor. But we are supportive 100 percent of whatever decision our employees make in terms of their right to organize.

We have a plant in Greenville, South Carolina; we have a plant in L.A. County; and we also have a plant in the Bay Area. And we are supportive of whatever our employees choose.

In terms of good jobs and clean-energy economy, our company provides salary, healthcare benefits, stock equity in the company for 100 percent of our employees. And we think that the types of jobs that we are creating for this company can be a model for this new industry as it grows and helps us improve our energy productivity.

Mr. LUJÁN. I appreciate that response, Mr. Popple. My father was a union ironworker. He learned how to weld in the shipyards of San Pedro as a young man before he found his way back to New Mexico. My brother is IBEW. My grandfather was a union carpenter as well.

The other question that I have, connected to that—and you alluded to this—but what are you doing also within the company to promote safe working conditions and to make sure that, while we are moving forward with what will be strong, new technological advances, that people are smart about the environments that they are creating for the teams that you are assembling to build the future?

Mr. POPPLE. That is a great question. Thank you, sir.

The reality is, working on electric vehicles and maintaining electric vehicles and operating electric vehicles is healthier for the worker than the fossil-fuel alternative. A lot of our service techs, one of the things they really like about this job is, at the end of the day, they are not covered in grease and oil. They don't feel like they are going back home to their families possibly with something on them that is a contaminant.

In terms of work environment, Proterra as a company exceeds our industry averages for safety. We start every meeting, every session, with a focus on safety, including with our board of directors. And we take very seriously the need to train workers on this new digital and electric technology, not just on the vehicle side but also on the infrastructure side.

Mr. LUJÁN. I appreciate that.

And you anticipated my next question, which was: How can we work with you to promote the skill and labor force needed, specifically in the electric vehicle service and maintenance workers and battery technicians? So I appreciate that very much.

Ms. Romero, I represent a rural district in New Mexico. What more can we be doing to promote electric vehicles and clean transportation infrastructure in districts like mine?

Ms. ROMERO. Yeah. You know, electric vehicle infrastructure charging stations are going to be put in neighborhoods where they think there is going to be a lot of electric vehicle ownership. And whether it comes to bringing these technologies to rural communities or bringing them to urban communities of color, the problem is the same. We need to make sure that we are investing in accessible clean technology for all Americans.

And sometimes that means a utility or a company isn't going to put it there, it doesn't make business sense for them. But for us, as a government that serves all Americans across the United States, we need to make sure that we are filling that gap and providing fair access.

Mr. LUJÁN. So, in States like New Mexico, where, you know, a lot of trucks are moving through there, there is a lot of long-haul. So our interstate systems are probably the first area that could benefit from that infrastructure investment.

As it then builds out away from those interstate systems into maybe vehicles that aren't going to be on such long hauls, what are you doing in that space?

Ms. ROMERO. Yeah. So I mentioned this a little bit earlier. There is a small town, a farm worker town in central California, Huron. It is a 7,000-person town. This is a community that takes 4 hours on three different public buses just to get to the nearest children's hospital. That is one way. It is an 8-hour roundtrip. And, of course, the buses don't run at night. As you know, in rural communities, the infrastructure is lacking.

And so what they are doing is they have this Green Raiteros program, where there is electric rideshare, community-owned—if you think of Zipcar, led by communities—where people can come in and use an electric vehicle to get to their appointments or use an electric vehicle to provide service for other members of the community. A lot of retired community members come in and do that; they

work or they volunteer as a driver. And they are able to bring that technology in and help solve some of those gaps.

Mr. LUJÁN. I appreciate that.

Madam Chair, I appreciate the emphasis in that community, as well, with the challenges they have for transportation. If they don't have a rural healthcare clinic, I think that is something else that we could look at, making sure those folks have access to.

But when you talk about a town of that size, you are talking about communities where I come from, so I get it. And I appreciate your work in that space, Ms. Romero.

Thank you, Madam Chair.

Ms. CASTOR. Thank you.

Mr. Levin, you are recognized for 5 minutes.

Mr. LEVIN. Thank you, Chair Castor. I am very grateful that you are holding this hearing. This is a personal issue for me, having grown up near a major port, the Port of Long Beach, for the first 8 years of my life before we moved down to south Orange County.

And I have three big ports in southern California, in Long Beach, L.A., and San Diego, and I am friends with a lot of folks there. I have had a chance to tour the Middle Harbor Initiative at the Port of Long Beach and see all the zero-emission things that are going on.

And I commend all of you, all four of you. And that includes anybody trying to do zero-emission, as you are at Proterra. I am also encouraged by the work being done at Cummins with the Cummins Westport engine.

The reality is that we need to get to zero. When I say zero, I don't just mean criteria pollutants. I think that is great. I think those advances are really critical on NOx, SOx, particulate matter. But the reality is we have to get to zero, period. That means zero CO2 as well. We have to get there as quickly as we can.

I think it is important also to note a lot of the work that we are doing on the light-duty side, as we work to build out an EV charging infrastructure throughout the State of California in particular, which I am most familiar with. We are going to go from 14,000 EV chargers to 250,000 EV chargers by 2025.

I have a bill that would increase the sales of new passenger cars to be 50 percent of all new passenger cars in California by 2035. And it ramps up—in the Nation—ramps up from there.

We are already doing this stuff in California. I am always mindful of, where are you going to get that electricity from? Because I hear the naysayers say, well, if the electricity is dirty, then the electric vehicles are going to be dirty. Right now, we are getting—and this is our handy ISO app in California—52 percent of all of our electricity in California is coming from renewable sources. That is right now, today.

I am also mindful that fuel cells could play a big role in this, as well, in the heavy-duty space. I worked in clean energy for about 15 years, representing a variety, everybody from electric trucks to fuel cells. And there are strengths and weaknesses to each of those technologies. There are infrastructure hurdles to each of those technologies as well.

And I wanted to just highlight the work we are doing in California, again, with regard to heavy-duty. Specifically, Port of Long

Beach just got an $8 million grant from the CEC to construct hydrogen refueling infrastructure. Port of L.A. got $41 million last year from the California Air Resources Board for the similar hydrogen fueling infrastructure, use of zero-emissions forklifts and the like.

So we have made it a priority in California. And the question for each of you is, what can we do at the Federal level? I have seen a variety of suggestions, but what one thing would you like to see us do at the Federal level to really advance zero-emissions heavy-duty infrastructure?

Mr. LOGAN. If I may, Congressmember, so if I was just to pick one today, I think investing in the DERA programs, specifically within a program looking at the freight sector, advancing zero-emissions. Using the example of the school bus rebate program and alter that to look like a rebate system for zero-emission technology in the freight sector.

Mr. LEVIN. Thank you.

Anybody else? Because we get to write laws up here.

Ms. ROMERO. Yeah, I mean, the sure thing I mentioned was the Clean School Bus Act for school bus electrification.

The other thing that I think is a big topic of discussion, potentially in a bipartisan way, is carbon pricing. And I think, so far, there is no carbon pricing legislation at the Federal level that is looking at how we leverage the revenue to accelerate the transition. And I would say any revenue-neutral option is not an option. So thinking about how do we leverage those dollars to deploy into solutions that are going to get us to zero-emission.

Mr. LEVIN. Okay.

Mr. POPPLE. So I would have two quick ones, Congressman.

One would be to open the ATVM program, which has funding to medium- and heavy-duty vehicles. The fact that ATVM excludes anything but a car shows how car-centric and -focused we have been, to our misfortune.

And the second one would be, I would aggressively invest in modernizing the power grid. Because we don't know exactly when all these different sectors are going to go electric, but we do know the low-carbon, common-currency fuel of the future is electricity. And the more we invest in the grid, the more we can get clean energy out of Texas or Iowa or northern California or southern California into other sectors, from Oregon—so any investment in the grid I think is a future-proof investment.

Mr. LEVIN. It is almost like we need to pass an infrastructure bill.

Mr. POPPLE. Absolutely.

Mr. LEVIN. Yes, sir.

