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CLEANER TRAINS: OPPORTUNITIES FOR REDUCING EMISSIONS FROM
AMERICA'S RAIL NETWORK

Wednesday, July 26, 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 2:32 p.m. in room 406,
Dirksen Senate Office Building, the Honorable Edward J. Markey
[chairman of the subcommittee] presiding.

Present: Senators Markey, Ricketts, Carper, Kelly, Padilla,
Lummis, Boozman.

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

Senator Markey. Good afternoon, everyone. I am pleased to call the Senate Environment and Public Works Subcommittee on Clean Air, Climate, and Nuclear Safety to order for this important hearing. This is going to be an absolutely fascinating subject for people.

Thank you for joining us today on our hearing on Cleaner Trains: Opportunities for Reducing Emissions from America's Rail Network.

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 partnership in holding this hearing. It is my pleasure to welcome our three witnesses.

Railroads were once the crown jewel of America. They were a product of the industriousness and talent of American workers. Massachusetts is proudly home to some of the earliest railroads. The completion of the Western Railroad in 1843 connecting Boston to the Berkshires conclusively demonstrated the feasibility of freight rail in the United States of America.

One hundred and eighty years later, unionized American workers stand at the ready to build today's green locomotives. But our railway system is blocking the crossing. In the midst of America's Green Revolution, our railway operators have lost their taste for American innovation.

Today's new locomotives are built to emission standards set by the Environmental Protection Agency which were last updated in 2008

and have not been revisited for 15 years. The EPA predicted that with the adoption of the next generation clean locomotive technology, these standards could prevent thousands of deaths and hundreds of thousands of lost work and school days.

However, we have not stayed on track with EPA's projections. Railroad operators have been reluctant to invest in those clean, new locomotives, derailing our pathway to emissions reductions. Nearly half of the Class One railway fleet of locomotives is more than 20 years old, old enough to vote. Those old trains emit almost seven times as much nitrogen oxide and 13 times as much soot as new, cleaner locomotives.

Since the 2008 rulemaking, we have seen more and more evidence that these pollutants are poisoning communities along railways and beyond. These pollutants affect the rail workers who breathe the diesel fumes day in and day out, taking home higher cancer risk and mortality. These pollutants affect the communities who live and work and play next to these railways, burdened with elevated risk of heart and lung disease.

And those pollutants affect the ability of States and municipalities to uphold their responsibility to provide residents with healthy air. We have low emissions technology, and it is built by union workers. We even have zero emissions technology, and it is built by union workers. Railroads powered America's past, but they can also supercharge our future.

We have the technology, we have the workforce to make our railroads safe, efficient, and clean, moving goods and people where

they need to go.

I am a huge supporter of American railroads and rail workers. I have introduced the BRAIN TRAIN Act, to connect Massachusetts by rail. I have introduced the Freedom to Move Act, to support fare-free transit to get Americans onto our trains and our buses. And I have supported increased funding for high-speed rail and I have introduced the Safe Freight Act to support the safe operation of railways for rail crews and railyards.

I believe in American rail. I believe in the workers that build and operate it. Rail can again become a beacon of American ingenuity, American innovation and capability, uplifting the talents and industriousness of the hard-working people who build these next generation locomotives.

Today we will learn about how our outdated regulations have left our communities, our workers, and our rail industry vulnerable. By updating regulations to better reflect the harms of air pollution, and technological advances on locomotives, we can get back on track. I look forward to hearing from all of our witnesses about how we can continue to move forward to clean trains, healthy communities, and a strong union workforce.

Before we hear from our witnesses, however, let me turn to recognize the Ranking Member of the Subcommittee, 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, Chairman Markey, for initiating this important hearing. I liked how you worked in the railroad terms into your opening statement. I am going to have to talk to my team about that when we have those opportunities. Thank you as well to our witnesses who are here with us today to talk about these important issues.

This hearing serves as an incredible opportunity to share the investments and innovations that are being made in our entire rail system. Nebraska has a long history of railroading and much of our development is intertwined with rail expansion in the west. Today, the rail industry employs over 8,000 Nebraskans. Rail ships grain, biofuels, and feed ingredients out of Nebraska while also importing coal, fertilizer, and steel. What I am getting at here is that rail volume is critically important to the economy of Nebraska.

