

CLEANER VEHICLES: GOOD FOR CONSUMERS AND PUBLIC HEALTH

Tuesday, April 18, 2023

United States Senate

Committee on Environment and Public Works

Subcommittee on Clean Air, Climate, and Nuclear Safety

Washington, D.C.

The committee, met, pursuant to notice, at 2:36 p.m. in room 406, Dirksen Senate Office Building, the Honorable Edward J. Markey [chairman of the subcommittee] presiding.

Present: Senators Markey, Ricketts, Carper, Merkley, Padilla, Capito, Cramer, Lummis, Sullivan.

STATEMENT OF THE HONORABLE EDWARD J. MARKEY, A UNITED STATES
SENATOR FROM THE STATE OF MASSACHUSETTS

Senator Markey. Good morning. I call the Subcommittee on Clean Air, Climate, and Nuclear Safety to order for this important hearing on vehicle emissions standards and clean vehicles.

Thank you to my Ranking Member, Senator Ricketts, and to the Chairman and Ranking Member of the Committee on Environment and Public Works, Senator Carper and Senator Capito, for their helpful partnership in holding this very timely hearing.

It is my pleasure to welcome my colleagues on the subcommittee, as well as our three witnesses. We appreciate your willingness to appear before our subcommittee today because, one day after Massachusetts celebrated Patriot's Day, we are here to discuss America's clean energy revolution, which is already well underway.

Last week, the Environmental Protection Agency proposed historic new rules to strengthen vehicle emissions standards for cars and for trucks. Thanks to the Bipartisan Infrastructure Law, the CHIPS and Science Act, and the Inflation Reduction Act, we can be more ambitious in our standards than ever before because we are actively building a world in which we can meet and exceed those goals.

Because of those bills, more than \$135 billion will be

invested to build America's electric vehicle future. We have unleashed incentives for clean cars and trucks while creating new American jobs in the process. We are putting billions of dollars towards new electric vehicles' charging stations, which will make clean cars an option for families across our Country.

We are making clean vehicles more affordable. We are making them more accessible, and we are making them here in the United States. Companies are racing to take part in this revolution, announcing over \$100 billion in battery investments alone.

While we build up our electric vehicle supply chain in the United States, we need roadside assistance for the remaining gas-guzzling cars and trucks on the roads to help fight climate change, save drivers money, and protect public health. That is where the EPA has to step in.

Transportation emissions make up 27 percent of total greenhouse gas emissions in the United States, more than half of which comes from light duty vehicles, and a quarter of which comes from heavy duty vehicles and trucks. Cars and trucks also produce nitrogen oxides and other toxic pollution that increases asthma and cancer rates, harming public health and disproportionately affecting Black, Brown, and indigenous communities.

To keep moving down the road to a safer, healthier, and

more affordable future, we need strong greenhouse gas emission and multi-pollutant regulation for light duty and heavy-duty vehicles, we need a foot not on the gas, but on the accelerator. Those benefits are a bonanza of benefits to our climate, to drivers, and to our health. We need to make sure they also benefit union American workers.

First, EPA's proposed rule for light duty vehicles for model year 2027 through at least 2032 would reduce carbon dioxide emissions from light duty vehicles by more than half compared to existing standards. EPA estimates that the Light and Medium Duty Rule could one, provide up to \$1.6 trillion in net benefits through the lifetime of covered vehicles, avoid 7.3 billion metric tons of carbon dioxide over 2027 to 2055, and save drivers up to \$13,000 apiece in fuel savings and maintenance costs.

Additionally, the EPA projects that 60 percent of new light duty vehicles sold by 2030 will be electric as a result of the proposed rule, overtaking President Biden's target for 50 percent of new vehicle sales to be electric by 2030.

The Light Duty Rule could be expanded upon, and I am interested to hear from our witnesses about what they recommend, but even so, it is an incredible start. The Heavy Duty Rule also makes progress and charts a new course for American industry, but we still need to make sure the Heavy Duty Rule

doesn't stall out our efforts to regulate other pollutants like smog and particulate matter from trucks and other big vehicles.

EPA projects that its Heavy Duty Rule will avoid 1.8 billion tons of carbon dioxide emissions by 2055, provide net benefits of up to 350 billion through 2055, provide 12 billion in reduced reliance on oil imports, and result in a 50 percent zero-emissions vehicle penetration rate of vocational vehicles. Strong proposed regulations are critical to driving climate progress forward, but they are more doable than ever, thanks to the billions in clean vehicles investments passed by Congress.

As our expert witnesses will explain, the clean vehicles revolution is not in our rearview mirror. It is right in front of us.

Before we hear from our witnesses, and we thank you so much for joining us today, I want to turn for an opening statement from our Ranking Member, Senator Ricketts.

[The prepared statement of Senator Markey follows:]

STATEMENT OF THE HONORABLE PETE RICKETTS, A UNITED STATES
SENATOR FROM THE STATE OF NEBRASKA

Senator Ricketts. Thank you very much, Mr. Chairman.

As we all know, last week, the EPA introduced or announced burdensome new regulations on emission requirements for American-made vehicles, including both light cars and heavy-duty trucks. These detached-from-reality requirements are going to have a disastrous impact on the well-being of American families, American drivers, and American businesses.

Rules like this tell States like mine that the EPA and Washington, D.C. doesn't care about our quality of life and doesn't understand who we are. It restricts freedom, shrugs off the higher cost of electric vehicles while families are struggling, ignores supply chain and infrastructure challenges, and disregards a better solution like American biofuels like ethanol.

This rulemaking claims to be technology-neutral while simultaneously touting on about the push towards the Administration's goal of an entirely electric vehicle America. But let us not forget the average cost of electric vehicles is around \$65,000. That is about 33 percent, or a third higher, than the average cost of a car right now. Frankly, that is more than most American households' income. In Nebraska, you are basically asking the average family to spend their entire year's

income on buying this car. This Administration wants to take Nebraska families' entire income to do that.

As far as the claims that this rule will lower carbon emissions, the increased costs will actually have the opposite impact, because when you increase the cost of the average vehicle because you are going to drive this mandate for electric vehicles, that means new and used vehicles will become more expensive, which means people are going to hold on to them longer before being able to purchase a new vehicle, and that means that you are going to have more emissions.

The EPA mandate also fails to address the many logistics challenges that come from a massive switch to EVs and what it poses. America lacks sufficient EV charging stations to cover the sharp increase in demand. President Biden's own Department of Energy map in the northern part of Nebraska shows no EV chargers on a 340-mile stretch of U.S. Highway 20 from Allen to Hay Springs. Many Nebraska communities are hundreds of miles from the nearest charging station.

I hail from the Beef State, and I can guarantee you that electric trucks are really not practical when you are hauling livestock. You can't just pull over on the side of the road to charge for two hours when you are hauling a truckload of cattle in 90-degree heat. It doesn't work that way. It is just not feasible.

In tandem with these rulemakings, President Biden has refused to support American energy production, going after traditional power plants, cancelling lease sales, and refusing to expedite permits for new construction. Instead of developing our national resources, his policies are increasing our reliance on foreign adversaries.

The American Transportation Research Institute says that full electrification of the U.S. vehicle fleet would utilize a large percentage of the Country's current electric generation capacity. Domestic long-haul trucking would use more than 10 percent of the electricity generated in our Country today, while an electric U.S. fleet would use more than 40 percent. This will cause an incredible strain on the electric grid at a time when the Biden Administration is dragging its feet on permitting generation, transmission, and storage of energy of all types.

While I am all for renewable energy production, and trust me, electric cars are cool. They have great torque, accelerate fast, that is cool stuff, this Administration is brushing over the need for reliable, baseload generation. Not to mention the fact that consumers paid 14.3 percent more for electricity last year on average than in 2021, more than double the overall 6.5 percent rise in prices. This is according to the Consumer Price Index data released at the beginning of this year.

ATRI's analysis also found that tens of millions of tons of

cobalt, graphite, lithium, and nickel will be needed to replace the existing U.S. fleet with battery electric vehicles, placing high demand on raw materials. For some materials, electrification of the U.S. vehicle fleet would require almost 35 years of the current global output.

According to the U.S. Geological Survey, the Chinese Communist Party controls around 80 percent of the world's production of rare earth elements, including elements like graphite and neodymium that are used in EVs. President Biden's own Defense Department concluded in 2021 that an overreliance on the Chinese Communist Party creates risk of disruption and politicized trade practices, yet his EPA is moving forward with a mandate that will increase this risk.

The Biden Administration has also excluded liquid fuels, which support jobs in rural communities across our Country. In Nebraska, we produce affordable, reliable, and clean-burning ethanol and biodiesel. Renewable fuels are a here and now technology proven to work in heavy duty vehicles.

Right here in D.C., for example, the garbage and recycling trucks operate on pure biodiesel, a fuel produced from waste fats and oils. Just last month, a poll showed that 70 percent of the poll responders support increasing the availability of E15 to help lower fuel prices and support energy independence. That same poll shows that responders strongly oppose government

mandates related to their vehicle purchase options.

A bipartisan coalition of farm State Senators has long worked to promote renewable fuels, a tried-and-true technology for which the infrastructure already exists today, lowers carbon footprints, and saves consumers money at the pump, all while supporting our communities in rural America.

There are many steps that we can take to support this here and now solution, and we must adopt a fair and consistent emissions model to truly compare these fuel sources apples to apples.

In short, emissions reductions technology should be consumer-driven, economically viable, and operate on a level playing field for all technologies. I am exploring options to push back on this Administration's overreach. I look forward to discussing these issues with our panel of witnesses. Thank you all for attending today.

I would also like to ask unanimous consent to submit four letters that I have here from the American Truck Dealers, Growth Energy, Renewable Fuels Nebraska, and the Renewable Fuels Association.

Senator Markey. Without objection, so ordered.

[The referenced information follows:]

Senator Ricketts. Thank you.

[The prepared statement of Senator Ricketts follows:]

Senator Markey. We thank you, Senator Ricketts.

We will now turn to our esteemed panel of witnesses. We will hear from them in this order. First, we will hear from Kathy Harris. Ms. Harris is the Senior Advocate for Clean Vehicles and Fuels for the Natural Resources Defense Council. Before that, she worked as a planner for the State of Delaware addressing policies and programs to mitigate emissions in the transportation sector.

Next, we will hear from Mr. Chris Harto. Mr. Harto is the Senior Policy Analyst on Transportation and Energy for Consumer Reports, where he leads research on electric vehicles, fuel economy, energy efficiency, and other energy issues. He has conducted 20 years of policy research experience for government agencies, national laboratories, universities, and NGOs.

Finally, we will hear from Andrew Boyle. Mr. Boyle is Co-President of Boyle Transportation based in the great Commonwealth of Massachusetts and is the first Vice-Chairman for the American Trucking Association. Mr. Boyle is a board member of the American Transportation Research Institute and a past chairman of the Trucking Association of Massachusetts. He grew up in Natick, Massachusetts, the home of Doug Flutie, amongst many other very important citizens of the history of Natick.

We thank you all so much for agreeing to join us today. Ms. Harris from the NRDC, we welcome your testimony first.

STATEMENT OF KATHY HARRIS, SENIOR ADVOCATE, CLEAN VEHICLES AND FUELS, NATURAL RESOURCE DEFENSE COUNCIL

Ms. Harris. Chairman Markey, Ranking Member Ricketts, and esteemed members of the subcommittee, thank you for the opportunity today to discuss the benefits of cleaner cars in the United States and the importance of the efforts by this body and other branches of the Federal Government in helping accelerate the transition to a clean transportation system.