Ms. SATTERTHWAITE. I will just add, funding DERA, continuing to fund DERA, and let customers choose which way to reduce emissions, and do it with short- and long-term benefits.

Mr. LEVIN. I wanted to ask a related question, and perhaps each of you could just briefly weigh in.

We have an opportunity with the USMCA, you know, the new NAFTA. And when I think about air quality and emissions in my region, the greater San Diego region, it seems to me heavy-duty

transit, you know, a lot of trucks coming to and from Mexico, certainly contribute.

What, if anything, should we be doing in the new NAFTA about heavy-duty emissions?

Mr. LOGAN. I would say, without a doubt, including in any type of agreement a clean-truck and clean-freight mandate.

The communities in and around those ports of entry are dramatically impacted. And, you know, I think this is one of the ways in which we can look at the cost of doing business, to help to be solution-oriented, addressing both the environmental justice and climate justice.

Mr. LEVIN. Appreciate it.

I am out of time, and I appreciate the chair.

Maybe if one more wants to answer this, and—I am really out of time.

Mr. SATTERTHWAITE. If I could, just quickly?

Ms. CASTOR. Go ahead. Quickly.

Mr. SATTERTHWAITE. Canada has essentially followed U.S. EPA regulations for heavy-duty trucks. So there was already harmonization between the U.S. and Canada.

Mexico has followed European standards, not U.S. standards. They are not that different, but there could be an argument that harmonization would be better, I think, as part of MCA. If we could harmonize heavy-duty emissions regulations across the historic NAFTA/USMCA, I think that could make a difference.

Mr. LEVIN. Thank you all very much.

Ms. CASTOR. Thank you.

Before we go to Mr. Griffith, I will recognize the ranking member for a U.C. request.

Mr. GRAVES. Thank you, Madam Chair.

Madam Chair, I can't tell you how much it pains me to submit anything that may refute what Mr. Huffman said. But I just want to ask unanimous consent to submit a report, a July 2019 report by EIA that demonstrates in 2019 that they are expecting emissions to have a net reduction of 2.2 percent, which I believe would be lower than the majority of years during the Obama administration.

Ms. CASTOR. Just a question. Is this in the electricity generation sector, or does it include the transportation sector?

Mr. GRAVES. Yeah. That is energy-related CO2 emissions.

Ms. GRAVES. So it is coal, natural gas, petroleum. So this is likely in the electric power sector, not the transportation sector? Or is it all sectors?

Mr. GRAVES. This is energy-related. It is my understanding that it is tied back to all sectors that use those fuels.

Mr. HUFFMAN. You beat me to it, Madam Chair. I think, if allowed enough time, I could track down another unanimous consent to show 2019 emissions are rising.

Mr. GRAVES. Bring it. Bring it.

Ms. CASTOR. Thank you all very much.

Without objection.

[The information follows:]

Submission for the Record

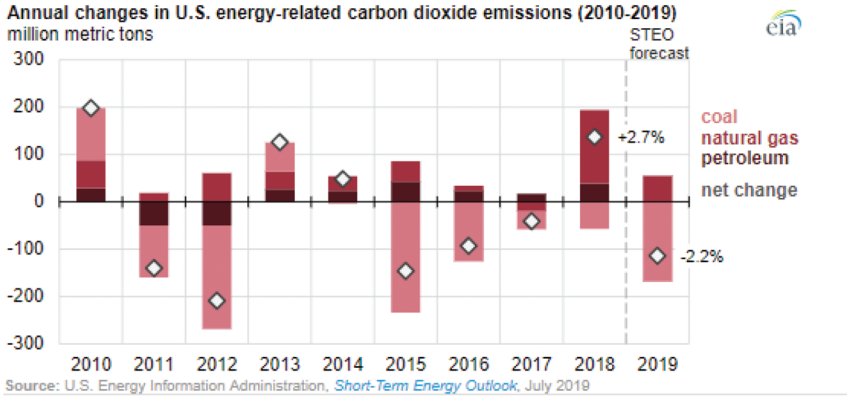
Representative Garret Graves

Select Committee on the Climate Crisis

July 16, 2019

JULY 15, 2019

EIA expects U.S. energy-related CO2 emissions to fall in 2019



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, July 2019

After a 2.7% increase in U.S. energy-related carbon dioxide (CO2) emissions in 2018, EIA's July *Short-Term Energy Outlook* (STEO) forecasts a 2.2% decrease in CO2 emissions for 2019. Nearly all of the forecast decrease is due to fewer emissions from coal consumption. Forecast natural gas CO2 emissions increase and petroleum CO2 emissions remain virtually unchanged.

Submission for the Record

Representative Jared Huffman

Select Committee on the Climate Crisis

July 16, 2019

ATTACHMENT: Storrow, Benjamin. "2019 Power-Sector Trends Point to a Continued Rise in U.S. Emissions." *E&E News*, 3 June 2019.

The article is retained in the committee files and available at:
https://www.scientificamerican.com/article/2019-power-sector-trends-point-to-a-continued-rise-in-u-s-emissions/

Ms. CASTOR. And, Mr. Griffith, you are recognized for 5 minutes.

Mr. GRIFFITH. Thank you, Madam Chair. Let me apologize to you and the other members of the committee and to our witnesses. I have been off in a hearing where we are working on fentanyl and trying to keep it from coming into the U.S.

So I apologize, but it is not that I have been out doing fun things. I have been working hard for the people of the United States.

Mr. Satterthwaite, Cummins is a leader in the ultra-low-emission natural gas engines. How do these natural gas engines help reduce carbon emissions in the heavy-duty transportation world?

Mr. SATTERTHWAITE. Thank you for the question, Mr. Congressman.

As I mentioned in my testimony, our latest low-emissions natural gas engine is actually achieving emissions levels which are 90 percent below the EPA and CARB heavy-duty diesel standards.

Natural gas usage is primarily limited to return-to-base fleets—city buses, refuse trucks, other fleets that are on a regular return to home bases—because of the challenges with natural gas infrastructure. There is just not enough fueling infrastructure to allow natural gas to extend into the long-haul, over-the-road trucks.

What we have been able to reduce in the natural gas engines is significant. On a horsepower-for-horsepower basis, natural gas is somewhere between 30-percent lower greenhouse gas generation than diesel for the same amount of work done. And so those engines have made a significant difference in the communities they have been in. Most of them are in urban areas and with municipal fleets. And so that has made a significant difference, we believe, in those communities.

Mr. GRIFFITH. I support an all-of-the-above approach, but I have expressed concerns in the past about electric vehicles and that I think maybe government policy has tipped the scales and we haven't researched enough on other fuels, which is why I ask about natural gas, because I am very interested in that.

So then the question becomes, on electric trucks—and I know a lot of companies, including Volvo, which its North American headquarters is in my district, is working on an electric truck. Don't we currently have the same problem with over-the-road trucking—that we would have with electric trucks as we would with natural gas?

Mr. SATTERTHWAITE. I think if you say the same problem, you mean the lack of infrastructure?

Mr. GRIFFITH. I mean the lack of infrastructure, and where are you going to refuel?

Mr. SATTERTHWAITE. Without a doubt. That is a significant impediment to the adoption of battery-electric technology in the over-the-road, long-haul, heavy-duty trucking. Definitely.

We also believe there are weight or energy-density challenges and also price and cost challenges which have yet to be overcome.

Mr. GRIFFITH. All right. Tell me what those are.

Mr. SATTERTHWAITE. So, currently, if you want to engineer a truck with the same power and the same range as today's diesel or natural gas technology, it will weigh approximately three times as much as today's cab because of the weight of batteries needed for the power and the energy.

Mr. GRIFFITH. Wow.

Mr. SATTERTHWAITE. So that is one challenge.

Mr. GRIFFITH. And so that challenge then creates a challenge for the various States and localities that are trying to keep their roads repaired, because that extra weight adds to road wear, does it not?

Mr. SATTERTHWAITE. That would be a consequence of that.