A point that is likely to be reiterated throughout this hearing: U.S. freight railroads can move one ton of freight more than 500 miles, or nearly 500 miles, on a single gallon of fuel. Now, put in that perspective, that is able to cross the entire State of Nebraska, from Iowa to Colorado. So that is a pretty incredible efficiency, to be able to move a ton of freight across the entire State of Nebraska with one gallon of fuel.

Nationally, rail makes up about 28 percent of the freight movement by ton miles. But railroads only account for 1.7 percent of the total U.S. transportation-related greenhouse gas emissions. To

give you another perspective, it would have taken almost 2 million additional trucks to handle the 34.5 million tons of freight that originated by rail in Nebraska in 2021 alone.

America's railroads have already taken steps to further reduce emissions, including increasing the uses of biodiesel and renewable diesel. In some cases, renewable diesel and biodiesel can reduce carbon emissions by 25 percent.

Utilizing more renewable diesel and biodiesel is a win-win scenario. Renewable diesel and biodiesel are produced from agricultural byproducts, wastes, and residues such as soybeans, echinacea and corn oils, animal fats, and used cooking oils. Creating value through byproducts sustains value for farmers across the country, decreases emissions, and supports renewable refining jobs across rural America. Renewable fuels are the here and now solution to maintaining rail efficiency while decreasing emissions.

There are ongoing efforts to push toward the electrification of our entire rail system. However, there are also many concerns with this approach. As you all know, the freight rail industry is an interconnected system of the seven Class One railroads and hundreds of short line railroads that own and maintain over 180,000 route miles of track throughout North America. At any given moment, 5 to 10 percent of the line haul locomotives being operated by the seven Class One railroads are actually owned and leased by another railroad.

As Class One railroads utilize one another's tracks and cars, this system is wholly reliant on the interoperability of technology. The deployment of unique locomotive technology would create captive

fleets that serve small geographic regions, harming the efficiency of railroad operations and disrupting entire supply chains.

Electrification of our Nation's freight rail network would also require building and maintaining a reliable high-voltage catenary system. This kind of system would require infrastructure through cities, deserts, plains, rivers, rail tunnels and bridges. Estimates put the cost of electrification at millions of dollars per railroad track mile.

I am supportive of and excited for the industry to lead innovation in this space. North Platte is home to the Bailey Yard, the world's largest classification yard. The Bailey Yard is responsible for sorting and building trains covering 2,850 acres and including more than 300 track miles.

The Bailey Yard will be home to four battery electric locomotives in the coming years, where the feasibility, safety, and reliability will be put to the test in Nebraska's hot summers and cold winters. This kind of industry innovation will ensure that our rail industry can make decisions that best support their workers, customers, and supply chain as a whole.

State and Federal regulations cannot put the cart in front of the horse when it comes to reliability and safety. It is important that our railroads maintain their interoperability, efficiency, reliability and safety.

I look forward to hearing our witnesses' testimony and finding ways we can work together. I also have an introduction for Mr. Jefferies, unless you are going to introduce him, in which case I will

defer.

[The prepared statement of Senator Ricketts follows:]

Senator Markey. We are going to introduce all the witnesses and then hear their testimony in order.

Senator Ricketts. I am on a roll.

[Laughter.]

Senator Markey. At this time, you should introduce Mr. Jefferies.

Senator Ricketts. Very good.

All right, so, Mr. Jefferies, thank you for joining us. Mr. Jefferies serves as the President and CEO of the American Association of Railroads, where he advocates for and works with member railroads to ensure the continued viability of America's railroad industry. Prior to this role, Mr. Jefferies was the senior vice president of the AAR's governmental affairs, where he led the development and promotion and implementation of legislative priorities for the AAR.

Before joining the AAR, Mr. Jefferies worked within government for more than a decade, including as a senior policy advisor to the chairman of the U.S. Senate Committee on Commerce, Science, and Transportation. In this role, he provided policy guidance on a host of transportation issues, including railroad and economic regulation and rail safety and passenger rail.

Mr. Jefferies began his career in government serving as a senior advisor to the mayor of Lexington, Kentucky, before transitioning to the Federal Government. Prior to serving in the United States Senate, he worked for the U.S. Department of Transportation, Office of the Inspector General, and the U.S. Government Accountability Office.

Again, thank you, Mr. Jefferies, for being here. I look forward

to having you answer our questions.

Senator Markey. Thank you.