My name is Kathy Harris, and I am a Senior Advocate leading the Clean Cars Portfolio at the Natural Resources Defense Council, or NRDC. NRDC is an international nonprofit of scientists, lawyers, and environmental specialists committed to improving public health, tackling the climate crisis, and creating a more affordable, clean energy future.

Zero emission cars and trucks provide the United States with an opportunity to ensure a win for public health and air quality, a win for consumers' pocketbooks and consumer choice, and a win for our economy and our global competitiveness.

The transportation sector is the largest source of greenhouse gas emissions in the United States, but is also a major contributor to nitrogen oxides, particulate matter, and other toxic pollutants. These emissions are not only detrimental to our climate and air quality, but also to human health.

The vehicle tailpipe standards announced by EPA last week will play a key role in improving air quality for communities across the Nation, especially communities that have been historically overburdened by vehicle pollution. EPA projects that their proposed standards will reduce tailpipe emissions by 56 percent by 2032 from new cars, SUVs, and pickup trucks.

These ambitious and achievable standards work by setting technology-neutral emissions levels for new cars and trucks. Based on automaker commitments and investments, increasing driver demand and the incentives from Congress, EPA projects that manufacturers will choose to reduce emissions from their fleets through increasing the number of zero emission and electric vehicles sold.

Electric and zero emission vehicle technology is a key strategy for reducing pollution from the transportation sector, as they release zero tailpipe emissions, improving air quality and health. Drivers also increasingly want these vehicles for these public health benefits in addition to the lower cost of ownership of the vehicles compared to gas-powered cars.

EPA estimates that strong emissions standards will save the average consumer \$12,000 over the lifetime of the vehicle. The auto industry has already invested billions of dollars in the United States to support a transition to zero emission vehicles. Many manufacturers have announced plans to increase electric

vehicles in their offerings, in some cases completely phasing out gasoline vehicles from their lineups over the next decade.

One thing that the Biden Administration and members of Congress have made clear is that American workers and communities must be able to capture the public health and economic gains associated with transitioning to electric vehicles and building a clean economy. Strong vehicle standards from the Environmental Protection Agency will play a key role in ensuring this occurs.

Strong clean vehicle standards complement the historic Federal investments from Congress. The Inflation Reduction Act will not only help to make new and used electric vehicles more affordable, but it also provides important incentives to increase domestic manufacturing and access to clean vehicles, helping the Country become more competitive globally and bringing more of these public health and workforce benefits to our shores.

The Infrastructure Law passed in 2021 will help to build out a robust network of over 500,000 charging stations throughout the Country to help ensure that drivers will have the ability to charge their cars reliably, while tax credits under the Inflation Reduction Act will help catalyze many more charging ports being installed across the Country.

It is clear that clean vehicles are a win for the United

States' air and public health, a win for consumers, and a win for the economy. We appreciate Congress and the Federal Government for their leadership in supporting the transition to a clean cars and clean air future.

Thank you for allowing me to speak with you today. I look forward to answering any questions that you may have.

[The prepared statement of Ms. Harris follows:]

Senator Markey. Thank you, Ms. Harris, very much.

Next, we are going to hear from Chris Harto from Consumer Reports.

STATEMENT OF CHRIS HARTO, SENIOR ENERGY POLICY ANALYST, CONSUMER REPORTS

Mr. Harto. Good afternoon, Chair Markey, Ranking Member Ricketts, and members of the subcommittee. My name is Chris Harto, and I am a Senior Sustainability Policy Analyst at Consumer Reports.

I thank the committee for inviting CR to testify today in support of the proposed EPA greenhouse gas standards for model years 2027 through 2032 and on the benefits that they will bring to American consumers.

CR is a nonprofit, nonpartisan organization. One of the things that CR is best known for is testing cars. Every year, our testers drive about half a million miles to put new cars through their paces, and we work with policymakers like you to advance policies for safer and cleaner cars.

For decades, Federal greenhouse gas emissions standards have played a critical role in reducing overall emissions from the transportation sector, while encouraging automakers to innovate and offer increased clean vehicle options for consumers.

The proposed EPA standards, if enacted, would bring cleaner, cost-saving transportation technologies to consumers faster. The rule will save consumers money while reducing spending on healthcare tied to air pollution and disaster

recovery tied to greenhouse gas emissions.

I have three main points I would like to make based on CR's analysis. First, EPA's standards are achievable. Second, consumer demand for EVs is far outpacing supply. Third, EVs save consumers money.

The proposal for light duty vehicle standards is ambitious, but achievable. EPA's analysis is that EVs are likely to be the most cost-effective compliance pathway, but not the only option for automakers. Automakers can also use a mix of improvements in internal combustion fuel efficiency, conventional hybrids, plug-in hybrids, and even hydrogen fuel cell vehicles to comply.

EPA estimated that while an EV-only compliance pathway would require about two-thirds of vehicles sold to be EVs by 2032, industry is already on track to deliver around 50 percent EV sales by 2030, according to commitments made by automakers.

Further, consumer challenges, such as charging infrastructure and affordability will only continue to improve due to the unprecedented investments from the Bipartisan Infrastructure Law and the Inflation Reduction Act, which provide funding for charging infrastructure and consumer tax credits, respectively.

Consumers want EVs. Consumer demand for EVs has been soaring, increasing 350 percent between 2020 and 2022. Unfortunately, automakers have not been keeping up. There are

now around 45 percent of consumers who say they would definitely buy an EV for every EV being manufactured. Meanwhile, 30 percent of new car buyers are not even considering a conventional non-hybrid vehicle.

CR estimates that an EV-only compliance pathway would result in the production of enough EVs for approximately 25 percent of Americans to own one by the end of 2032. A 2022 CR survey found that already, 36 percent of American adults were definitely or seriously considering an electric vehicle if they were to buy a vehicle today, indicating the consumer demand may already exceed what is needed to comply with these standards.

Despite the rapid growth in consumer demand, people can't buy vehicles that don't exist. Consumers who want an EV right now often have to deal with long waitlists and dealer markups. Automakers are making investments to improve supply, but unfortunately, the growth and supply has still been lagging. EPA's proposal should help automakers catch up.

EVs are cheaper to own. A 2020 analysis by CR found that EVs are cheaper to own than comparable gasoline vehicles, even when factoring in higher purchase prices. EVs save an average of 60 percent on fuel and 50 percent on repairs and maintenance. This translates to between around \$6,000 and \$10,000 over the life of the vehicle, even factoring in higher prices.

Higher purchase prices, however, are likely to be

temporary. As of January, automakers and battery manufacturers already plan to invest \$210 billion in U.S. manufacturing by 2030. A 2022 analysis by ICCT found that EVs are rapidly approaching cost parity with conventional vehicles, even with a range of over 300 miles.

In conclusion, EPA's proposed light duty vehicle standards will hit the accelerator, helping to drive automakers to catch up to consumer demand for cleaner vehicles. We see these rules as a win-win for consumers and the climate, putting over a trillion dollars back into consumers' pockets while delivering massive reductions in air pollution and greenhouse gas emissions.

[The prepared statement of Mr. Harto follows:]

Senator Markey. Thank you, Mr. Harto.

Finally, we are going to hear from Andrew Boyle from the American Trucking Association. Welcome.

STATEMENT OF ANDREW BOYLE, CO-PRESIDENT, BOYLE TRANSPORTATION,
FIRST VICE-CHAIR, AMERICAN TRUCKING ASSOCIATIONS

Mr. Boyle. Chairman Markey, Ranking Member Ricketts, and members of the subcommittee, thank you for the opportunity to testify.

In addition to serving as first Vice-Chair of the American Trucking Association, I am Co-President of Boyle Transportation, a trucking firm headquartered in Massachusetts. My company has the honor of doing important work delivering life-saving medicine and transporting critical materiel for the U.S. Military.

We employ 200 people, including 160 of the Nation's finest professional truck drivers, and we are recognized as having the number one work environment among smaller fleets in all of the U.S. and Canada in 2020 and 2021. Boyle is a subsidiary of Andlauer Healthcare Group, a highly regarded logistics provider to the North American healthcare industry.

We take tremendous pride in our environmental record. An EPA SmartWay partner since 2008, we have been a SmartWay high performer for five straight years and received EPA's Environmental Merit Award. In 2021, we became the first trucking company in North America to achieve certification for the rigorous ISO 14001 Environmental Management System. Our headquarters is solar-powered.

ATA shares that commitment to sustainability as it represents a diverse industry which includes carriers ranging from enterprise fleets to single truck operations, and which serves every economic sector.

Trucks move 72 percent of America's freight tonnage, a number that will continue to grow. Essentially everything touches a truck. Thanks to collaboration between industry and government, today's clean diesel trucks produce 99 percent lower emissions than those from the 1980s. Sixty trucks today emit what just a single truck emitted in 1988.

This progress is owed to both aggressive innovation and technically achievable national standards. We were aligned with another EPA emissions standard slated to take effect in 2027, which will reduce NOx by yet another 83 percent until EPA recently announced that it was going to reopen that rule. How are manufacturers and fleets meant to comply with regulations that whimsically change with political preference?

EPA also recently decided to create a State patchwork that undermines Federal leadership by approving a waiver for California's so-called Advanced Clean Trucks Rule, which is heavily predicated on the adoption of electric trucks.

While we share the passion for EVs in cars and light duty vehicles, projecting an automotive construct onto trucking industry dynamics is a massive mistake. Let me be clear: if

battery electric trucks had adequate range, there was adequate charging infrastructure, and utilities could deliver the power, we truckers would be delighted, but let me explain our reality.

Today, a clean diesel truck can spend 15 minutes fueling anywhere in the Country and then have a range of about 1,200 miles before fueling again. In contrast, today's long-haul battery electric trucks have a range of about 150 to maybe 330 miles and can take up to 10 hours to charge. So for the same 1,200-mile journey, we would go from 15 minutes of fueling a clean diesel truck once to charging today's BEV four to eight times for dozens and dozens of hours. This is assuming there are chargers where you need them.

We would need far more trucks to haul the same amount of freight, and each of those trucks would cost two to three times a comparable diesel truck. Converting the U.S. fleet of Class A trucks to battery electric would require a \$1 trillion investment, which ultimately would flow to consumers.

We welcome the opportunity to provide real-world, factual, and constructive input into the legislative and rule-making process. We recognize that most people don't understand how the trucking industry works behind the scenes to supply the American public, but we can't allow unrealistic timelines, a State patchwork, and technically unachievable regulations to set trucking up for failure. Remember, we deliver food, medicine,

baby formula. Failure is not merely inconvenient; it is catastrophic.

Thank you, and I look forward to answering your questions.

[The prepared statement of Mr. Boyle follows:]

Senator Markey. Thank you, Mr. Boyle, very much.

Now, we will turn to questions from our panel. I will begin by just pointing out that when I served in the House of Representatives, I authored the fuel economy language in the 2007 Energy Independence and Security Act that kickstarted the new race to the top for vehicle efficiency, and that legislation made it clear that we must set the maximum feasible standard for fuel economy.

The EPA standards are no different. They must "reflect the greatest degree of emissions reduction achievable through available technology." Well, in the Inflation Reduction Act, the Bipartisan Infrastructure Law, and the CHIPS and Science Act, Congress invested more than \$135 billion to make clean vehicle technology more available than ever.

To each of the witnesses, do you believe that investments from these bills are making clean vehicles more affordable and available? We will begin with you, Ms. Harris, and Mr. Harto, then you, Mr. Boyle.

Ms. Harris. Thank you so much for your question, Senator.