Mr. GRIFFITH. And since most of our taxes currently are based on taxing the diesel to get road money, wouldn't that also then create a problem for the local governments and the State governments for having enough funds to repair the roads as a result of that extra weight?

Mr. SATTERTHWAITE. That could definitely happen as well, yes.

Mr. GRIFFITH. All right.

Well, I do think that we need to increase our infrastructure both for natural gas and to make sure that we have refueling for electric as we move into this direction. As I said, I am all of the above, I am open to it, but we have to solve these problems on both road maintenance and on refueling.

Because for a lot of the truckers in my area, driving up and down Interstate 81, just in the State of Virginia, you have 328 miles. If you can't drive that far on a tank and there is no place to refuel when you get to the end of the line, you are not going to use that technology, no matter how efficient it might be and how much it might do for the environment.

I appreciate it very much and appreciate you all being here today.

And, with that, Madam Chair, I yield back.

Ms. CASTOR. Thank you very much.

So I recognize myself for 5 minutes for questions.

I am so glad that we got to this topic, because I think there are exciting opportunities ahead. We have the climate solutions. We know how to do this. We know how to unleash American ingenuity. We must find cleaner and carbon-free solutions for how we move people and goods across America and across the globe.

And families and consumers will benefit greatly. Lower costs—let's talk about a few of them. And by the way, this isn't decades away. This is now. For families and communities, when we talk about reducing carbon pollution, we talk about better health. Communities and families will be healthier, and that will help save money. Transportation-related businesses have a whole lot to gain when fuel costs come down dramatically.

This is going to be a revolution that we live through over the coming years, if the Congress has the courage to act and put the incentives where they need to be put.

Just look at what fuel economy has done on the passenger-car side. For decades, every time the Congress has pushed automobile manufacturers to do better, they have met the challenge. But we are at risk right now of ceding that leadership to other countries, like China.

Plus, we can create good, family-sustaining jobs as we build this clean-energy economy—yes, in rural areas. And we need to talk about the areas across the country that need those investments.

Ms. Romero, talk to us about what the costs would be if we just stuck with the status quo.

Ms. ROMERO. Yeah, I mean, we are talking about the decimation of communities across the country.

And, honestly, even looking at having less than 11 years or less than 10 years until the next level of global catastrophe isn't enough. We are looking at low-income communities and communities of color today surrounded by busy freeways and highways, surrounded by pollution, where asthma and other pollution-related illness is impacting their ability to do anything.

And so the consequences are grave, they are human, and——

Ms. CASTOR. And you say: Gosh, start with school buses.

Ms. ROMERO. And start with school buses. Why not? I mean, we need a lot more than that, obviously, in a comprehensive approach, a massive mobilization of resources, but why not——

Ms. CASTOR. But that is an area where we could get co-benefits there by reducing the costs for school districts. Maybe they can plow some of those fuel costs back into the classroom. And, plus, kids will be having a healthier ride to school.

Ms. ROMERO. And we will raise the whole next generation to understand the new technology and be the leaders for the next future decades.

Ms. CASTOR. Mr. Logan, what do you see are the costs of the status quo?

Mr. LOGAN. In the same way, with children across the country. There are communities in and around ports that are bearing the brunt of the health consequences in the multiple billions of dollars in healthcare costs.

And so there is both the health cost, but there is also the lost days of work, and there is also the low productivity of many different sectors. I mentioned earlier agriculture but also within the manufacturing as well.

And, you know, if we don't, you know, resolve this issue, we are not going to have goods to move. We won't be having this conversation because we won't need to move things. We won't have things to move.

Ms. CASTOR. Mr. Popple, I think Proterra really tells an important story.

You are currently building these electric buses in South Carolina and in California. What other parts of the country do you think can support these manufacturing jobs as we move forward?

And I just know, we are going to invest a whole lot more. It just makes too much sense for local communities back home.

So what do you see? What does the future hold? Can we go into rural areas and areas that need a little bit of economic development for these clean-energy jobs?

Mr. POPPLE. Absolutely. Especially, Congresswoman, if we focus on early-adopter categories like transit and school bus. Transit, in particular, has a Buy America requirement, which means 70 percent or more of the supply chain has to come from domestic sources.

So, if you look at our product, it is not a product that just benefits California and South Carolina. Charging stations, for us, are built in Michigan. Electric motors are built in Colorado. Our composite bodies are built in Iowa and Rhode Island.

So there is a national supply chain that can be set up on the vehicle side and on installing the infrastructure. And all of that infrastructure, that is local, so that is a local job to that community.

Ms. CASTOR. And you said we are at risk right now to ceding leadership in the world to China and other countries. Is that right?

Mr. POPPLE. Absolutely, Congresswoman. And I think what is at risk is, if we become less productive at moving goods and people than other global countries or other global economies, they will have a profound economic advantage, just like if we were stuck with propeller planes and the rest of the world moved to jets.

Ms. CASTOR. Well, I want to thank you all very much.

I want to thank the minority and Mr. Graves and my colleagues for a terrific discussion.

We are going to continue the focus on the transportation sector moving forward. To use Ms. Romero's analogy, we should celebrate the U.S.'s ability to reduce carbon and air pollution, but the game is still on. We need to keep our hustle to achieve the type of reduction science shows we need to achieve to avoid it being "game over" for our children and future generations. That is what this committee's work is all about.

As we heard in our second hearing from Dr. Liverman, every ton of CO2 we keep from going up in the atmosphere is important, because every increase in temperature counts to the health of people and the planet.

So thank you again for being here today. Thank you again, colleagues.

The committee is adjourned.

[Whereupon, at 11:58 a.m., the committee was adjourned.]

United States House of Representatives, Select Committee on the Climate Crisis

Hearing on July 16, 2019, "Solving the Climate Crisis: Cleaning Up Heavy Duty Vehicles, Protecting Communities"

Questions for the Record

Angelo Logan, Campaign Director, Moving Forward Network

THE HONORABLE KATHY CASTOR

1. Deploying zero-emission heavy-duty vehicles will require capital investment. These costs are easy to identify, while the costs of the status quo are less well-understood. How would you describe the costs of the status quo in terms of the public health impacts of pollution from legacy vehicles and the impacts of climate change to frontline communities?

Although the economic impacts associated with heavy duty freight transportation on public health is less available at the National level, the State of California has conducted several studies on this very topic. I draw from California's studies as examples of the cost of the status quo in terms of the public health impacts of pollution from legacy heavy-duty freight vehicles and the impacts to public health and climate change to frontline communities.

In 2005 California Air Resources Board (CARB) estimated that freight transportation is responsible for 360,000 missed workdays and 1,100,000 missed days of school with 2,830 hospital admissions and 2,400 premature deaths. Between 2005–2020 it is estimated that heavy-duty freight transportation cost California residents $200 billion in health costs.

The freight system relies predominately on diesel-powered equipment, which produces diesel exhaust made up of toxins and climate pollutants. Diesel exhaust creates CO_2, a major greenhouse gas. Freight transport worldwide contributes approximately 3 billion tons of CO_2. Black carbon is also a result of diesel exhaust. Black carbon is a fine particulate matter and short-lived climate pollutant that has very high global warming potential—some estimate over 600 times higher than CO_2. The freight transportation sector accounts for roughly 9% of U.S. greenhouse gas emissions and in the next couple of decades, it is expected that ocean going vessels alone will account for about 17% of all man-made carbon dioxide emissions worldwide.

The people hit first and worst from the climate crisis and freight transport are the over 13 million people that live near major marine ports, rail yards, and freight facilities. These communities are disproportionately low-income communities of color and have increased health risks from climate change impacts and the toxic diesel pollution that is concentrated at high levels around freight hubs. The sources of this diesel pollution are heavy-duty trucks, trains, ships, and cargo handling equipment. Diesel exhaust is estimated to contain over 450 chemicals; many are known toxins linked to early death, respiratory problems, heart attacks, and reduced birth weight

and premature birth. Children have higher rates of exposure to air pollution and are at higher risk of health impacts.