Let me continue by also introducing Carl Rosen. Mr. Rosen is the General President of United Electrical, Radio, and Machine Workers of America. UE represents 35,000 workers across America, including railway crew drivers and machinists that build next generation clean locomotives. Mr. Rosen has been a member of UE since 1984, when he joined as a rank-and-file members.

We will also hear from Ms. Ivette Torres. Ms. Torres will be joining us virtually. She is the lead Community Researcher at the People's Collective for Environmental Justice. Ms. Torres has been raised in freight communities her entire life. She is an expert on the environmental impacts of freight movement on southern California communities.

Finally, we will hear from Mr. Ian Jefferies, who you just have heard introduced by Senator Ricketts.

So with the conclusion of the introductions, Mr. Rosen, you are up.

STATEMENT OF CARL ROSEN, GENERAL PRESIDENT, UNITED ELECTRICAL, RADIO,
AND MACHINE WORKERS OF AMERICA

Mr. Rosen. Thank you very much, and thank you for having this important hearing today.

Our union represents thousands of workers in the rail industry, both those who manufacture locomotives and parts and rail crew drivers who work in rail yards across the Country. We are unequivocally in favor of stricter emissions standards for rail. Stricter standards would be good for workers and good for the economy, and can be met using existing technology.

In 1998, the Environmental Protection Agency instituted a tier-based system for regulating the emissions of locomotives. Modern Tier 4 locomotives have been in production since 2014 and became the standard for all newly built locomotives in 2015. They are estimated to emit 90 percent less particulate matter and 80 percent less nitrous oxide than Tier 2 locomotives, those built before 2012.

When the EPA issued the Tier 4 standard, it estimated that by 2023, over 30 percent of the locomotives on the rails would be Tier 4. However, the railroads have been slow to upgrade to this cleaner and greener technology.

As of 2021, the most recent data for which the Bureau of Transportation Statistics data is available, less than 10 percent of the Class One railroad locomotive fleet was Tier 4, while over three-quarters was still Tier 2 or lower. Without action by our government officials, the railroads will keep those dirty locomotives running for years, if not decades to come.

Rail yards are well known as hot spots for pollution. In urban areas, they are often located in low-income communities of color. Neighborhoods surrounding high traffic yards in California have a significantly elevated rate of cancer.

When wind carries air from a yard into a residential area, airborne black carbon spikes to twice the normal level for an urban area. Children living near rail yards have twice the incidence of asthma of those living at least four miles away.

Hundreds of UE members work in these unhealthy environments on a daily basis. Many of them live there as well. It is unconscionable that we let this go on, when existing technology can mitigate the issue, and now commercially viable technologies like battery locomotives can all but eliminate it.

Setting stricter emissions standards for locomotives is not only the right thing to do for workers and communities around the railroads, it will also stimulate American manufacturing, as new requirements for railroads to fully modernize their fleet will spur demand.

Essentially, all manufacturing of locomotives for the U.S. market takes place domestically, and much of it is union, with family-supporting wages and benefits, such as at the UE represented plant in Erie, Pennsylvania.

A recent report by the University of Massachusetts Amherst shows that if the Erie plant were to be utilized to its full capacity, building clean locomotives, it would create thousands of quality, family supporting jobs in a Rust Belt city that has been hit by both

de-industrialization and job loss associated with our transition away from fossil fuels.

The existing regulations are outdated and full of loopholes. There is no mechanism to enforce the adoption of new green technologies. We need stricter, enforceable standards. We need to allow States to take the lead, as California is attempting to do, in protecting the health and welfare of its residents. But we also need action on the Federal level to ensure that the benefits of new standards are shared across our Nation.

Tier 4 locomotives have been in production for almost a decade. The zero-emissions battery operated locomotives have been in use for years in rail yards. These are proven technologies. Their adoption is not a matter of technological feasibility, but of priorities.

What is more important for our Country, clean air, addressing the climate crisis, and good jobs, or corporate profits, executive bonuses, and payments to Wall Street?

The Class One railroads, which own 90 percent of the locomotives on the rails, are enormously profitable. However, we need look no further than the disaster in East Palestine to see an example of how they prioritize profits over the public good. The bottom line is that they will not make this investment in our shared future unless our Country requires them to.

Setting stricter emissions standards for the rail industry, requiring that they quickly upgrade their cross-country fleets to Tier 4 and use zero-emission locomotives in rail yards is the right thing for workers, the right thing for the planet, the right thing for

working class communities and communities of color, and the right thing for building greener, cleaner manufacturing in the U.S.