I think the short answer is yes. We are seeing that the upfront prices of electric vehicles costs are reducing, and that is in large part due to the Inflation Reduction Act and the tax incentives passed by this body, but additionally, we know even today that the total cost of ownership of electric vehicles is

still cheaper than a comparable gasoline car. We are seeing an increase of desire for these vehicles from the American people, as well.

Senator Markey. Meaning that over the life expectancy of the vehicle, you spend so much less on electricity than you do on oil?

Ms. Harris. Yes, and the maintenance costs of the vehicles are lower, as well.

Senator Markey. Yes. Mr. Harto?

Mr. Harto. Yes. We do believe that these policies are helping to accelerate and bring more EVs to consumers cheaper. The more automakers do something, the better they get at it. Learning by doing and economies of scale are two of the biggest drivers of cost declines in any industry. The more clean vehicles automakers deliver, the cheaper they will be able to offer them to consumers.

Senator Markey. Let me go to you, Mr. Boyle. What incentives are most helpful to the trucking industry in the legislation thus far to increase the ambition to move to clean vehicles?

Mr. Boyle. Thus far, the adoption of BEVs, so in a heavy-duty truck, the upcharge is roughly \$300,000. So the incentives barely cover the Federal excise tax, which is an issue we would like to bring up, because I know some of your colleagues have

been advocating for us. A huge impediment to buying newer, cleaner trucks, even today's trucks, is the Federal excise tax that was installed more than 100 years ago to finance World War I.

A big issue when we look at the emissions in aggregate right now is not so much that today's trucks aren't clean enough, it is just that of the fleet on the road, not enough are today's trucks. This is one lever we have to kind of make it more affordable for fleets and operators to buy today's clean trucks.

Senator Markey. Yes. My father was a truck driver, so I grew up with a truck driver as my father, so I am very conscious of this profession and the need to have these vehicles be able to operate.

Mr. Harto, would the investments which are being made in EV charging help to deal with the range anxiety that people have had in purchasing an EV in the past?

Mr. Harto. Absolutely. Charging infrastructure is one of the biggest barriers to EV adoption in the U.S., and the Bipartisan Infrastructure Law provides significant investments to especially roll out those chargers in areas where the free market is lagging, States like Senator Ricketts' Nebraska, as well as low-income areas of the Country.

It is really targeted at filling the gaps where the market

is missing to help consumers feel confident that they can buy an electric vehicle.

Senator Markey. Ms. Harris, how quickly is this transition occurring in terms of consumers' demand and the purchases of electric vehicles, especially the light duty, the SUVs?

Ms. Harris. We are seeing a great increase in the interest in electric vehicles. Last year, electric vehicle sales were about 4.5 percent over the course of the year, and in 2021, they were about 4.5 percent. In 2022, that rose to about 7 percent over time. We have even seen that in December of 2022, that was almost up to 9 or 10 percent sales, as well.

So there is a continuous increase in interest in these vehicles, and we are seeing that demand increasing annually.

Senator Markey. Beautiful. Thank you. Senator Ricketts?

Senator Ricketts. I will yield to Senator Lummis.

Senator Lummis. Thank you very much, Senator Ricketts, and thank you, Mr. Chairman.

Ms. Harris, do you believe it is appropriate to analyze only the tailpipe when calculating greenhouse gas emissions?

Ms. Harris. Thank you so much for your question, Senator. I believe that electric vehicles and the tailpipe emissions from the transportation sector are a major source of toxic pollutions in the United States.

Senator Lummis. Okay, so what about the fact that that

method misses significant emissions generated through the extraction of rare earth minerals in foreign countries that are needed to create EV batteries?

Ms. Harris. There have been many studies that have shown that electric vehicles today from well to wheel are still cleaner than compared to a gasoline vehicle.

Senator Lummis. But you haven't analyzed the need for rare earth minerals and the mining, the significant mining that has to occur. So can you confirm that lithium, cobalt, manganese, nickel, and graphite are all critical to the manufacturing of electric vehicle batteries?

Ms. Harris. Many of the batteries that are currently made today for electric vehicles do require those minerals.

Senator Lummis. Do you know which country is the third-largest producer of lithium and controls 60 percent of global battery-grade lithium refining capacity?

Ms. Harris. I do not have that number in front of me today.

Senator Lummis. Well, it is China. Do you know which country is responsible for over 50 percent of cobalt exports?

Ms. Harris. I do not have that number in front of me today.

Senator Lummis. It is the Democratic Republic of the Congo. Do you know which country is responsible for nearly 75

percent of global exports of manganese?

Ms. Harris. I do not have that number in front of me today.

Senator Lummis. It is China. Do you know which country is responsible for the most exports of nickel?

Ms. Harris. I do not have that number in front of me today.

Senator Lummis. That would be Indonesia. Do you know which country is responsible for nearly half of the global graphite exports?

Ms. Harris. I do not have that number in front of me today.

Senator Lummis. That is also China. Do any of these countries have anywhere near the stringent environmental regulations the United States has?

Ms. Harris. I cannot speak to that today.

Senator Lummis. So you don't know? You don't know whether these countries are mining in a more environmentally friendly way than the United States?

Ms. Harris. Oh, I am sorry. I misunderstood the question. Could you please repeat it?

Senator Lummis. Do any of these countries have anywhere near the stringent environmental regulations that the United States has?

Ms. Harris. My apologies. Not to my awareness.

Senator Lummis. If climate change really is a worldwide problem, how does shifting the responsibility of mineral extraction to these countries help us reduce worldwide emissions?

Ms. Harris. Thank you so much for the question. I will say that there are many investments and incentives that are happening here in the United States to bring the supply chain to the United States.

Senator Lummis. I have a rare earth mine in my State that has been trying to open for over 10 years and still doesn't have the environmental permitting to open. There is no way that the standards and the materials needed to produce and manufacture in the United States can happen in 10 years.

To ramp up the supply even in foreign countries that have far lower environmental standards, not to mention human labor standards, this is not possible to do. It is going to take four to six times more product, and then the mining and milling of that product over a 10-year period to meet the regulatory standards that the EPA is advocating for.

It is going to raise greenhouse gases all over the world, including in China, Indonesia, the Democratic Republic of the Congo. It is going to create child labor and human labor issues that are deplorable. And we are doing that all so we can

provide a vehicle that costs \$65,000 to the American consumer, and that if you are in an accident, you have to replace the whole vehicle, because the battery can't be damaged? To me, there is really nothing about this idea that is reflective of global reality.

Mr. Chairman, I would like to enter into the record this article about the gamble on critical minerals that is being undertaken with regard to this proposed EPA regulation.

Senator Markey. Without objection, so ordered.

[The referenced information follows:]

Senator Lummis. Thank you. I yield back.

Senator Markey. Okay. Senator Cramer is recognized.

Senator Cramer. Thank you, Mr. Chairman. Thank you, witnesses.

I have to say, I have taken more notes while I was listening to Senator Lummis than I came with. A couple things that struck me right away, as well as listening to your earlier testimony, Mr. Boyle. We acknowledge that they are heavier. We have acknowledged they are more expensive. Maybe the incentives don't even cover the excise tax.

What does it cost to insure a vehicle like a large truck that has these extra costs and weights and an infrastructure, frankly, not designed for 5,000 more pounds per axle, and those kinds of things?

Mr. Boyle. Yes. It is hard to tell because we are so, the consumer-facing EV product is so much further ahead, right? We are talking about a very heavy duty, under high stress, corrosive environment. Just so we are clear on the scale of the issue, each electric vehicle battery for a heavy-duty truck weighs 8,000 pounds. You would need at least two of them. We are talking the weight of four or five cars.

My friends and peers in the industry nationwide who have tried to make efforts to put in, say, hey, I am going to convert a dozen forklifts to electric, or I want to tee up a facility

for 30 electric trucks, there is no power. The utilities come back, the cities come back and say, is this some kind of joke?

One friend tried to put in in Illinois a facility, teed up for 30 trucks for electrification. The city came back and said, this is some kind of joke. You are asking for more draw than the entire city requires.

Just to give you an idea, 30, 50 trucks, that is like a five- or six-megawatt application. The factory that makes the trucks is a two-megawatt factory.

We are playing checkers right now. We would be delighted to have more choices. If the power and infrastructure is not available, it is not even a consideration for trucking, yet California wants to make it effective next January as the only choice. No diesel trucks, no OEM is going to be compliant with California Carbon Standard for a diesel electric truck starting in January. They will have product due to credits and so forth, but none is going to be technically compliant.

What are we talking about here? We are trying to serve the Country and supply commodities that are essential to everyday life, so before any of the, this is not a choice, we have the cart before the horse right now.

Senator Cramer. Well, and the fight over the infrastructure piece is not a small matter, either. When you start talking about all these socialized costs for a grid that

covers every inch and socializes the cost of every little generator and every street corner, another issue I am not suggesting we get into right now.

But building even more on what Senator Lummis was talking about with regard to the supply chain, the Congo, Indonesia, China, and the human rights violations and the workforce challenges, certainly standards that don't meet ours, to me, those are of greater importance than some of the other issues we are trying to solve.

Here is the other irony. She has an opportunity in her own State that isn't being done. We know of two critical minerals mines that have been shut down before they even had an EA in this Country, by this Administration, this year, one in Minnesota, Twin Metals, and one in Alaska, Pebble Mine. You are right, the cart is before the horse. Let us build the horse and find the supply chain that can produce some of these things before we start incentivizing things.

The other thing I would bring up, unlike Senator Lummis, I don't come from a tropical environment like Wyoming. I come from the arctic State of North Dakota.

[Laughter.]

Senator Cramer. Or Nebraska, which is balmy by comparison. The performance in cold weather is not just unproven, it is proven to be horrible. I just can't imagine pushing this

standard on North Dakota.

Mr. Boyle. That is right, sir. So, the battery degrades in cold conditions, up to about a third. That range I talked about, 180 to 150 to 330, it is degraded by 30 percent.

Senator Cramer. Is range fairly important in the trucking industry?

Mr. Boyle. If you want to talk about range anxiety, we truckers would need therapy.

Senator Cramer. I bet. With that, my point is made. I appreciate you all being here, and I yield. Thank you.

Senator Markey. Senator Ricketts?

Senator Ricketts. Thank you, Mr. Chairman.

Mr. Boyle, you talked about the trucking industry. Talk a little bit about, the trucks are heavier, you said, like 8,000 pounds for a battery. Does that mean that you can't haul as much, your payload is reduced? Is that correct?

Mr. Boyle. That is correct, which means more trucks to haul the same amount of freight.

Senator Ricketts. So, you are going to need more trucks on the road. Does that mean that consumers are going to have to put up with more trucks on the road as they are driving around, right, because there would be more traffic?

Mr. Boyle. Certainly.

Senator Ricketts. Is there a shortage of truck drivers in

your industry today?

Mr. Boyle. We estimate about roughly 70,000, 72,000 short currently.

Senator Ricketts. But you would need more truck drivers if you are going to need more trucks, is that fair?

Mr. Boyle. Yes, sir.

Senator Ricketts. Okay, so talk to me about what your experience is from your industry about some of your friends you have talked about doing it, something along those lines of more trucks, how many more trucks are we talking?

Mr. Boyle. Yes. We have members of ATA who have limited scope operations where they are testing BEVs. What they have found is that they need about a three-to-two or occasionally two-to-one ratio of trucks, meaning for every route and mission that one truck would do in an internal combustion, reliability was high, they now have to use two BEVs due to charging downtime, reliability, et cetera.

Senator Ricketts. Is it fair to say that is more expensive?

Mr. Boyle. Certainly.