Affected by freight transportation, African Americans are a high-risk population that is 3 times their proportion of the U.S. population and Latinos made up two times their proportion. All this to say, freight transport poses a huge climate crisis for the planet and for the local environmental justice communities that have been dealing with the impacts of the air pollution that is causing the climate crisis.

2. We understand that the Moving Forward Network has dozens of members around the country. Could you please highlight some of their priorities for cleaning up goods movement?

The Moving Forward Network (MFN) is a national coalition of over 50 member organizations including community-based environmental justice organizations, national environmental organizations, and academic institutions, in over 20 major U.S. cities, representing over 2 million members, committed to reducing the public health harms created by our country's freight transportation system. Importantly, MFN members include individuals who work and live in freight-impacted communities.

The MFN priorities are as follows:

- Protect the Clean Air Act and the National Environmental Policy Act throughout all legislative actions. Congress must oppose all provisions to any Infrastructure Bill or Surface Transportation Reauthorization Bill that would endanger public health by weakening the Clean Air Act and/or the National Environmental Policy Act.
- Congress must develop and adopt policy principles for climate legislation that advance climate justice, environmental justice, communities' self-determination and local solutions. Frontline communities have the real expertise and true solutions that will solve the climate crisis. Therefore, the process for developing any solution or strategy is paramount.
- Congress must provide EPA with the tools and resources needed to meet its mission and play a role in solving the climate crisis. Congress must appropriate a substantial increase of funds to the EPA, both DERA and the Environmental Justice grants program. The Environmental Justice Grants programs support communities working on solutions to environmental and public health issues. The Diesel Emissions Reduction Act (DERA) authorizes grants to eligible entities for projects that reduce emissions from existing diesel engines. EPA must develop a more targeted strategy for awarding these funds. Funds for demonstration projects should target zero-emission technologies.
- Congress should hold EPA accountable to meeting its mission and legal requirements under the Clean Air Act. EPA must adopt regulations to reduce and eliminate emissions from the freight sector. EPA must identify reducing freight-related air pollution as a top priority for the Agency. Tackling such pollution will further the Agency's air quality, climate and environmental justice goals. EPA must adopt new national standards for freight-related sources and provide more guidance to states with freight-related activities in areas that violate national air quality standards and/or produce localized health risks with the goal of deploying zero-emission technologies.

3. California's Gross State Product is more than $3 trillion. If it were a sovereign nation, it would have the 5th largest economy in the world. For those that suggest that decarbonization requires sacrificing economic growth, how would you respond?

In response to suggestions that decarbonization of the freight sector requires sacrificing economic growth, I only respond with the mayor of Los Angeles' quote related to the joint ports of LA and Long Beach, the country's largest port complex; "The Ports of Los Angeles and Long Beach are driving forces of our region's economy—they should also be models for how we move toward a more sustainable future by balancing growth and environmental stewardship," said Los Angeles Mayor Eric Garcetti. "The draft Clean Air Action Plan is an important step in our work to reduce air pollution in our communities, and take action on climate change." "We have already proven that it's possible to increase jobs and trade with cleaner air and healthier communities and I want to thank all of our partners who helped make this possible." The Mayor of Los Angeles is referring to jobs, trade and growth as economic growth and prosperity. To answer the question, the nations largest complex is decarbonizing by way of the "Clean Air Action Plan" without sacrificing economic growth.

THE HONORABLE GARRET GRAVES

1. In your testimony you talk about the Clean Air Act and holding EPA accountable to meets its legal obligations under the Clean Air Act. Do you

agree that the federal government should hold those with compliance obligations under the Clean Air Act accountable as well? Should there be severe penalties for states that has areas habitually out of compliance?

As of today, there are more than 30 counties in California that are out of compliance with not just one, but MULTIPLE federal air quality standards in the Clean Air Act. Reducing criteria pollutants (National Ambient Air Quality Standards) would almost certainly translate into greenhouse gas reductions as a co-benefit. Do any of you know what the reduction in greenhouse gas emissions would be if all of California simply complied with the Clean Air Act? Do you know how many fewer California deaths there would be if California were in full compliance?

The Clean Air Act is a United States federal law that should be upheld by the federal government in the same regard as any other federal law that is intended to protect the public's health and safety. Under the Clean Air Act the EPA is charged with compliance and enforcement of the law. As part of my testimony, I recommended to the committee that Congress doμeverything in your power to hold EPA accountable to this charge—requiring, to the full extent of its authority, that EPA take action to address pollution. Also, Congress should hold regular hearings on the progress of EPA in meeting its legalμrequirements under the Clean Air Act, which includes requiring states to comply with federal air quality standards.

I agree that reducing criteria pollutants and meeting the National Ambient Air Quality Standards would translate into greenhouse gas reductions as a co-benefit. The fact that 30 counties in California are out of compliance with multiple federal air quality standards means significant greenhouse gas emissions and associated negative health impacts such as prematureμdeaths, and demonstrates the need to hold EPA accountable to meeting its mission and legal requirements under the Clean Air Act. Specifically, EPA should be adopting mobile source and other regulations that reduce and eliminate criteria and climate pollutants. In addition EPA should grant California the ability to adoptμstandards beyond EPA's, not limit California's ability to adopt standards that would allow them to meet the National Ambient Air Quality Standards. In other words, EPA should require California to achieve compliance with air quality standards, not hinder the State.

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Graves Q1

- 42 U.S.C. section 7401(a)(4)
- 42 U.S.C. section 7410(k)(5)

Questions for the Record

Michelle Romero, National Director, Green for All

THE HONORABLE KATHY CASTOR

1. In your testimony, you referenced examples of inclusive financing programs that helped low-income customers have access to energy efficiency upgrades to buildings. Could you please provide additional detail about these programs and explain how a similar model could be applied to public school transportation? What policies should Congress adopt to promote broader use of inclusive financing?

There are a number of inclusive financing programs that have been deployed to help address the upfront cost barriers for building energy efficiency upgrades.

In 2009, Green For All was proud to be a part of a program with the city of Portland, Oregon. Like many communities across the country, residents in Portland were experiencing the effects of the Great Recession, and needed a way to preserve jobs, create jobs, and spur economic growth. The city found a way by launching an inclusive financing pilot project to provide deep home energy efficiency retrofits for residents. The project was developed with Clean Energy Works Oregon, a nonprofit now known as Enhabit.[1]

Leveraging public dollars to attract outside investment, Portland established a self-sustaining revolving loan fund to offer low-interest financing for residents to overcome the upfront cost barriers for deep home energy efficiency retrofits. The program provided residents with an Energy Advocate to asses their homes needs, along with the low-interest financing that would allow residents to pay back the loan from their bill savings through a charge on their utility bill, known as on-bill financing. In addition, Green For All worked with Portland to facilitate a community worker agreement for the program to achieve triple-bottom line results by requiring the jobs to be prevailing-wage jobs, setting goals for local and targeted hiring, and contracting with women and minority-owned businesses. The initial pilot was so successful, Portland was able to attract $20 million from the federal government to expand the program.

Learn more about Portland's financing program design in our report: https://www.greenforall.org/clean_Kenergy_works_portland_report (2009).

Find a summary of Portland's high-road jobs outcomes from the project here: https://www.greenforall.org/high_road_outcomes_in_portland_s_energy_efficiency_upgrade_pilot (2011)

Green For All collaborated with the National Housing Trust to create a guide to On-Bill Programs that Advance Multi-family Energy Efficiency, which is available here: https://www.greenforall.org/on_bill_programs_that_advance_multifamily_ energy_efficiency (2013)

This report highlights four case studies on multi-family energy efficiency programs: PSE&G New Jersey Multifamily Program, MPower Oregon, Windsor Efficiency PAYS, and MidWest Energy HowSmart® Kansas.

Green For All offers a Best Practices Guide for High Road Agreements here: https://www.greenforall.org/high_road_agreements_a_best_practice_brief_by_green_for_all (2012).