Thank you.

[The prepared statement of Mr. Rosen follows:]

Senator Markey. Thank you, Mr. Rosen.

Ms. Torres, if you are ready, we can proceed with your testimony at this time.

STATEMENT OF IVETTE TORRES, COMMUNITY RESEARCHER LEAD, PEOPLE'S
COLLECTIVE FOR ENVIRONMENTAL JUSTICE

Ms. Torres. Thank you, Chair Markey, Ranking Member Ricketts, and the Clean Air, Climate, and Nuclear Safety Subcommittee of the Senate Environment and Public Works Committee, for inviting People's Collective for Environmental Justice to testify today.

My name is Ivette Torres. I am the Lead Community Researcher at the People's Collective for Environmental Justice in San Bernardino, California and a Ph.D. student in environmental engineering at the University of California Berkley. PCEJ is a community-based environmental justice organization in the Inland Empire in southern California. We fight against pollution and environmental racism caused by the freight and logistics industry.

I am a member of the Moving Forward Network. MFN is a network of over 50 member organizations led by environmental justice communities representing over 2 million members working to eliminate the deadly public health and environmental impacts caused by the freight transportation system.

I want to thank the members of MFN who are here today and those who share their stories in my written testimony. I want to honor those who are not able to be here because of their health and those in the fight who have left us too soon because the regulators and rail industry failed to protect our communities from the environmental burdens those same diesel-fueled industries caused.

I was raised in freight communities my whole life. The Inland Empire is made up of San Bernardino and Riverside Counties. We have

desert, forest, and beautiful mountain landscapes. Picturesque hills surround our communities. Our elected say these same hills and mountain ranges trap the L.A. smog and cause the Inland Empire to have the worst ozone pollution in the Nation.

What our elected officials fail to see and what the community has been pleading for years is that the logistics and freight industry is the real reason our communities suffer from the worst air quality in the Nation.

Freight communities are hubs for the logistics industry. We see 40,000 diesel trucks come in and out of our neighborhoods every single day, and thousands of diesel trains that are miles long carrying tens of thousands of heavy containers coming into rail yards near our homes.

Cargo air freight is also presently expanding. All these cumulative impacts are slowly killing my community and many others across the Nation. The whole freight system is interconnected. It is poisoning us left and right.

The California Air Research Board ran a rail health impact study with community advocates and found that anyone living close to a rail yard, rail line or port is most likely to have a lower life span due to risk of cancer, dubbing these communities, our communities, cancer clusters. I worked with community members who lived by the San Bernardino Intermodal Facility to monitor both indoor and outdoor air quality. Community-collected data that revealed, inside their homes, where they should feel comfortable and safe, the levels of particulate matter were ten times higher than the EPA standard.

Communities having to monitor the pollution is not unique to San Bernardino. MFN members across the Nation are collecting their own data. This is because the railroads refuse to share any data with us. It is impossible to know when locomotives will idle for more than 30 minutes. When locomotives idle, they create a safety hazards. Communities like Colton, California are locked in, trapped by rail lines and truck traffic. Idling trains prevent emergency vehicles from being able to get to the hospital. We have also seen children jumping over trains to get to school.

Over 13 million of us in the United States live and work near rail yards, rail lines and ports. That is 13 million people who are most likely to be black and brown communities dealing with these realities day to day. But the last time EPA updated its emissions standards was 15 years ago. We continue to suffer.

There is no reason why our communities must suffer. The technology is here for locomotives and rail yard machines to switch to zero emissions. One-third of the world's rail lines are electrified. Electric rails have been used for hundreds of years and transports the heaviest freight cargo, which use technology like overhead catenary in the United States. Yet we have outdated diesel locomotives still operating today that are older than many of us in this room.

Our goal is not to stop freight as we know it. But this movement is an essential part of our Country's lifeline. We want to transition our communities to safer, zero-emission technology. Many of us are products of the freight industry.

I want to ensure we create more employment and investment

opportunities in my community. But that should not mean it should cost our lives. We can create opportunities while prioritizing community health and safety.

EPA must adopt a zero-emissions locomotive standard.

[The prepared statement of Ms. Torres follows:]

Senator Markey. Thank you so much for your testimony.

And now, having already been introduced, we welcome you, Mr. Jefferies. Whenever you feel comfortable, please begin.