Senator Ricketts. One of the things, also, that you were talking about is, if you have this cost, and also the tractor trailers themselves, I was told by somebody in the industry that a regular tractor trailer diesel runs \$180,000. These are about

\$500,000. Is that ballpark correct?

Mr. Boyle. Yes. Yes, so for the tractor part of a tractor trailer, about \$180,000 to \$200,000 for a sleeper truck and then, in comparison to the \$450,000 thousand price point for a battery.

Senator Ricketts. I just want to reemphasize something you said in your testimony. Who, ultimately, is going to pay for this, I think you said, a trillion dollars in additional costs? Who is going to pay for that?

Mr. Boyle. Ultimately, it flows to the consumer.

Senator Ricketts. The American consumer will end up paying that.

Mr. Boyle. Yes.

Senator Ricketts. So now, the American consumer is going to have to foot the bill for all this so forth, and I think that there was an ATRI study that showed that the trucking industry used about 10 percent of our electric power generation?

Mr. Boyle. I think it is actually more, sir. It is closer to 14 percent, so we would be putting an incremental load of 14 percent on the grid.

Senator Ricketts. Okay. Mr. Harto, can you help me? We have this one study that talked about, trucks would need 14 percent more, is that 14 percent more, or 14 percent overall power generation, Mr. Boyle?

Mr. Boyle. Effectively, it means we need 14 percent more power generation, incremental.

Senator Ricketts. Got it. I think the electric vehicles, if you electrify the entire fleet, it is 40 percent of our current power capacity generation. That is a study out there right now.

Are you aware of, are there studies where somebody has put pencil to paper to see how much more we would have to increase our power generation that has different numbers than what we just talked about here?

Mr. Harto. Yes. The USDOE research labs, I forget which ones, have done this type of analysis. I know at least for the light duty vehicle sector, we are looking at increased growth in generation demand of about 1 percent per year, which is well within what the electricity industry has done in the past, when we deployed AC.

Senator Ricketts. Really, Mr. Harto, 1 percent per year, when Gavin Newsom last year announced within the same week that he wanted to ban the sale of all internal combustion engines in California by 2035, and then told people with electric vehicles, you can't charge them in the afternoon, because the grid can't handle it?

Mr. Harto. Yes.

Senator Ricketts. Didn't that seem like a disconnect to

you? It doesn't seem like a disconnect to you?

Mr. Harto. It is about 1 percent per year in overall generation need. As well, utilities have a lot of tools to move around when EVs charge. Time of use rates, managed charging, eventually we will have vehicle-to-grid technology where EVs, when they are not being used, can push power back to the grid and help get through those peak periods in the late afternoon, when everybody is running their AC, everybody is coming home and cooking dinner, and demand is very high.

Senator Ricketts. So when you say manage, when you say managing your charging, you are talking about like Gavin Newsom is talking about management, don't charge it in the afternoon. Is that what you are saying?

Mr. Harto. You can plug in, you can have your car sitting in your driveway, plugged in, and your utility can just switch it on and off for a few minutes, for a few hours. Typically, you only need it charging for a couple hours a day.

Senator Ricketts. If they can do that, why isn't California doing that right now? Why would he have to tell people, don't charge your cars?

Mr. Harto. It still takes a little bit. We are in the first inning of the EV transition. A lot of this stuff is going to get a lot better as we scale up.

Senator Ricketts. Eventually. Okay, thank you Mr. Harto.

Thank you, Mr. Chairman.

Senator Markey. Thank you, Senator Ricketts. If Senator Merkley is ready, or I could go for another round and then recognize you. Are you ready to go now? Okay.

Let me come back to you, Mr. Harto. Is it not true that the Inflation Reduction Act protects against the use of minerals from countries of concern that make vehicles ineligible for the tax credit if they are using minerals from China, from Russia, from countries of concern?

Mr. Harto. Absolutely. The Inflation Reduction Act puts strong incentives in place for automakers to realign their supply chains and secure them away from countries of concern.

Senator Markey. Yes. So, countries of concern is just another way of saying, countries we are not really confident of having the correct environmental standards, or that we can trust them as a national strategic partner for a transition as important as this. Is that correct?

Mr. Harto. Yes, that is correct.

Senator Markey. So, right now, we are hearing some complaints from some automakers that the new IRS rules are not going to allow their vehicles to qualify because they are importing too many materials from China. Is that correct?

Mr. Harto. Yes, that is correct, but many of those automakers are rapidly moving to realign their supply chains in

order to qualify for these very strong incentives.

Senator Markey. So, in other words, you heard Senator Lummis go down this whole list of concerns, which is obviously the whole point of the CHIPS Act, the whole point of the Inflation Reduction Act, the whole point of the Infrastructure Bill.

It is just to say to China, we don't need your materials anymore, and to Russia, we don't need your oil any more than we need your caviar, and to Saudi Arabia, we don't need your oil any more than we need your sand. We are fine; you can keep it. We are moving in a new direction.

That is really what those three big bills are all about. Is it not true, Mr. Harto, that that is the goal?

Mr. Harto. Yes, that is correct.

Senator Markey. So, yes, we are going to be in a little transition period right now, obviously, where there will be a little bit of a grace period for some of these materials to be used, but after that, we are on to a whole new era where we are not only using materials from countries that we have close partnerships with, but also that we are going to make in America. Go through that, Mr. Harto, a little bit.

Mr. Harto. Yes. Large portions of the world's reserves of critical minerals are actually from countries like Canada, Australia, and Chile, with which we have strong trade

partnerships with. Again, automakers are working hard to realign their supply chains to meet these standards.

Senator Markey. Are they making that transition?

Mr. Harto. The massive investments that they are putting into this transition to electric vehicles say that they are.

Senator Markey. They say that they are.

Ms. Harris, there are some complaints that this is too ambitious, but you are saying the real world says no, there is a big appetite for these vehicles.

Ms. Harris. Yes, that is correct. To Mr. Harto's point, automakers have already announced over \$210 billion of investments here in the United States to help with that transition and, as you mentioned, help bring that supply chain here to the United States, which will continue to increase the benefits to the economy and to drivers.

Senator Markey. Yes. I had this problem, actually, back in the 1990s. I was chairman over Telecommunications, and unfortunately, Alexander Graham Bell would have still recognized our phone system, those black rotary dial phones, or a cell phone that was the size of a brick that Gordon Gekko was using in Wall Street. How can we move to the future?

So, my bill, that I was the principal Democratic author of in 1996, said, break up all these monopolies. They are stultifying technological growth, and by 2000, four years after

the bill passed, we have a broadband revolution. We had a dot com bubble, but everyone had broadband except for the most rural parts of the Country and the poorest people in our Country. It had just been held up.

We heard from the auto industry for so many years, we can't do this, you don't know how hard it is, if you knew what you were asking for, you wouldn't even raise the subject. Well, now, of course, finally, the auto industry is accepting the future. Now, they let Tesla get a huge lead on them by maintaining their denial that you could do it. But the battery technology, all of these new technologies, they are all happening and improving very rapidly.

The interesting thing about the 1996 Telecommunications Act is that it created a broadband revolution. What is the electricity revolution? The electricity revolution is a broadband revolution. You can manage the electricity coming in off the ocean, off the prairies, off of roofs. You can manage the electricity inside of people's homes and buildings, and you can manage automobiles and trucks, feeding electricity back into the home or into the grid.

All of that is now possible because of the broadband revolution, and this revolution is going to create all new revolutions in battery storage technologies, in the ability for us to be able to imagine where our electricity comes from, or

what kind of vehicles we have.

There has always been really, very strong opposition to these kinds of technological revolutions, and I understand that, because it is just part of looking at the world in a rearview mirror. We have to be sensitive to industries that are going to be impacted. The legislation, the regulations are trying to do that, and I am sure there are some accommodations that can be made.

Nonetheless, because of the imperative of us to back out imported oil, national security issue, to reduce greenhouse gases going up, national security issue, we really don't have a choice. This bill is saying to China, to Russia, to other countries, we are not going to need your minerals anymore. We are not going to need your parts anymore. I think that is a big part of what the message is that is being sent to the private sector, and it is largely responding.

We are going to have to make some adjustments, obviously, but I still think that we have an incredible future that we can look forward to. Let me turn and recognize the Chairman of the full committee, Senator Carper.

Senator Carper. Thanks. I appreciate, Senator Merkley, your letting me slip ahead of you. Thank you so much. First of all, let me just say, I appreciate you having the hearing today.

The largest source of carbon dioxide emissions, carbon

emissions, greenhouse gas emissions, come from our mobile sources. I think it is about 30 percent, about 25 percent from power plants, about 20 percent from manufacturing operations, including cement plants, including steel mills, that kind of thing. We are trying to make sure we focus especially on those three, but including focus on autos.

I will never forget, I have shared this with some of my colleagues before, I used to go to the Detroit Auto Show every January, actually. When Delaware had two big auto plants, a big Chrysler plant and a big General Motors plant, they employed about 3,000 or 4,000 people at each of them. It was a big deal for a little State.

I remember being at the Detroit Auto Show about 10 years ago, and I met a young woman named Mary Barra. For a lot of people, that is a familiar name now, because she is not just the CEO of General Motors, she is the chair of the Business Roundtable.

I met her at a ceremony they had at the Detroit Auto Show to announce what car was selected as car of the year, what SUV or truck was selected as the truck of the year. The car of the year was the Chevrolet Volt, and it was a hybrid. They don't make them anymore, but it was a hybrid. I remember talking with her, and she told me that it got 38 miles on a charge, and after that, the battery was depleted and the car would have to operate

on gasoline, diesel, whatever.

Ten years later, she is a big deal. She is the chairman of the company and chairman of the Business Roundtable. I was trying to get GM, maybe about a year ago, to join Ford and Volvo and some other companies in really signing onto fuel efficiency standards, or emissions standards.

I will never forget what she said to me. She said, Senator, I am all in on electric. That is where the future is. They are cheaper to build, to maintain, and climate change is real. It makes sense. She said, three things have to happen before people will buy the vehicles that we are prepared to make, the electric vehicles we are prepared to make in the future.

Number one, 300 miles range. She said, that is on the industry, not on the government. She said, the second thing we need is the ability to charge batteries in minutes, not hours. That is on the industry; that is not on the government. She said the third thing is on the government, and that is to make sure that we have throughout not just Delaware and places on the East Coast, but all over the Country, charging stations and fueling stations for vehicles that we are prepared to build. She said, if we don't do that, we will never be as successful here as we would like to.

Another conversation that I remember was with a person, I

remember a conversation with, I think it was Amazon and FedEx. They were talking about their delivery vehicles and whether or not they use electric vehicles, do they use diesel vehicles, some combination thereof.

I am not sure if it was Amazon or FedEx, but over a relatively short period of time, they migrated almost entirely to electric. They did it, and I will never forget them explaining to me. The fellow we talked to from whichever company it was said that, the right business decision for us, set aside concerns about climate change or global warming or sea level rise, for us, the right business decision was electric vehicles.

Same reasons that Mary Barra had given me. It is not just low emissions; it is low maintenance. They are easy to build, easier to maintain. She didn't say this, but as the owner of an electric vehicle that I have had now for about two years, they are fun to drive. That is kind of hard to put a price tag on, but they are just a hell of a lot of fun. For people who, I can see some heads in the audience here nodding, yes, they really are.

For those reasons, I think that is where we need to go, ought to go. Having said that, 10, 15, 20, my last vehicle was a 2001 Chrysler Town and Country Minivan with 600,000 miles on it. Some people just love their vehicles. Maybe some people in

the audience love their vehicles and never want to change, and they are going to keep their vehicles for 100,000, 200,000 miles, maybe more. We are not going to hit a switch and just move over and take EVs, or hydrogen-powered vehicles, but we will eventually migrate away.