Pay As You Save (PAYS) is another program model to help address barriers that can prevent low-income populations from accessing clean energy solutions. The PAYS model utilizes a tariff-based method; customers select their improvements through their utilities, and pay for their improvements over time. Until the investment is recovered, the tariff for the PAYS charge applies automatically to any future customers at that site. The PAYS model supports widespread adoption even in market segments that are hard to reach, such as renters, low and moderate-income households, multifamily buildings and municipal customers. For instance, this model eliminates debt-based disqualification. The debt-free PAYS model has yielded average energy savings of 25% and has been adopted by utilities in Kansas, Kentucky, North Carolina, New Hampshire, Hawaii, California and Arkansas. Learn more about the PAYS program by Roanoke Electric in North Carolina here.[2] (page 14–16).

If applied to public school transportation, similar models of local lending and tariff-based payments could enable districts to invest in making the switch from diesel to electric buses. Like energy efficiency upgrades for buildings or solar panel instal-

[1] https://enhabit.org/programs/clean-energy-works/

[2] https://d3n8a8pro7vhmx.cloudfront.net/greenforall/pages/7020/attachments/original/1464933284/TOOLKIT_1_-_Fair_and_Just_Investments.pdf

lation, electric buses have a higher upfront cost, which can be a barrier for many schools. But because electric buses are so much cheaper to fuel and maintain, an inclusive financing approach to remove the upfront cost barrier and allow the school to pay back a loan out of their savings would make it much more feasible for more schools to adopt electric buses. Other federal policies that would assist in broadening the scope of electric buses include matching programs, and interest-free government-funded loans that prioritize low-income and minority-serving schools and districts.

2. California's Gross State Product is over $3 trillion. If it were a sovereign nation, it would have the 5th largest economy in the world. For those that suggest that decarbonization requires sacrificing economic growth, how would you respond?

Civil rights leader Van Jones said in a 2018 statement, "Everything that's good for the planet is a job. It's a contract. It's a business opportunity. Solar panels don't put themselves up. Wind turbines don't manufacture themselves. Organic gardens don't make themselves. Every single thing that we need to make the Earth whole is also work that can make our society whole."

Protecting our environment and building our economy are not at odds. Decarbonization involves engaging people across sectors of society, from architects to farmers to truck-drivers. Within these fields, decarbonization allows opportunities for educational, professional, and economic progress, and these jobs can provide steady income, job security, and significant benefits for workers. For example, the transition to clean and renewable energy has created so many jobs that solar panel installers and wind turbine technicians are now at the top of the United States' list of fastest-growing jobs, and continue to grow in popularity, need, and compensation.[3]

Republican and former Governor of California Arnold Schwarzenegger said on The Van Jones Show last year, "The fact of the matter is in California we have a 4.3% economic growth and the nationwide growth is only 1.3%[...] How is that possible when we have the strictest environmental laws in the United States? So we have already proven you can do both—you can protect the environment and protect the economy at the same time. It's that simple." Watch the segment here: https://www.youtube.com/watch?v=D3xpPyai8zo It is worth noting California has dedicated a significant portion of its climate investment dollars to programs and projects that benefit the state's most disadvantaged communities. A minimum of 35% of the state's cap and trade dollars, for instance, are required to be spent in disadvantaged communities or to benefit disadvantaged communities. In practice, the state regularly invests more than half of its climate dollars to benefit disadvantaged communities. This matters not only from a moral perspective, but from an economic perspective too.

When new technologies and businesses come to market, their products and services are generally more limited in quantity during the early stages. This can keep prices high, making them affordable only to "early adopters" or people with the means and readiness to adopt them.

As green businesses pick up market share and have more capital to invest in improving technology, purchasing materials in larger quantities, and so forth, prices can drop and put them within reach of lower and moderate income consumers. The green economy is not immune to these realities. Electric vehicles and solar panels were more expensive at first, and are gradually becoming more affordable. Government incentives and subsidies in the right places can help spur the kind of growth needed to put the green economy within reach of more Americans. Targeted investments in bringing clean technology to harder to reach markets, and making them affordable for lower-income consumers has not only been a way to ensure the green economy does not leave anyone behind in California, it has been a way to bolster green business growth and clean technology advancement, which I would argue, has helped California's economy continue to prosper.

It is also important to recognize that California is not the only state proving you can have strong environmental policies and a strong economy. In Lancaster, Pennsylvania—a city that developed its first clean energy goals in 2011—the city's clean energy infrastructure provided a cost-effective approach to stormwater management that saved the city about $2.8 million in energy, air-quality, and climate-related benefits.[4] There are multiple benefits to protecting our environment and transitioning to a clean economy.

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[3] tps://cleantechnica.com/2019/01/26/solar-pv-installer-wind-turbine-tech-are-fastest-growing-occupations-in-us/

[4] https://www.epa.gov/sites/production/files/2015-10/documents/cnt-lancaster-report-508_1.pdf

In California and across the country at large, smart decarbonization policy can and should move us towards a more sustainable and prosperous future for all Americans.

3. California is a national leader in the deployment of electric vehicles as well as electric buses. How do low-income communities and communities of color benefit from these policies?

Where should Congress focus its resources to provide the greatest benefit to these communities?

Low-income communities and communities of color are hit first and worst by pollution. In the transportation context, decades of discriminatory land use and urban planning decisions have created a situation where communities of color are more likely to live near busy roads, freeways and highways, ports, and other major sources of tailpipe emissions. And the cumulative impacts of these conditions put them at greater risk of asthma, cancer, and pollution-related disease. These communities have much to gain from investments in low-carbon transportation and mobility options, and the transition to zero-emission vehicles; It directly impacts their health and lives.

California has made big commitments like putting 5 million electric vehicles on the road by 2030[5] and transitioning to 100% zero-emission bus fleets by 2040,[6] which have made the state a national leader in the deployment of electric vehicles. One might think that because communities of color are disproportionately affected by tailpipe pollution it would mean they are natural beneficiaries of these policies but the issue requires much more attention and intention than that.

The fact is, higher income consumers can more readily afford and access EVs on their own. To expand access to EVs, California offers rebate programs to low-moderate income consumers on a sliding scale. Individuals making less than or equal to 300% of the federal poverty level are offered higher rebates. In total, a qualifying low-income individual in California could receive up to $13,500 to scrap an old emitting vehicle and replace it with the purchase of a new EV.

California also recognizes that vehicle ownership is not the right solution for everyone. In some cases, consumers can opt to receive a bus or transit voucher to scrap their old emitting vehicle if they would rather not replace it. To see a sampling of California's various incentive programs for both rural and urban areas, visit the Resource Finder at http://upliftca.org/resource-finder/.

In terms of federal policy, the federal government should conduct an analysis of existing clean vehicle tax, rebate, voucher, and incentive programs, and evaluate their impacts. How is each one structured? Who do they benefit? How can they be strengthened to direct investments to the people who actually need help accessing EVs? For wealthier individuals, EV ownership is a matter of marketing. They have the means to make the choice to buy the EV. That is not true for many Americans, and the federal government should be focusing its resources on creating the conditions that would enable them to make those choices, too. Moreover, policies and incentive programs should be structured in such a way as to meet the needs of lower and moderate-income consumers. For instance, a tax credit that gives a taxpayer a $2,500 credit or rebate only after they file their taxes, does nothing to help people who cannot afford the sticker price of an EV. We also know that lower-income Americans do not typically purchase new vehicles, and while there has not been much of a used EV market to-date, that is changing, and incentives should support the purchase of both new and used EVs.

Another issue to consider is how to prioritize zero-emission technology investments compared to other types of "cleaner" but still dirty fuels. While we recognize EV technology may not be ready for mass deployment in all transportation scenarios, wherever zero-emission options are available, they should be given priority over alternative fuel vehicles. For instance, electric school buses and transit buses are viable and available today. Therefore, the federal government should no longer be investing in diesel, natural gas, or other forms of "cleaner" but still dirty buses. The purpose of the public's limited dollars should be to spur new economic growth and provide investments in cutting-edge technology that will keep the United States competitive while solving our greatest societal challenges. In the bus scenario in particular, the cost of buses is so great that agencies expect to get the full life-cycle use out of them. That means, these buses will be in existence for many years to come, and as they come to the end of their life and are retired, they should be replaced with the absolute best available technology on the market today, which is a zero-emission bus.