STATEMENT OF IAN JEFFERIES, PRESIDENT AND CHIEF EXECUTIVE OFFICER,
ASSOCIATION OF AMERICAN RAILROADS

Mr. Jefferies. Chair Markey, Ranking Member Ricketts, members of the subcommittee, thank you for the opportunity to speak with you today about the freight rail industry's environmental profile and how we can work together to drive down transportation-related emissions.

You have heard the stat today: a Class One railroad on average moves one ton of freight about 500 miles on a single gallon of fuel. To use a different city pairing, that is farther than the distance from Boston to Washington, D.C. using I-95. Railroads do this on infrastructure they own, and they maintain, spending some \$25 billion of their own money per year on the network.

Pick your stat: the numbers recognized by the White House's Decarbonization Blueprint speak for themselves. While transportation is the largest source of U.S. emissions, rail, which moves approximately 40 percent of long-distance freight, is less than 2 percent of those total emissions. Rail today is three to four more times fuel efficient than trucks. And the possibilities are exciting as well. If just 10 percent of the freight that currently moves across the Nation's highways moved by rail instead, annual emissions would fall by roughly 20 million tons, equivalent to taking 4.1 million cars off the highways every single year.

None of this is by accident. It is a result of innovation, vigorous spending, and an understanding of the societal and economic benefits of continued environmental progress. Over the last 20 years, railroads consumed 11.8 billion fewer gallons of fuel and emitted 133

million fewer tons of carbon dioxide than they would have if they had not improved their efficiency.

These gains emanate from buying or retrofitting better locomotives, incorporating anti-idling technologies, fine-tuning fuel management systems, and increasing the use of low-carbon fuels. Simply getting trucks in and out of yards quicker through technological innovation has made a marked impact as well. The result is a strong foundation for the future.

The next wave of progress on the main line and in yards is in sight, as railroads are using more zero-emissions cranes, purchasing electric switcher locomotives for yard use, and testing battery and hydrogen powered locomotives in revenue service. While the latter technologies are in pre-commercial stage, observers are justifiably encouraged.

Yet progress does not stop, especially in driving further gains for particulate and overall emissions. We understand the urgency, including for fence-line communities closest to rail operations. Progress will be best realized through practical policies grounded in data and collaboration as a necessity.

Some policies are easy wins, and we just saw that this morning in this committee. We encourage Congress to reauthorize and continue the Diesel Emissions Reduction Act and to support relevant grant and loan programs particularly those most critical to short lines to help modernize their equipment.

We also encourage Congress to support mode neutrality and sustainable fuel programs and to ensure research in this area

considers the broadest possible base of feedstocks and resources.

Other measures, however, are bigger lifts, namely, the need to reestablish a user pay system in transportation in a way that removes market distortions and uncompetitive subsidies for competing freight modes with higher emissions. We were encouraged to see the chair of this committee's call this week for DOT to make progress on a national vehicle miles traveled pilot program. Most of all, we must be pragmatic.

On the contrary, proposed mandates like what we have seen in California, which would force the adoption of technology that is not commercially viable at odds with Federal law does not add up. While regulators in that State may think they are expediting decarbonization, in fact they are diverting resources that could be used in accomplishing shared goals.

The impact on small business alone with this proposed rule would be staggering, with 25 percent of short lines in the State of California expected to go out of business. The result of that, additional trucks on the highway, is not something that I think is the goal of CARB.

Much of the same can be said about the widespread catenary electrification ideas. This notion is simply unrealistic on a 142,000-mile network operating 24-7 in all climates across tunnels and bridges and all topographies.

However, expressing concern is not obstinance, it reflects reality. We cannot ignore the industry's measurable actions today and to date and let the hope of perfection stand in the way of continued

meaningful progress made together.

We are proud of our progress in this area, and will continue to drive down emissions.

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

[The prepared statement of Mr. Jefferies follows:]

Senator Markey. Thank you, Mr. Jefferies.

Now we will turn to questions for the panel. Let me begin by recognizing myself.

The Environmental Protection Agency hasn't updated its locomotive standards in 15 years. A lot has happened in 15 years. The science connecting air pollution and health impacts is stronger. And our clean technologies are much cheaper and better.

During that same period, the EPA strengthened or proposed to strengthen emissions standards for trucks and cars at least five separate times.

We are taking action on emissions across the transportation sector, and our workers and companies are on the road to success. But our railroads have been left to fall behind.