The other thing I would just say, I mentioned in another hearing today what we are facing in terms of climate change, sea level rise, and that sort of thing. We have to be smart enough to not let this happen. The question is, are we smart enough to avoid the dire consequences that we hear about all the time, are we smart enough to do that, and at the same time, create jobs and economic opportunity?

I would take away from my conversations with Mary Barra and the folks at General Motors, and frankly, Bill Ford at Ford Motors and the folks at Amazon, the delivery company or FedEx that offered the very smart, I thought, coaching arguments for supporting EVs. There we go. We don't have to do it just because it feels good, but it is actually good business sense.

My wife and I have some four step-grandchildren. I want to make sure that they grow up and have a planet to grow up on and grow old on and have good jobs. It comes to that.

Mr. Chair, I want to ask unanimous consent a study by the International Energy Agency that compares the greenhouse gas life cycle analysis between an internal combustion vehicle and

battery electric vehicles. It is hard to read my staff's writing, but then considering the mining of critical minerals electric vehicles are substantially less in emissions compared to internal combustion vehicles. We will change this for the record, but I think I am asking unanimous consent for a study by the International Energy Agency, here.

Senator Markey. Without objection, so ordered.

[The referenced information follows:]

Senator Carper. I have a question for Mr. Harto, and then I will be out of your hair.

I want to thank the Chair for holding a hearing on a transportation sector that I have suggested as a major source of carbon emissions, and we have to do something about it. We are doing something about it. EPA's newly proposed light duty vehicle and heavy-duty vehicles greenhouse gas emissions standards will reduce emissions of criteria pollutants, greenhouse gases, and air toxics, creating significant benefits for public health and our climate.

This issue is especially personal for us in Delaware. I think I have mentioned a million times, my committee members can tell you, a million times how Delaware is the lowest-lying State in the Country. Our State is sinking. The seas around us are rising. It is not a good combination.

Here is my question for you, Mr. Harto. We always talk about the tremendous clean air and climate benefits of EPA's Clean Car Rule, but as a car enthusiast with, as I said earlier, my own electric vehicle, I also want to hear about what these rules will mean for American drivers.

Does your research show that many drivers want to buy electric vehicles, and if so, why? How will these clean car rules help protect drivers from volatile global oil prices, which are often influenced by the whims of dictators?

Mr. Harto. Great. Yes, thank you for your question.

Yes. These rules will deliver consumer savings to Americans. EVs on the road today, despite their higher prices, already deliver lifetime cost savings to consumers while reducing the volatility of their monthly fuel budget. Electricity prices change over time, but they change very slowly, in fairly predictable ways, whereas oil prices fluctuate wildly, which can, even if you thought you could afford the vehicle when you first bought it, if oil prices rise \$1, \$2, you might have to choose between feeding your family and fueling your vehicle to get to work every day.

Senator Carper. Anybody else want to comment on that? Ms. Harris?

Ms. Harris. Thank you so much, Senator.

Just uplifting what Mr. Harto said, we are already today seeing significant cost savings for an electric vehicle compared to a gasoline-powered car. Since the transportation costs tend to be a large energy burden for drivers and consumers, transitioning to zero emission vehicles is a win for consumers' pocketbooks as well, in addition to a lot of the points that you uplifted for improving air quality and health of Americans and also making us more globally competitive, too. There are many, many benefits, and there is an increased interest from drivers to purchase these vehicles.

Mr. Boyle. Senator Carper, if I may?

Senator Carper. I was just handed notice that I need to go give a speech on the Floor right now. If I could be, I should be two people right now, but I apologize, I need to run. I welcome anything you want to give us for the record, please and thank you.

Mr. Boyle. Thank you.

Senator Carper. Thanks so much.

Senator Markey. The Senator's time has expired, and his request for inclusion in the record of the document that he referred to, without objection, they would be so ordered.

The Senator from Oregon?

Senator Merkley. Thank you very much, Mr. Chairman, and greetings to all. Thank you for your testimony. I just want to repeat what I heard you all saying, Mr. Harto, that life cycle costs for a consumer, they are better off buying an electric vehicle?

Mr. Boyle. That is correct.

Senator Merkley. Do you agree with that, Ms. Harris?

Ms. Harris. Yes.

Senator Merkley. So, if I am buying an electric vehicle, and I am wondering, well, how many miles am I going to get on a kilowatt hour, what is the answer?

Ms. Harris. A recent study that I saw said that the

average range of an electric vehicle today is about 290 miles.

Senator Merkley. That is not the range. How far am I going to go on a kilowatt hour?

Mr. Harto. Somewhere between three and four miles per kilowatt hour.

Senator Merkley. Four miles on most of the Bolt, for example. I pay 12 cents for each kilowatt hour that comes to my house. Therefore, it costs me how much to go one mile?

Mr. Harto. About three or four cents.

Senator Merkley. Three cents. Brilliant. That is incredible. I think that is why the life cycle savings are significant, not to mention the savings when you have an internal combustion vehicle doing tens of thousands of little explosions that have to be managed, they have all kinds of parts to repair that you don't have on an electric vehicle.

I did, however, have a problem in that a mouse got under the hood of my Bolt and ate a bunch of key wires out of reach. So I did have to have one repair, unfortunately.

Well, I have a 360 square foot, 20-panel solar panels on my roof. So far, well, this month, they produce about 30 kilowatt hours a day, just 360 square feet, which means that the average milage that I get from my car out of this little, tiny solar array on my roof is about 120 miles. I can drive my car 120 miles a day on the electricity coming in on that little tiny

array on my roof. To me, that is incredible.

I think it is helpful for people to hear those basic numbers, because it doesn't translate initially that just a little bit of panels on your roof, and you can drive. Well, think about that. If you are doing a hundred miles a day, for a year, that is 36,000 miles on just that little sunlight coming in on your roof.

Anyway, it has to be, however, when you are on the road, outside of the range of your fueling up at home, charging up at home, it has to be as easy to charge up as it is to fill up. Have we reached that point yet, either one of you?

Mr. Harto. No, we haven't, but these EPA standards really help solve the chicken and egg problem with charging infrastructure. Private industry isn't going to invest billions of dollars in putting in chargers if they aren't sure that the vehicles that need them are going to be there. Industry promises only go so far. Having set rules really sets a direction for the industry and allows them to invest with confidence.

Senator Merkley. Well, we do have to grow the charging stations and grow the number of vehicles, but something else that would be helpful, and I have sent a number of letters to our Transportation Secretary, I have had many conversations with him about this, is the complexity of charging when you find that

station that is open. Some of them charge monthly fees. Some of them charge by how much time you are hooked up. Some of the charge by kilowatt hour, but don't tell you what the charge is, and so forth.

My advocacy to the Transportation Secretary is making it as transparent as gas stations are. Every single one of them, you know what you pay per gallon before you drive in. Can we do the same and have people know how much they are going to pay per kilowatt hour when you bring it up to the charging station? Would that be a good idea?

Mr. Harto. Sure, yes. Sounds great.

Senator Merkley. Those are softball questions, maybe leading questions. Some stations charge 15 cents in Oregon. Some charge 45 cents, and you don't really know until you get there. That will really help, because there is a certain anxiety about the complexity of charging stations that is totally unnecessary.

So, with the grants that we have in the legislation we passed last year, my argument was, require people to standardize in a way to get rid of that anxiety about the complexity of a charging station. For folks who travel a lot, you eventually figure out the system. You figure out how to check the apps, but it doesn't need to be that hard.

I read, Mr. Harto, that 36 percent of Americans were

definitely or seriously considering an electric vehicle. I certainly, after having one, understand that there is a lot to love. But what is the main reason Americans are considering an electric vehicle? Is it the cost savings that you referred to? Because I think most Americans don't really know that yet. Is it how quiet they are, is it the lack of repairs, is it the environmental sensitivity? What is driving their interest?

Mr. Harto. Every American has their own reasons for choosing an electric vehicle. Some of them choose them for climate reasons; some of them choose them for cost reasons. Others just like that they are faster and perform better, and they enjoy driving them. There are a lot of different entry points for Americans into electric vehicles.

Senator Merkley. Any insights, Ms. Harris, on what are considered the top two drivers for people's interest in electric vehicles?

Ms. Harris. Nothing more to add than what Mr. Harto said. I think there are a variety of reasons, but I do think that the cost savings for drivers is definitely one of the reasons why they continue to purchase electric vehicles.

Senator Merkley. I must say, early on in the electric vehicle world, it was the glue yourself to the back of your seat acceleration that put a big smile on a lot of people's faces. I must say, I nearly wrecked an electric vehicle the first time I

drove one, because it was like -- I was on the freeway before I knew what had happened. I am glad I made it through that, otherwise I wouldn't be here today.

My time has expired, so I am going to turn it back over to the Chairman. Thanks.

Senator Markey. Thank you. Now, we will turn and recognize the Senator from Alaska. Mr. Sullivan?

Senator Sullivan. Thank you, Mr. Chairman. Thank you to our witnesses.

Mr. Boyle, I would like to focus on some of the issues relating to the trucking industry. There has been a really good story on the fact that 70 percent of our economy's total tonnage has been coming from you and your industry, and there has been very significant greenhouse gas emission reductions, primarily through your own work. Isn't that true?

Mr. Boyle. Yes, sir.

Senator Sullivan. Do you think that has been highlighted much?

Mr. Boyle. You know, the line of demarcation that most people refer to with diesel technology emissions was 2010. So, right now, if we look at the national fleet of Class A trucks, 47 percent of them are still pre-2010. So there is an 83 percent reduction going from 2010 to today. Senator Carper and others have actually facilitated legislation grants to help

refresh this fleet. We want to remove impediments for people to buy today's trucks.

Senator Sullivan. That is going to help make the environment cleaner, correct?

Mr. Boyle. With the existing infrastructure, without the trillion-dollar investment, yes.

Senator Sullivan. Well, listen, I think that is a story that we need to hear more about. But I am very concerned, like many, bipartisan concern, by the way, of the EPA's using its regulatory power to the transition vehicle fleet in a way which I think is not an achievable pace. These rules are de facto bans on internal combustion engines, and that is why Senator Ricketts and I intend to introduce resolutions of disapproval under the Congressional Review Act both for heavy duty truck proposals and EPA light and medium vehicle proposals. I ask, Mr. Chairman, unanimous consent to enter into the record a recent op ed from the Wall Street Journal, saying Biden's EPA rules remake the auto industry.

Senator Markey. Without objection.

[The referenced information follows:]

Senator Sullivan. Thank you. Mr. Boyle, do you agree that the regulations are an unprecedented move by the EPA to dramatically move forward something that we think probably violates the recent Supreme Court decision in EPA versus West Virginia in terms of, if you are going to regulatory authority to remake the whole economy, you need to get that authority from the Congress. What is your view on that?

Mr. Boyle. We work in interstate commerce. My trucks transport cancer drugs. When we impede interstate commerce, the products that are essential to daily life don't get delivered. So yes, by passing the buck and allowing States to enact their own regulations on emissions, the market is not large enough for innovators to address individual States.

Furthermore, yes, historically, we have had great, our OEMs and other stakeholders in industry have great cooperation and collaboration with EPA on technical standards and on timelines that were achievable. If we don't do that, and we cede to the States, we end up with this patchwork.