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[5] https://cleantechnica.com/2018/01/30/california-wants-5-million-zero-emissions-cars-roads-2030/

[6] https://ww2.arb.ca.gov/news/california-transitioning-all-electric-public-bus-fleet-2040

Finally, we have seen public transportation infrastructure deprioritized all across the country, in favor of freeway widening projects that only keep more cars on the road. As a result, there are low-income communities locked out of economic opportunities, education, and healthcare because they lack reliable bus service and transportation options where they live. In some neighborhoods, including in Oakland, CA, there is not adequate bus service to meet the demand. This results in a situation where it is commonplace that a bus becomes full by the time it reaches your stop, and needs to skip your stop. You are then left at the bus stop stranded and unable to get to work on time. You may even lose your job if it occurs too regularly, and these are circumstances beyond your control. There are rural communities where it can take 8 hours round trip on multiple buses just to get a child to the nearest hospital. These are not conditions that can be remedied by continuing to favor individual vehicle ownership and the idea that American households should have 2 and 3 cars each in our policymaking. We need to look at transportation systems comprehensively and design systems where people—not only goods—can get to where they need to go with ease, efficiency, and affordability.

THE HONORABLE GARRET GRAVES

1. You noted in your testimony the support for the Clean School Bus Act of 2019. Do you believe this legislation better addresses this issue when compared to the EPA's Clean School Bus program?

The Clean School Bus Act of 2019 and the EPA's existing Clean School Bus Rebate Program should not be viewed as "either-or." By Clean Energy Works' estimate, it would take at least $6 billion to transition just 10 percent of the nation's school bus fleet. There is no way for cash-strapped schools to be able to make this transition without funding and financing to overcome the upfront cost barriers of buying electric. More funding—not less—is needed. And our children deserve it. Children are an especially vulnerable population when it comes to exposure to toxic tailpipe emissions. The Clean School Bus Act of 2009 is meant to augment and complement other programs and available funds to help schools in making the transition to zero-emission electric buses that give kids a cleaner, safer ride to school.

The Clean School Bus Act of 2019 would provide grants of up to $2 million to local governments to invest exclusively in electric buses and charging infrastructure, and to train their workers to operate and maintain the electric buses. Importantly, it gives funding priority to schools that serve low-income populations, and would authorize a total of $1 billion dollars over 5 years for a Clean School-bus Grant Program run by the U.S. Department of Energy.[7]

The EPA's program commits $9.3 million in rebates to replace older diesel-powered school buses with newer, cleaner buses—not necessarily electric or zero-emission buses. It also funds retrofits for existing buses in accordance with the Diesel Emission Reduction Act (DERA) of 2010. The program's focus is on reducing children's exposure to toxic emissions from school buses, and was designed with 2010 conditions in mind. There has been significant technological advancement since the DERA of 2010. Today, technology has moved beyond lower-emission buses to now having fully zero-emission buses on the market that can travel more than 150 miles on a single charge. Given this, the federal government should consider amending EPA's existing program to refocus bus replacement dollars on replacing older buses with electric. Why expose kids to dangerous levels of emissions if we don't have to?

School buses are expensive, and schools expect to get the full life-cycle value out of the bus, which can be 10–12 years. That means, buying "cleaner" diesel buses today locks children into having to breathe toxic emissions for a full decade. Today, better technology exists. Zero-emission electric buses are ready for deployment and are serving schools in many different parts of the country now. Federal dollars and grant programs to replace older, retiring buses should go toward zero-emission electric bus technology.

The EPA's current program goes beyond bus replacement, and provides funding for retrofits, as well. Until all dirty buses reach their retirement age and can be replaced with clean zero-emission buses, a process that could take a decade or more to complete, the EPA should continue to fund school bus retrofits that will reduce children's exposure to emissions.

Children's health must be a top-priority. Both the Clean School Bus Act of 2019 and the EPA's Clean School Bus Rebate Program are critical programs for reducing harmful exposure to tailpipe emissions and curbing climate risk.

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[7] https://scipol.org/track/clean-school-bus-act

2. In your testimony, you say there are an estimated 150 million Americans living in neighborhoods that don't meet federal air quality standards. Do you know how many of them are in California?

According to the American Lung Association's State of the Air report, California is home to seven of the top 10 "Smoggiest Cities" in the United States.[8] It is estimated that 90% of Californians live in counties with unhealthy air.[9] With an estimated population of 39.56 million (2018), that would mean California is home to about 35.6 million Americans living in low-quality air conditions or approximately 23.5% of all Americans who are experiencing similar conditions.

California has a population of over 39 million, a warm climate that helps form pollutants, and a topography that traps pollution, which creates unique challenges for the state in tackling air pollution. These challenges have been recognized by the federal government and are a key reason why California is given a special waiver to set higher vehicle emissions standards that the federal standards. Other factors contribute to the problem, such as rising housing prices which push people to live further and further away from where they work, and result in an increase in the overall vehicle miles travelled. While the state has enacted numerous policies to reduce emissions, it still has more work to do.

Approximately 76.5% of Americans living in poor air quality areas live outside of California. Cities that made the top 10 "Sootiest Cities'" list include: Fair Banks, AK; Pittsburgh, PA; four cities in Ohio; and Weirton, West Virginia.[10]

3. Your program exists to lift people out of poverty, according to your testimony. How will changes in the heavy-duty transportation industry affect the low-income neighborhoods from an economic standpoint?

First, we aim to reduce transportation costs for low-income households and expand mobility access. Lower-income earners spend a higher percentage of their incomes on basic necessities like energy and transportation, while low-income communities can oftentimes be locked out of economic opportunities due to inadequate transportation and mobility access. By investing not only in clean transportation solutions like electric vehicles, but also improved and expanded public transit service, transit-oriented affordable housing development, electric vanpools and rideshare programs for rural communities, and other solutions that help people reach jobs, education, and healthcare more efficiently and affordably, we can reduce the cost of living and improve quality of life.

Second, we aim to leverage job creation to put the people who most need work, to work doing the job that most needs done: building a more sustainable future.

Shifting the transportation industry from dirty diesel to electric vehicles shifts the job market, as well. It is estimated the industry will require 40 million installed chargers across the United States, Europe, and China.[11] As electric vehicles become more widespread, technicians will be needed across the country to install and support these technologies. If we look to the spike in solar panel installers and wind turbine technicians as an example, we can see how clean technology can energize our economy and provide new, well-paying, and cutting-edge jobs to the people who need them most. The federal government can help ensure this by tying federal funds to fair labor and workforce standards such as paying a prevailing wage, local and targeted hiring, contracting with women, minority, and veteran-owned businesses, requiring entities receiving public dollars to be union neutral, and more. Senator Gillibrand's Build Local Hire Local Act of 2019 is an excellent example of how this could be done.

While the automobile industry will face some disruptions in its traditional forms of production, the electric car industry doesn't eliminate the industry and the need for automobile technicians.[12] Rather, it opens up the market for potentially higher-paying jobs, like engineering autonomous technology, and hardware and software engineers. This will require a shift in our job training and workforce development programs to include creating job training pathways and pipelines for low-opportunity youth, women, minorities, veterans, and other vulnerable populations to access these new jobs.

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[8] https://www.usatoday.com/story/news/nation/2019/04/24/air-pollution-smog-soot-worst-california/3551734002/

[9] https://www2.calstate.edu/csu-system/news/Pages/California-Named-State-with-the-Worst-Air-Quality-Again.aspx

[10] https://www.usatoday.com/story/news/nation/2019/04/24/air-pollution-smog-soot-worst-california/3551734002/

[11] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/charging-ahead-electric-vehicle-infrastructure-demand

[12] https://evadoption.com/15-shifts-how-the-transition-to-electric-vehicles-will-transform-industries-jobs-and-the-environment/

4. Are you aware of the attached "The 200" lawsuit in California?[13] Without the need to comment directly on the lawsuit, what are you doing to ensure that energy, environment and climate policies in California are not creating an undue burden on those who are already struggling economically?