Then, furthermore, as we discussed earlier, as of January of this coming year, there will be no internal combustion truck that is compliant with California Carb Standards. Battery electric trucks, if everybody in this room took off their socks and shoes and we counted fingers and toes, we would have more of them than there are chargers for heavy duty trucks.

We have to play a little bit more chess, not checkers, get the power generation, establish the infrastructure for chargers and then, by all means, we would embrace this notion. But to do so without that in place sets trucking up for failure which in turn, sets up consumers for failure and higher costs.

Senator Sullivan. Thank you.

Let me ask one final question for all the panelists. The Administration, and I think this is a bipartisan issue, says that they want America, not China in particular, to source the critical minerals that we will need for electric vehicles and so many other clean energy technologies. Yet, this kind of timeline doesn't give our Country the ability to mine critical minerals that we have.

By the way, in Alaska, we have the highest environmental standards in the world on mining critical minerals. If we need critical minerals, and we want to get away from China, the reliance on China, and we have the highest standards in the world and we can employ our own people, why wouldn't we do that?

You may have seen Senator Manchin's statement on what he called the EPA's radical vehicle emissions standards, and he said that the one thing that is going to happen here is that it is going to only result in more energy secure and powerful China and strengthening our reliance on minerals and technologies from China. This is a Democrat saying this.

I am meeting with, in the next couple minutes, a group from the Ambler Mining District in Alaska. Huge critical minerals supply for our great State. Highest environmental standards, labor, Tribal, individuals I am going to be meeting with on this Ambler project. The Biden Administration, on the day the President held a critical minerals summit, reversed the seven-year environmental impact statement on the Ambler mining road.

It is crazy. If we need green technologies and we need the critical minerals for it, why wouldn't we do it from here? Why would we keep relying on China? The Administration recently took a very large critical mineral deposit in Minnesota offline for 20 years. All this does is make us more reliant on China, and they have the worst environmental standards in the world.

Would anyone like to comment on this? If we need these technologies and minerals, why wouldn't we get it in the place with the highest standards on the planet? That is America. That is Alaska. Yet, this Administration talks a big game, and all they do is undertake policies that make us more reliant on the Chinese Communist Party and its economy.

Any views on that? I will throw it open to anybody. Mr. Boyle, we will start with you.

Mr. Boyle. Certainly, national security needs to be taken into consideration. If we expose ourselves, we are just moving from one commodity to another.

Senator Sullivan. Ms. Harris, any views on that, just wanting to source critical minerals in the place that has the highest standards in the world, which is us?

Ms. Harris. Yes, of course, thanks for the question, Senator. Thanks to Congress passing the Inflation Reduction Act, the U.S. is now on course to insource much of the battery production while also having minerals sourced from countries that we have trade agreements with.

Senator Sullivan. And our allies, right?

Ms. Harris. Yes. I will highlight, too, that these rules are being complemented by U.S. programs to reduce, reuse, and recycle the minerals from batteries so that we can reduce the need for additional extraction.

Senator Sullivan. Good. So, you agree with focusing on American production, mineral production, or our allies, who have much higher standards than the Democratic Republic of the Congo and China, correct?

Ms. Harris. Yes, and we are seeing automakers also bring this industry onshore already, with over \$210 billion of investments just here in the United States to help with that process.

Senator Sullivan. Good, excellent.

Mr. Harto, do you have a view on that, as well?

Mr. Harto. I have nothing more to add from what has

already been said.

Senator Sullivan. Okay, thank you. One point five partisan agreement. I think everybody here agrees with this.

Mr. Boyle. It is worth noting, to your point, if we were to convert the entire U.S. trucking fleet to battery electric, we would need to commandeer global production of lithium for more than seven years.

Senator Sullivan. Yes.

Mr. Boyle. That is the scale of the problem we are talking about. It is not that we can't overcome challenges, but we don't overcome them by pretending they don't exist. We just manifest our own destiny that way.

Senator Sullivan. But a lot of the challenges we have, Mr. Chairman, as you know, we can solve here, in America, with our own high standards on the environment and production. I think it is a good area of bipartisan cooperation. I am glad all the witnesses are in agreement. Thank you very much.

Senator Markey. I thank the gentleman.

After the Waxman-Markey bill passed, I traveled immediately to China, waiting for it to pass the Senate. We actually went to a wind turbine manufacturing facility. It was massive. We didn't have an equivalent in the United States. I said, those wind turbines are pointing at the American economy in the same way that the Russian missiles were pointing at the United States

during the Cuban Missile Crisis.

We need a response, and that is what the IRA is. It is saying, domestic manufacture, domestic sourcing, only with our allies, and let us just put this thing together, because we have been asleep, allowing for this erosion of our own domestic capacity. I think it is an area where we can partner.

Let me turn to the Senator from California.

Senator Padilla. Thank you, Mr. Chairman. I appreciate your holding this important and timely hearing today.

I just want to start by saying I am so proud of the efforts that you have led, that I have tried to lead, along with Chairman Carper pushing the EPA to finalize the strongest possible vehicle emissions rules.

I am starting to like this subcommittee and this committee as a whole, because it seems like every time I walk in from another committee, I am told that they were bashing California again for the audacity to exercise some policy leadership. Let me just say that you are absolutely right. We are setting the bar high, but we are also thoughtful enough, from the Governor, the legislature, the Congressional delegation, on down to be thoughtful about a transition from fossil fuel vehicles to electric.

The deadlines that have been set are not tomorrow or next week or next month. We know that there is a transition that

needs to take place. By setting out a marker several years, we know that technology will continue to improve, performance of those technologies will continue to improve in that time frame, not just batteries, but all aspects of electric vehicles, for example, passenger vehicles, to heavy duty trucks, even locomotives eventually, but also modernizing the electrical grid to handle the transition to the transportation sector that we are mindful of.

So, give us some credit, that we were thoughtful about this, and already showing some significant progress.

Focusing on today's hearing though, EPA's latest rules are important for so many reasons. They are going to save drivers money on gas. They are going to create high quality jobs in the process and continue to position the United States as a leader in zero emission vehicle technology.

Equally important, and I want to make sure this is not lost on anybody, equally important to my constituents are the public health protections that come from cleaning up vehicles, particularly in the heavy-duty sector. I can't tell you how often I hear from constituents who just want to be able to breathe clean air outside, go outside and play with their kids, and live healthy lives.

I hear frequently from constituents all over California, but particularly in the Inland Empire that is the nation's

capital when it comes to logistics, we all know people love, in this day and age, getting products, whatever they buy online, literally delivered to your doorstep. But we have to understand that that convenience comes with a significant cost to the public health of Californians, not just, but especially in the Inland Empire.

Mr. Harto, I appreciate your testimony and your organization's reports that shine a light on the environmental injustices happening in the Inland Empire in California, often referred to, as I said, America's logistics capital. The reports show that the impacts of the rapid expansion of warehouses in the area disproportionately fall on low-income communities and communities of color, which increases air pollution in the area due to trucks that burn fuel and transport goods to and from warehouses, to and from ports, and to and from homes.

Can you speak for a minute on how EPA's proposed Heavy Duty Rule will mitigate air pollution in these communities?

Mr. Harto. Yes, thank you for your questions. I will admit, I have not had a chance to dig too deeply into the EPA's proposal on the Heavy Duty Rule, but we know that decarbonizing and removing emissions from these vehicles that are driving around communities in people's front yards, where children are playing in communities, is extremely important to improving the

health of all Americans, especially Americans who live in disadvantaged communities.

Senator Padilla. Suffice it to say, we have made and can appreciate the significant progress in cleaning up the passenger vehicle sector. We can only imagine the positive benefit that will come with cleaning up the heavy-duty vehicle sector, as well.

One follow-up question in my time remaining. I have been fighting for the cleaner trucks since I first came to the Senate from pushing EPA to originally revise the standards back in 2021 to moving the Clean Trucks Plan to the proposed phase three standards that we are discussing today.

Question for Ms. Harris. The NRDC has written about how the final phase three standards need to aim higher in order to reduce trucking pollution and put the trucking industry on a path to zero emissions. What do they mean by aiming higher? Can you describe what being more ambitious means to you?

Ms. Harris. Sure. EPA's truck standards are an important step forward, but the main proposal is much too weak. Truck makers have shown that they can deliver less polluting and zero polluting vehicles, and EPA needs standards that will get them, to get them on the road. This is especially true given the historic incentives for electric heavy-duty vehicles that were included in last year's Inflation Reduction Act.

To your point, we are going to be working with our partners in communities near highways and ports and freight hubs nationwide to deliver data to the Environmental Protection Agency showing how and why this pollution can be cleaned up, and why it must be cleaned up now.

Senator Padilla. Thank you.

In closing, Mr. Chair, I will just reiterate my invitation to any of our colleagues who want to see the future of a cleaner transportation sector in progress, I am happy to welcome you to California. Thank you very much.

Senator Markey. Of course, we always take that as a challenge, especially since what they do in California is that they take people who are educated at MIT, elect them to the United States Senate, then challenge Massachusetts to develop better, more innovative people. We accept the challenge, as we have in the past.

[Laughter.]

Senator Markey. We don't have a choice here. We really don't. I have the great honor, as a member of Congress, this is how long I have been around, I voted to bail out Chrysler in 1979. They were going bankrupt because they had fallen so far behind technologically. Then, I had the honor in 2009 of voting to bail out Chrysler, because they had fallen behind technologically.

We can keep waiting for them to get it, and they would keep saying, oh, Tesla, that is not the future. Do you know how hard it is? People don't want to drive around in an electric vehicle, like a golf cart. They didn't have the vision to see what an electric vehicle could be, more powerful than an internal combustion engine vehicle.

So, now they are hustling to catch up, finally, thank God they are, and it is about time. Because in Europe, for example, the European parliament has committed to making all new cars and vans in Europe to be zero emission by 2035. If we want to be selling vehicles in Europe, we better get moving, here. That is the market.

If we don't want to be in the market, of course we can go slow. We could have a bill to bail out auto companies in 2031 because they are going too slow, and people aren't buying them, or in China, if we want to look at Asian markets, we better be making vehicles that they want to purchase.

That just comes down to what Senator Padilla is talking about, that we need to have a way to continue to innovate and get out there. Take them on. We don't want to keep them out. We want to ultimately take them on. Let's have this battle. But we have to have the battle on our terms, so that we are not Uncle Sucker here, just importing all of their raw materials.

There are different levels of heavy-duty vehicles. Some

are easier to electrify, no question about it. A school bus is easier to electrify than a long-haul truck.

That is why EPA rules to regulate different classes of heavy-duty vehicles are different, giving more leeway and a longer ramp to the vehicles that are hardest to electrify. We can work with the industry on this subject.

But I will just say this, and I hate to do this before the Senator from California leaves, because I am going to cite the Lawrence Berkeley National Laboratory in California for a study which they have completed that finds that zero emission freight trucks are primed for success, because in their assessment, an average long-haul trucker goes 150 miles between 30-minute driver breaks.

So if we deploy fast chargers across this Country, we can electrify those truck routes and save 13 percent for the owners of those trucks per mile, if we do it right. We are going to have to do it right, there is no question. We are going to have to do it in the correct sequence.

Of course, buses and other vehicles of that nature are going to be easier than the kind of vehicles that Mr. Boyle is talking about.

But we can do this, reflecting the truck stops that, for safety purposes, truck drivers have to accommodate anyway. It will have to be done in a massive enough future.

Again, from Massachusetts, I thank the Senator for all of the great work from the State of California as well. Thank you.

Let me just ask, if I may, one final question before I turn it over to Senator Ricketts. That would be, battery efficiency and the efficiency benefits that we get if this EPA supported battery efficiency standards for vehicles as part of the rulemaking process. Could you speak to that?

Mr. Harto. Yes, I can take that question. Thank you.

Not enough is talked about on efficiency of electric vehicles. Increasing the efficiency of EVs reduces the cost, reduces the amount of batteries, and allows the vehicles to travel greater distance on the same amount of electricity. Ensuring that the EVs that are built are as efficient as possible is great for everybody.

Senator Markey. The EPA is considering the treatment of upstream emissions from plug-in hybrid electric vehicles and battery electric vehicles. I really do believe it is an area where we can put the strongest possible standards in place, and the whole system would benefit greatly.

Let me turn and recognize Senator Ricketts one more time.

Senator Ricketts. Thank you, Mr. Chairman.

Ms. Harris, Mr. Harto, both of you mentioned that when it comes to securing these critical minerals, that we can work with our allies, and certainly, Canada is obviously a very close

ally. I think you mentioned Chile, too. Was Argentina the third one that you mentioned?

Mr. Harto. Australia.

Senator Ricketts. Australia, okay. Very good.

When it comes to specific items, right, when you have to make a battery, you can't miss anything, or else the battery is not going to work. Is that a fair statement? Like, if you don't have graphite, you can't make the battery work, is that fair?

Mr. Harto. Sure.

Senator Ricketts. I think 80 percent of the graphite comes from China. Can these other countries make up the difference of that? Has somebody done, again, for all the critical minerals that are needed for these batteries, has somebody looked at the reserves for these countries and done the math to see that they can actually meet that need? We have heard that you are going to have to, Mr. Boyle, you said 35 percent of the world's minerals we are going to need to do all the heavy trucks, right?

Mr. Boyle. We would need to commandeer seven years' worth of global production.

Senator Ricketts. Seven years' worth. Has anybody done that math, looked at the allies and what they can actually provide?

Ms. Harris. I believe that there are some studies on that,

but I have not. I don't have that in front of me.

Senator Ricketts. So you don't have any personal knowledge of it. Mr. Harto, do you?

Mr. Harto. Yes, again, we haven't dug deep into it, but I will say that, you mentioned graphite. There are methods to make synthetic graphite from coal. We have a lot of coal that is not going to be used here in the United States.

Senator Ricketts. Do you know how much more expensive that would be to make it?

Mr. Harto. I don't know offhand.

Senator Ricketts. Okay.

Ms. Harris, I think in your testimony, you said, in your written testimony, rather, you said rural drivers who, on average, tend to drive further and have larger vehicles, stand to benefit the most from identifying their electric vehicles. Is that accurate?

Ms. Harris. Yes.

Senator Ricketts. I believe that the study you were looking at analyzes impacts in Maine, Vermont, Virginia, and Maryland. Is that accurate?

Ms. Harris. I believe so, yes.

Senator Ricketts. Just out of curiosity, do you know how long it take to drive north to south in Maryland?

Ms. Harris. I don't have that estimate in front of me.

Senator Ricketts. About four hours.

Ms. Harris. Yes.

Senator Ricketts. What about Vermont? Have you any idea?

Ms. Harris. I would estimate two to three hours.

Senator Ricketts. Actually, it is about four hours and 40 minutes, so it is a little bit longer in Vermont.

Nebraska is about seven hours. If you look at not just how long it takes to drive back and forth, but also the square mileage, if you look at the States that you cited in your study, Maryland is about a sixth the size of Nebraska; Vermont is an eighth the size. Maine is about half the size, a little bit less, and Virginia is a little more than a half of it.

My point being that these States are not typical for what you would find in the Western United States as far as rural States. Trying to get at how it is going to impact people in those States is one of the challenges. In fact, that is one of the things that I have noticed since I have come here to Washington, D.C.

Again, to Senator Carper's point, driving electric vehicles, they are fun. They have great acceleration. It is great that we can have fun with them like that. But I think one of the things that I have seen here in Washington, D.C. in my short time is that when you are around big urban areas, you have a different perspective on how you can use electric vehicles and

the access to charging stations and so forth versus a rural State like Nebraska, where you have two metropolitan areas that wouldn't even be considered big on the East Coast and a lot of open space in between where you don't have a lot of people. We have, for example, three times as many cows as we have people.

You have to drive long distances to be able to get anywhere, and I mentioned the stretch between Allen and Hay Springs, 340 miles, there are no charging stations. Even with the \$6 million a year I think Nebraska is going to be getting from the stimulus package that got passed, you are not going to be able build that out in time to be able to have two-thirds in effect, in my humble opinion, by 2032. That is a lot of infrastructure.

We are challenged with that right now when it comes to just getting broadband out to our Nebraska households. That is a billion-dollar investment there, to be able to get just broadband to every household in Nebraska. Trying to do charging stations is going to be another drop, and then again.

Just in my experience as governor, working with our public power districts, we are the only public power State in the Country, just providing, for example, Google and Facebook, which use a lot of electricity, have come to our State, and economic development, creating jobs, they use a lot of electricity. You just don't pop up the kind of electricity it takes to handle

those types of facilities.

In fact, in my conversations with OPPD, Javier Fernandez is their president, it is a challenge to be able to make sure you can keep up with just the growing needs that we have today, none of this is factored into that. None of this is factored into having two-thirds of cars being electric vehicles in less than 10 years. It is not in their plans right now to be able to accommodate that sort of growth in the utility field.

My time has expired, so I yield back. Thank you, Mr. Chairman.

Senator Markey. Thank you, Senator.

The Senator from West Virginia is recognized.

Senator Capito. Thank you.

Sorry this is a quick in and out, but this is a very topical topic, and I appreciate the three of you and the panel being here today. I am going to jump right in with Mr. Boyle. I understand that your fleet transports sensitive materials that can have strict temperature range requirements. You did a lot of transporting, I believe, of the vaccine?

Mr. Boyle. Yes, ma'am.

Senator Capito. Yes. If you are required to purchase an electric heavy-duty truck, do you have any concerns about the ability to deliver shipments with these kinds of specific temperatures, and are those even available with that kind of

technology for an electric heavy-duty truck?

Mr. Boyle. That is a great point. The draw and the demand is very intense. It is a completely different dynamic than the auto sector.

I would like to address Chairman Markey and Senator Padilla explicitly. We share your concern and your drive toward zero emissions. The trucking industry starts at yes. We are on that path, and we share the concerns about all different communities, rural and urban.

But the path to get there has to be logical. We can't be set up for failure, and in many respects, some of the regulations have caused negative consequences. California actually has among the oldest truck fleets in the Country, so 52 percent of California trucks are pre-2010 diesel emissions. If we got them current to today, that would be an 83 percent reduction with the existing infrastructure.

It is not that we do not want to reduce emissions. We are fully on board with that. It is just that not all solutions, we can't spread the peanut butter from cars onto all vehicles.

Senator Capito. Let me ask you this, and it has probably been asked, the cost issue, a new diesel truck in your business, how does that cost? What is the equivalence there for that and an electric truck?

Mr. Boyle. The upcharge is roughly \$300,000.

Senator Capito. That is on top of what the vehicle costs?

Mr. Boyle. Yes, ma'am, the upcharge, the delta.

Now, as my friends to the right of me here have pointed out, over the cost of ownership, a portion of that may be realized, but not nearly the \$300,000. But at some point, yes, it might be somewhat more viable. It is just that we are years away from it. It is simply not an option, because there isn't the infrastructure or power to get to them.

Senator Capito. In terms of, let's say, if we are looking 10 years down the road, or if we look 10 years back, would that \$300,000, we expect, I think, and you probably, I don't want to put words in your mouth. Do you expect, I expect, that that delta does down over time as there is more, or not?

Mr. Boyle. So, the economies of scale that have been discussed previously are in the auto sector where the addressable market is exponentially larger, in the millions of vehicles per year. In trucks, it is a couple hundred thousand, so the market opportunity isn't such that you would have a Moore's law for heavy trucks, for example.

I can tell you, over the course of my career, I haven't seen truck prices go down much over time, but yes, could it be compelling and a total cost of ownership at some point? Perhaps, and we are not averse to that. But we are certainly not in position to even phase that in at a 1 percent level at

current.

Senator Capito. The weight is an issue as well, both for cars and for, I am concerned about, I will go to cars. Cars are going to be heavier. EV cars are going to be heavier because of the weight of the battery and other things.

What kind of safety issues and what kind of State DOTs, what kind of reinforcements along the highways, is that all going to change, accidents, impacts? All of these things I know are critical when you are looking at transforming an entire fleet. I don't know if the trucking industry, by the time you add the weight to the truck, what does that do to the cargo, because there are weight limits, obviously?

Mr. Boyle. Yes, sure. Each heavy-duty truck electric vehicle battery would be about 8,000 pounds. They are typically in sets of two or three or four. As you add weight in that respect, you reduce the payload capacity. I think another lever for improving congestion and emissions that you have championed, with direct targeted infrastructure investment, and particularly in chokepoints around the Country in a smart fashion, then reducing traffic reduces emissions. That is another lever that the government has at its disposal.

Senator Capito. Ms. Harris, I wanted to ask you a question on, in your testimony, you highlight the NRDC support for EVs and the incentives in the Inflation Reduction Act. The

investments that have to be made in battery manufacturing, we know we are beholden to China right now, so we are trying to draw that back into our own Country and have domestically produced critical minerals and chips and everything.

Does the NRDC, are you supporting any domestic mining projects right now that would provide that? Can you name any that your organization does support in terms of creating a mine for critical minerals?

Ms. Harris. That is not my area of expertise, but I will say that the auto industry has already committed over \$210 billion to bringing this battery supply chain here to the United States. Many of the incentives that are coming from Congress, including in the Inflation Reduction Act, are not only helping to on-shore some of these supply chains, but are also incentivizing reducing, reusing, and recycling the batteries so that we need to extract less minerals moving forward.

Senator Capito. But we still have to extract in order to get the domestic production requirements in the Inflation Reduction Act and other things. There are still requirements for, and there is a great desire for us to have domestic materials, whether they are recycled or not, you have to originate. If you are going to have this whole, huge glut of new vehicles or trucks or whatever, or both, you have to have the critical mineral, and you have to have the mine to do it.

We have to have support for permitting reform and for permitting these mines. I question whether your organization would be in favor, and I understand it is not your expertise of domestic mining of some of these critical minerals, which can be very difficult. Thank you.

Ms. Harris. Thank you for your question.

Senator Markey. Great, thank you. Just a tip of the cap to West Virginia because school buses are considered to be heavy duty.

Senator Capito. And they are making them.

Senator Markey. And they are making them in West Virginia, so the innovation State of West Virginia has figured out how to make heavy duty buses, school buses, that will be purchased in States all over the Country. They have already made an announcement in West Virginia of 750 jobs in a battery manufacturing plant that is going to be opening down in West Virginia. Congratulations on that, and the fact that it is a company from Somerville, Massachusetts, which is going to use West Virginia for the 750 manufacturing jobs down there.

Senator Capito. What company is that?

Senator Markey. Form Energy.

That is going to the grid, but again, it is the larger size battery technology that can be developed. For example, I heard Mr. Boyle talking about how when the truck fills up, it goes

1,200 miles, but if you take out that 1,200 mile capacity for oil, that leaves a lot of space for a battery and innovation that can develop that battery that could fill in, because that is a lot of weight that is taken off the truck if you could then replace it with a battery that could use it. West Virginia is at the cutting edge of those issues.

Again, I view this, Mr. Boyle, in a way in which we had these cell phones that were the size of a brick, and then I know because I moved over the 200 megahertz to create the flip-phone era. If you listened to the incumbents at that time, oh my God, you don't know how hard that is, but within three years, everyone had a flip phone by 1995.