California utilizes a variety of tools and policies to identify its most vulnerable and disproportionately impacted populations, dedicate and direct resources to benefit those communities, routinely evaluate and measure program success, and maintain a transparent process by which the public can view results.

For example, CalEnviroScreen is a mapping tool the state uses which looks at cumulative impacts to identify the most "disadvantaged" populations. The tool includes environmental indicators like air quality and toxic exposure, health indicators such as asthma and cancer rates, vulnerable population factors such as children and senior populations, income and poverty indicators, and other risk factors that would illustrate where there are disproportionate pollution burdens and people who lack the means to address the issues on their own.[14] The tool both identifies where heavy sources of pollution are found, as well as where the people who are most susceptible to the effects live.

Policymakers use the tool to make informed climate and clean energy investment decisions. Senate Bill 535 (2012) required a portion of California's cap and trade dollars go to benefit the most disadvantaged communities, and today the state spends more than 50% of the funds on programs that benefit these communities.[15]

It is worth noting that equity has become such a key priority for the state that it uses a variety of metrics for evaluating the success of its climate programs;[16] Whereas most programs would measure greenhouse gas reduction levels as the sole measure of success, California considers co-benefits and impacts such as preventing displacement, engaging the community, and workforce development and job creation.

If the federal government were to adopt a national carbon pricing program, which could provide significant funding for many clean energy solutions, it should adopt many of the criteria described above that would ensure dollars are deployed to create fair and inclusive access to and participation in the clean economy. You will find Green For All's two-pager on the key principles of effective and equitable carbon pricing policy here.[17]

Additionally, Congress should consider developing a system for evaluating all policies, especially climate and energy policy, through an equity screen. Bills would be evaluated in terms of how well they propose to address existing disparities and whether it would be likely to widen or narrow the gap between the eco-haves and eco-have nots. A scoring rubric could be developed to assign value to different equity measures, assigning the bill an "equity score." In many ways, this would be similar to how bills are evaluated and marked up for their financial or budgetary impact.

Questions for the Record

Ryan Popple, President and CEO, Proterra Inc

THE HONORABLE KATHY CASTOR

1. In your testimony, you referenced the Advanced Technology Vehicles Manufacturing Loan Program administered by the U.S. Department of Energy. How could this loan program be amended to facilitate greater deployment of zero-emission heavy-duty vehicles?

One of the goals of the Energy Independence and Security Act of 2007, which established the Advanced Technology Vehicles Manufacturing Loan Program (ATVM), is to increase the efficiency of vehicles and improve US energy security. The loan program, however, was limited to the improvement of the use of advanced technologies in light-duty cars and components manufactured in the United States. Manufacturers of heavy-duty vehicles—such as electric public transit buses—are ineligible to apply for the low-interest loans. My understanding is that there is approximately $16B remaining in this loan program, having successfully helped companies such as Tesla, Nissan and Ford. The loans are currently limited by statute to manufacturers and suppliers of light duty vehicles, the class of vehicles that

[13] https://centerforjobs.org/ca/news/behind-the-green-curtain
[14] https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30
[15] https://ww2.arb.ca.gov/resources/documents/cci-funding-guidelines-administering-agencies
[16] https://ww2.arb.ca.gov/resources/documents/cci-methodologies
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weigh 8500 pounds or less. Congress should amend this program to allow U.S. heavy duty vehicle manufacturers, like Proterra, to apply for loans that will help them invest in R&D and accelerate product development. The amendment should expand the eligibility to include manufacturers of zero-emission heavy duty vehicles—which weigh more than 8500 pounds—for public transportation that meet certain criteria. I suggest expanding the ultra-efficient vehicle category by adding a new vehicle class. The new class of vehicles must be able to operate as a fully electric vehicle that can carry 28 passengers and pass standard energy economy tests established by the FTA's Model Bus Testing Program.

2. California's Gross State Product is over $3 trillion. If it were a sovereign nation, it would have the 5th largest economy in the world. For those that suggest that decarbonization requires sacrificing economic growth, how would you respond?

Investing in decarbonization promotes economic growth and American leadership in the global economy. Advancement and growth in the clean energy sector is critical to America's economic competitiveness and is creating good paying jobs across the country. Decarbonization in its various forms has contributed to California's significant economic growth in the form of investment, venture capital and job creation. California has demonstrated decades of job growth in the clean tech economy—experiencing more job and wage growth than the United States as whole.[1] Today, more than 500,000 Californians are working in clean energy.[2] Further, by targeting efficiency technologies like LED and electric vehicles, the US economy could create more value with less energy, providing a competitive advantage.

The reality is that encouraging innovation attracts entrepreneurs, which in turn attracts private venture capital funding, which in turn leads to job creation and generates economic growth. In 2017, California attracted $1.42B of clean technology venture capital funding.[3] And the state attracted over $22B in clean technology venture capital funding from 2007 to 2017 due to the strong ecosystem of innovation that was developed in response to semiconductor, software, energy and healthcare opportunities.[4] California's share of the clean technology global venture capital funding during this same period has ranged from 48% to 18%.[5] Proterra alone has raised over $500M in capital and created more than 575 U.S. jobs while establishing its Corporate HQ and two manufacturing facilities in CA.

Lastly, California's emissions fell 1% in 2017, to 424 million metric tons. But the state's economy grew at 3.6%, higher than the national average, demonstrating that reducing emissions does not hamper economic growth.[6] According to the California Green Innovation Index, California had greater emissions reductions (−11.1%) than the United States as a whole (−10.2%) between 2006–2016, while also achieving greater economic output.[7]

3. Deploying more electric vehicles, buses, and trucks will add significant demand to the electricity grid. What can Congress do to prepare the grid for large-scale electrification?

It is worth noting that Tesla reports deploying approximately 14,000 "super chargers" in North America of power levels ranging from 75 kW to 150 kW and, as I understand, without any stress on the overall grid. https://www.tesla.com/supercharger. Tesla has made local investments to distribution hardware (transformers and switch gear) to facilitate super charger locations in many areas, but they haven't required more power plants. The Tesla example is relevant because those "super chargers" are the approximate power level of a bus charger, meaning we have a proof point that approximately 14,000 electric buses worth of plug-in chargers has already been installed without impact to the grid. To put this into perspective, the load of the entire US public transit fleet (approximately 70,000 buses) charging at 100 kW simultaneously would be 7 gigawatts, or less than the average annual capacity increase from 2007–2017.[8]

I believe that planning for and managing demand on the grid is the primary responsibility of utility companies. Recent studies have shown that, overall, there's not a near capacity scarcity and EVs have the potential to help balance loads and improve the resiliency of our nation's electricity infrastructure.[9] That being said, it is imperative we take a collaborative approach to proactively managing grid demand as we move towards large-scale electrification. Congress can help in the following ways:

- Expand the Alternative Fuel Tax Credit (26 U.S.C. §6426(d)) to make fuel neutral by including electricity as an alternative fuel. By including electricity as an alternative fuel, Congress will level the playing field by making the credit fuel neutral, promote competition on the merits for alternative technologies and further promote conversion to alternative fuels, thereby reducing U.S. dependence on foreign oil and encouraging creativity and innovation in the marketplace.

• Expand federal funding for energy research and development, and in particular for the Department of Energy's Office of Energy Efficiency and Renewable Energy (Vehicle Technologies Office) and Advanced Research Projects Agency-Energy.
• Provide additional federal funding support for infrastructure projects that will support medium- and heavy-duty vehicle fleet deployments at the state and local levels including school bus and transit bus projects.
• Increase federal agency research on electrification, automation, and connectivity technologies and deployment strategies.
• Fund vehicle-to-grid integration and stationary battery storage demonstration projects to promote grid resiliency and smart cities demonstration projects.
• Fund research and development of battery-electric technologies and create incentives to further investment in primary battery cell development and manufacturing in the United States to support a domestic supply chain for stationary storage and vehicle applications.
• Encourage more collaboration between the Federal Energy Regulatory Commission and the state regulators (including state Public Utility Commissions and state energy offices) on electric vehicles, electric vehicle infrastructure and other emerging grid technologies to ensure better planning and coordination.
• Help cities and utilities plan so that they can identify the structural needs to support the integration of vehicles and infrastructure into city and utility operations.
• Encourage North American electric vehicle charging connection standardization by working with private standard setting organizations, such as the Society of Automotive Engineers (SAE).
• Encourage the adoption of a new Transportation Infrastructure bill that includes funding for heavy-duty electric vehicle fleets and the accompanying electric vehicle infrastructure.
• Support investment in infrastructure, storage and smart technologies that enable demand management and promote grid resiliency.
• Support or create incentives for power companies to accelerate transition of the grid from point-to-point to electric distribution as a network.

THE HONORABLE GARRET GRAVES

1. I assume you are competing against Chinese bus manufacturers. How well do you compete against them and what is your biggest concern about having to compete with them in the U.S. market? What can Congress do to help?

One of our competitors is the Chinese-manufacturer Build Your Dreams (BYD) and we compete throughout the United States for electric bus deployments for public transit agencies. Published reports show that BYD benefits from aggressive Chinese subsidy programs to lower prices in order to win business. We believe this reflects a strategy to price below market costs to eliminate competition and dominate the market in the United States and around the globe—which is the goal of Made in China 2025. To address this practice, Rep. Harley Rouda recently introduced a bill (HR 2739) that would prevent federal transit funds from being used by transit agencies to purchase rail cars or buses manufactured by Chinese owned, controlled, or subsidized companies. The same bill was introduced in the Senate by Senators Cornyn and Baldwin (S 846). Both bills were made part of the National Defense Authorization Act (NDAA) for Fiscal Year 2020. Section 6015 of the Senate NDAA retained Rouda bill language that would preclude funding for Chinese-supported rail and bus rolling stock. Unfortunately, section 896 of the House NDAA did not and limited the restriction solely to rail rolling stock. Congress should pass the Senate version in the NDAA conference report so that buses are included. A final NDAA bill that includes buses will ensure that U.S. manufacturers like Proterra and its domestic suppliers do not face unfair competition from companies that receive support from the Chinese government. Prohibiting federal transit funds from being expended on Chinese rolling stock would have the added benefit of protecting our national security and transportation and electric grid infrastructure from the threat that China poses and improving cybersecurity in public transportation.

2. What are some of the challenges of electrification for long-haul agriculture and food supply vehicles? Do you see potential concerns for farmers, the food supply chain, and to food safety, animal welfare?

The challenge for long-haul agriculture and food supply vehicles, as I see it, revolves around vehicle range and charging infrastructure deployment. Range is impacted by the use of auxiliary items like refrigeration and HVAC systems to provide humane conditions for animals being transported. Electrification in the food sector

would have to accommodate refrigeration in many applications, which will impact the range of those vehicles. Short distance food supply vehicles would require careful route analysis and planning to ensure that they were able to meet their daily routes while accommodating the energy needs for refrigeration. High power and high-speed charging could solve that problem if vehicles were able to charge mid-day. Mid-day charging could top off the batteries on longer routes. However, this raises a second challenge involving the right placement of high power, high-speed chargers for long-haul agriculture and food supply vehicles.

That being said, we see opportunities for EV technology to improve economic productivity in the agriculture sector, and to reduce emissions exposure and health care costs for workers in the agricultural economy. The bus & truck sector share many components and supply chains with the off-road commercial vehicle sector, which includes mining, construction and agricultural vehicles like tractors and harvesting equipment. In the near-term, the first opportunities for EV technology to provide benefits to the agricultural sector will be in fleet-based farm and ranch vehicles. These EVs will enable farmers to reduce their dependency on a single fuel type, and in many cases allow farming operations to self-generate much of their energy, as we increasingly see farms deploying solar and wind energy to diversify their revenue and gain more self-sufficiency. In terms of food safety and animal welfare, zero emission electric vehicles used in the agriculture sector will reduce the level of diesel pollution in crops and livestock, enabling a healthier food supply for America. In the long-term, zero emission freight trucks and trains could enable low-cost, zero emission freight shipments between major agriculture markets. Long-haul electric trucks are already being introduced by major manufacturers including Freightliner, Tesla and Volvo. Long-haul will require more infrastructure investment that may include on-road charging similar to what has been demonstrated in Northern Europe. But the near-term opportunities for farm, construction and mining electric vehicle technology offer the most immediate economic, health and environmental improvements for the agricultural sector.

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Questions for the Record

Tony Satterthwaite President—Distribution Business Cummins Inc.

THE HONORABLE KATHY CASTOR

1. In your testimony, you referenced the SuperTruck program administered by the U.S. Department of Energy. How could this program be expanded or modified to accelerate development and deployment of zero-emission heavy-duty truck technology?

The SuperTruck program administered by the U.S. Department of Energy could be expanded and modified to accelerate the development and deployment of zero-

emission heavy-duty truck technology by setting more aggressive emissions goals and expanding the resources available to meet those targets. For example, the current running SuperTruck II program sets a target of 55% improvement of Brake Thermal Efficiency (BTE) over the 2009 baseline class 8 truck. The next iteration of the program could supplement a BTE goal, which measures the efficiency of an internal combustion engine, for an emissions goal. Awarding competitive grants for truck and engine manufacturers to create teams to meet aggressive class 8 targets can help spur development and remove barriers like cost and infrastructure that exist for commercial customers. Use of the national labs, universities and commercial fleet partners can ensure access to resources and an understanding of how a customer wants to use a vehicle. By setting an emissions goal and not a technology mandate teams can try different approaches to meet these aggressive targets, like high efficiency diesel, natural gas, fuel cell and battery-electric power.

2. In your testimony, you referenced opportunities to capture landfill gas or biogas for processing into fuels for vehicles. What should Congress do to expand deployment of these technologies?

Congress can and should continue to invest in a variety of emerging technologies to help reduce the impacts of climate change. The Department of Energy and National Labs should continue to conduct research on net-zero carbon sustainable fuel choices including landfill gas or biogas as fuel. Creating consistency in the tax code around these technologies can also help industry develop long-term strategy. By supporting American innovation on a number of promising technologies, Congress can ensure US leadership on whichever option markets and customers choose to do their job.

THE HONORABLE GARRET GRAVES

1. What are some of the challenges of electrification for long-haul agriculture and food supply vehicles? Do you see potential concerns for farmers, the food supply chain, and to food safety, animal welfare?

The challenges for vehicle electrification for long-haul agriculture and food supply vehicles are the same faced in many heavy-duty applications: cost, weight and infrastructure. Currently, the cost of an electrified powertrain for a commercial vehicle is significantly more than a comparable diesel or natural gas truck. In fact, for dollar per unit of NOx reduced, just transitioning a food supply fleet to the latest diesel technology will be far more effective in reducing NOx in the air. With existing technology, battery weight on such a truck will also negatively impact the amount of freight carried, so more trucks will be needed to carry the same amount of product. Finally, there is not currently consistent and reliable charging infrastructure on long-haul routes for many customers to switch to battery electric power.

The food supply chain has additional challenges of refrigeration during transportation, currently supplied by diesel reefer units. The same challenges facing heavy-duty applications: cost weight and infrastructure, will also impact mobile refrigeration in an electrified scenario. Currently, there are no commercially-available electrified mobile refrigeration units. Heavy duty vehicles can recover some energy from braking, but refrigeration units do not have this option, making the range or time of operation of the electrified reefer a concern.

These are some of the barriers that may concern agriculture customers. We are, however, encouraged by government efforts to address the problems of cost, weight and infrastructure, and of additional low and no-emissions technology options for these markets like natural gas and fuel cell to power long-haul vehicles.

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