And then a very smart kid out in Silicon Valley figured out, you know what, with all that spectrum, I could actually turn it into an iPhone with the capacity of a computer on the Apollo mission in 1969.

So I am very confident that once we set these high goals, with all of the tax incentives that are going to be there, that we will make the breakthroughs, but understanding that you are in an area which will be more difficult, but there are many other heavy duty truck areas that can be solved.

Do you agree with that, that for school buses, for other types of heavy duty but still within a range of technological feasibility to solve that problem in a relatively short period

of time?

Mr. Boyle. You make a great point, sir. It is a massive, diverse industry, and not all operations are the same. However, your previous statement where you used a very important term, sequence, it has to be at the right sequence.

Currently, .001 percent of operations could be supported. That is part of the problem, is that the Clean Trucks Rule, all these things, are way too aggressive based on the current infrastructure. Many carriers are actually making inquiries. When the utility tells you, you are three years out from converting to ten forklifts in a warehouse, I think that should alert us to the fact that we are just not there.

Once again, we are on board with getting there in a gradual fashion, but even come January of this year, we are not quite there. We welcome the opportunity to kind of inform the rulemaking and legislative process.

Senator Markey. Thank you for that.

Again, the sequencing is important, but we should get those heavy-duty vehicles that we can, and then continue to work, knowing that innovation will help us to accommodate the more difficult areas over time, but still to meet the goal.

One thing, Mr. Harto, that continues to tick me off, is that we import oil from Saudi Arabia, that we import oil from Iraq to put into gasoline tanks in the United States. We put 70

percent of all the oil we consume at the gasoline tanks, when, with innovation, we can just back out that oil.

Can you talk about those benefits, Mr. Harto, for our society, both from a climate and from a national security perspective?

Mr. Harto. I can talk about it from the perspective of the consumer. From the consumer perspective, not having to worry about the fluctuations in the price of gas as it goes from \$2 a gallon to \$5 a gallon, back to \$3.50 a gallon, and who knows where it goes tomorrow or two weeks from now.

Electrified vehicles, whether they are hybrids, whether they are plug-in hybrids, which would work great in Senator Rickett's State of Nebraska, where people may have to drive long distances without charging infrastructure while still significantly reducing emissions, all of those technologies can reduce consumers' risk to fluctuating oil prices.

Senator Markey. Without question. When Saudi Arabia and OPEC Plus two weeks ago decided, well, too much oil on the market, we are just going to reduce the amount of oil on the market to drive the price back up again. The equivalent to my father, the truck driver, he can't do anything about it. He has to buy the oil. He doesn't have a choice. We are just held to whatever the price that this cartel, this essential monopoly, a cartel, wants to charge us.

This gives us a chance to kind of break that link. It will probably help us make more intelligent foreign policy decisions, as well, in terms of this dependence that we have had upon oil over all of the years.

I can't thank all of you enough for your testimony today. In conclusion, when I am going to give you each is one minute to summarize what you want us to know at the conclusion of this hearing. I will go in reverse order of the opening statements and give each one of you that one minute. We will begin with you, Mr. Boyle.

Mr. Boyle. The trucking industry is not averse to change. We embrace the opportunity to explore alternative fuels and alternative technologies to achieve zero emissions over time.

We are very disappointed with EPA's about-face in terms of the existing rulemaking that manufacturers were trending to and planning for and investing the capital necessary to achieve another significant reduction in emissions.

Secondly, this kind of punting to a State patchwork of emissions standards is not workable when you are dealing in interstate commerce. The assumptions and the passion for electric vehicles in the car industry and the car segment, I totally appreciate. But to extrapolate that onto the trucking industry and the complexities where you can't leverage any of the existing car charging infrastructure is a huge mistake.

We look forward to working constructively both with Congress and the agencies. Thank you.

Senator Markey. Thank you so much.

I should have offered Senator Ricketts a final round, as well, which I did not do, and I apologize for that. If you would like to ask questions, let me just give each one of these the one minute, and then we will come back to you.

Ms. Harris?

Ms. Harris. Thank you so much. One takeaway, three major wins that a transition to --

Senator Markey. One minute.

Ms. Harris. Oh yes, I will sum it up very quickly. The three wins that we can anticipate through a transition to clean air cars is a win for pollution reductions and for public health. Clean car standards will reduce greenhouse gas emissions and also just improve the health of our communities and our children.

It is a win for consumer pocketbooks and for consumer choice. We know that transitioning to zero emission vehicles can save drivers thousands and thousands of dollars over the life cycle of the vehicle.

And it is a win for the industry and the economy in the United States. We have the opportunity to have a renaissance of manufacturing here in the U.S. and incorporate and increase our

competitiveness across the globe.

For these reasons, we are very excited and appreciate the Federal Government's efforts to support this transition. Thank you.

Senator Markey. Thank you, Ms. Harris, very much.

Mr. Harto?

Mr. Harto. Yes. I just want to reiterate my three main points that these EPA standards are achievable, there is consumer demand that is far outpacing supply for electric vehicles, and we see that continuing into the future, and third that, again, EVs already save consumers money, and they will continue to save consumers money far into the future.

Senator Markey. Thank you, Mr. Harto, very much.

Again, I apologize to Senator Ricketts. You are recognized for another round of questions.

Senator Ricketts. Not at all. Thank you very much, Mr. Chairman.

Mr. Harto, you mentioned earlier, you talked about hybrids. I actually agree with you that a hybrid is a better solution with regard to States like Nebraska, where you have longer distances that you have to drive. The EPA has said to attain their standards by 2032, it would have to be something like two-thirds of cars would have to be electric vehicles, if it was only an electric vehicle solution. But you also mentioned in

your earlier testimony that car manufacturers can do things like hybrids. Correct?

Mr. Harto. That is correct.

Senator Ricketts. Do you know, have you done the math, have you seen any studies that show that say, you were going to just assume electric vehicles were going to grow to the current pace, what would hybrid vehicles have to be, what percentage of the new car sales would hybrid vehicles have to be to meet the same sort of attainment standards if you had two-thirds?

Mr. Harto. Again, we are going to have a mix of solutions in different places. When we did the analysis on a 50 percent target, if an automaker built mostly hybrids, that 50 percent drops down to about 35 percent electric vehicles. Again, an automaker could build 50 percent. I don't know the exact numbers, but they can build a mix. The more hybrids they build, the more plug-in hybrids they build, the fewer battery electric vehicles they have to build.

Senator Ricketts. So Consumer Reports has done that math on that to say how much percentage would have to be to reach these attainment emission standards?

Mr. Harto. We haven't for the current rules. We plan to do some of that analysis in the future. They were just released last week, so we haven't had a chance to run the numbers. But we have done it on similarly strong standards, and there is a

lot of room to apply other technologies.

Senator Ricketts. Okay. Mr. Boyle, we have talked a lot about how the trucking industry is on board with reducing emissions. You have already been doing it. Talk to me a little bit, though, about, you mentioned the patchwork of States also trying to do this.

Can you discuss the impact these rules would have on business development strategy? When you have a change like this, what does it do for your long-term business planning?

Mr. Boyle. Yes. I hope I conveyed early on how my company is in the top 1 percent of the top 1 percent in terms of sustainability performance and initiatives. I can tell you that, tragically, it is not valued in the marketplace.

So one other lever that I would suggest that the Federal Government has at its disposal is to put out a carrot. Think of the purchasing power of the U.S. Postal Service, the GSA, the Department of Defense. None of those factor in sustainability of the transportation service provider in the procurement decision.

How about we use market forces to entice people to buy newer, cleaner vehicles? And that will enable us to bring that 40 percent of America's fleet that is on the old standard up to current, and that will have, without as much of an investment, that will have a greater impact.

Senator Ricketts. What about, again, just talking about your own business planning, when you see changes like this, how does that impact your business, specifically?

Mr. Boyle. I guess we would have to have a lot more trucks to service the same amount of freight, and then we would have to, we really, as of right now, it is not even a consideration to invest in battery electric trucks. The Clean Truck Fleet Rule is not saying, as Senator Markey said, hey, particular applications is more applicable. No, you are looking at, hey, every motor carrier, you have to have this percentage. That is just completely irrational.

Senator Ricketts. So, you are saying the regulations don't accommodate what we are talking about, that maybe school buses would be a good application, but long-haul trucks would not be? The regulation is too broad, it is too blunt of an instrument to actually make that, it doesn't have that nuance. Is that fair?

Mr. Boyle. That is a great analogy, yes, because all school buses have the same characteristics and operation. Trucking is so massively diverse.

Senator Ricketts. I thought you just said something about, it is a discouragement to make investments in battery trucks. Is that what you just said?

Mr. Boyle. Yes. Right now, because, as we said, the sequence, the power generation, if we said right now, 25 new

nuclear plants are going in to create clean energy in the Country to feed the grid and other renewables, and then in parallel we are going to build the charging infrastructure, hey, then we are considering it. That is a business decision.

We all want to reduce fuel consumption. That is good business, but without those in place, there is actually no consideration whatsoever.

Senator Ricketts. Thank you, Mr. Boyle.

Chairman Markey, I would note that under the last Administration, the United States was energy independent before the Biden Administration's policies that reduced the investment by our own companies here in America. So we actually didn't have to do all that importation of other fuel, if we would take advantage of our own resources.

Senator Markey. No, we were importing oil from Saudi Arabia and other OPEC countries.

Senator Ricketts. But we were a net exporter of energy, and we could be again if we would take advantage of some of the things we talked about today about using our resources. And of course, I don't think anybody is going to do it better than we are with regard to protecting the environment.

Senator Markey. I appreciate what you are saying, but if we did not export our own oil, we could have told Saudi Arabia and other countries, we don't need your oil at all. So, by

exporting our own oil, we then need Saudi oil.

In essence, what this revolution is, we are saying to all of the oil companies, we are not going to need your oil. We are going all electric. It is not going to be drill, baby, drill, it is going to be plug in, baby, plug in. It is across the whole oil industry, across domestic and international markets.

I appreciate what you are saying. Ultimately, this plan is one to create jobs in America. Let's just say that. If by the time we have 50 percent of all vehicles here sold in the United States by 2030 are electric, and we do nothing to on-shore the EV supply chain or grow the market share for American-made vehicles, there will be significant job losses in the United States.

But if 50 percent of vehicles sold in the U.S. in 2030 are electric and we increase domestic content and increase the market share of American-made cars, 140,000 new jobs will be created in the United States.

So, implementation of this matters. It is going to be very important for us to make sure that we get this technological and economic and climate justice revolution underway, and that it happens in a fair way with environmental justice for our communities, for union workers, and with intentional implementation of the billions of dollars in new money going to the right places, while the EPA has to deliver that we are, in

fact, delivering for those communities that have always been impacted most intensively.

Again, I will just add one more fact that in 2022, the United States was a net petroleum exporter in 2022, so we were in fact exporting more oil than we actually imported in 2022. That is just the reality of where we are today. This is a discussion about how we are moving to the future.

As a matter of housekeeping, I would like to ask unanimous consent to submit for the record a variety of materials that include letters from stakeholders and other materials that relate to today's nomination hearing. Without objection, so ordered.

[The referenced information follows:]

Senator Markey. Senators will be allowed to submit written questions for the record through the close of business on May 2nd. We will compile these questions, send them to all of our witnesses. We will then ask you to reply by May 16th.

With that, this very important and reformative hearing is adjourned. Thank you.

[Whereupon, at 4:42 p.m., the hearing was adjourned.]