In 2008, the EPA set longer-term standards, known as Tier 4 standards for newly built locomotives that reflected the advanced state of high efficiency technologies in 2008. It also tightened standards for existing locomotives when they are remanufactured to varying degrees.

But those standards made key assumptions that railroad operators would continue business as usual rather than pumping the brakes on innovation.

Ms. Torres, do the locomotive emissions standards established in 2008 meet the needs of communities today?

Ms. Torres. No, unfortunately not. Tier 4 is still diesel-fueled. Our communities have been suffering and continue to suffer. We know that the technology is here, and it is feasible, economically

feasible to go completely zero-emissions. We need standards that are higher and better than the 2008 standards.

Although it was adopted 15 years ago, and I know others may say that is something that could have helped us then, technology has moved and will continue to move toward zero emissions to make it feasible.

So we need something that is not diesel-fueled for Tiers.

Senator Markey. Mr. Rosen, can you describe what a Tier 4 locomotive is, just so everyone can understand who is watching this across the Country?

Mr. Rosen. Sure. The Tier 4 locomotive became the standard for locomotives in 2014. It reduced particulate matter by 70 percent. It reduced nitrogen oxide by 76 percent. It is a very substantial step up on any of the other diesel locomotives that are out there.

I would agree with Ms. Torres that we have the ability to also be moving toward zero emissions. But there is an awful lot of very old locomotives on the rails right now that could be quickly replaced in terms of the cross-country piece by Tier 4, while we get zero emissions over the coming period to cover that also eventually.

But certainly in urban areas, there is no reason we shouldn't be using the zero emissions locomotives right now.

I will also point out, they need higher crash standards, too. There were better crash standards put into place in 2009, and by continuing to have the overwhelming majority of locomotives out there being older locomotives means that there is continued danger both to the communities where crashes might take place as well as of course the workers.

Senator Markey. Just expand, what zero emissions options are available for the railway industry to adopt for locomotives?

Mr. Rosen. Sure. So right now, the company where we represent workers has developed what they call the FLX locomotive, which is a battery locomotive, which can operate independently. There are other companies that have battery locomotives, which can certainly operate very well in rail yards where they can be recharged there.

They can also operate while going cross country in what they call a consist, which is basically in tandem with a diesel locomotive, ideally a Tier 4 locomotive. And you can really bring the emissions down farther. Then when you get into the cities, shut off the diesel altogether and run off just the battery locomotive at that point.

Senator Markey. So let me ask this. In terms of these low-emissions and zero-emissions trains, are they commercially available right now?

Mr. Rosen. They are.

Senator Markey. Are there ways to purchase?

Mr. Rosen. Orders have been taken for these battery locomotives. And in addition, they have run good tests with them in California. There was a famous example of that being done within the last couple of years to show how much better off they are.

Then in addition, there are electric locomotives that are in use in a number of places in this Country, and very heavily overseas. Those are all available, too.

Senator Markey. So where are these low-emissions and zero-emissions trains manufactured in our Country that are available now?

Where are they made?

Mr. Rosen. There are multiple locations, but the biggest source, especially for these battery locomotives, would be the large facility in Erie, Pennsylvania.

Senator Markey. Thank you, sir.

Senator Ricketts?

Senator Ricketts. Thank you, Mr. Chairman.

Mr. Jefferies, some have accused the railroads of having opposed methods to reduce emissions. Can you speak about the industry's efforts to reduce emissions within their existing fleet of locomotive? Are there Federal programs that you support to help with these efforts?

Mr. Jefferies. Sure, thank you, Senator.

Well, I think we, it is not a joke, but if you want to reduce emissions right now, take trucks off the highway and put them on the rail, and you reduce emissions by three to four times. And again, truckers are our biggest partners and our biggest competitors as well. So I say that with a smile on my face. But it is fact.

Railroads, as we mentioned, 40 percent of long-haul freight, less than 2 percent of transportation related emissions. And that is due to the investments we have made over the years. Certainly there have been billions invested into modernizing or re-equipping locomotives. Some of the examples about next generation locomotives were mentioned by my colleague, as far as getting battery electric into revenue service, proof of concept, working on hydrogen powered locomotives, in the yards, getting electric cranes, electric switcher locomotives.

Even again, using technology to get the throughput faster in yards. Because idling trucks, for example, are leading to additional emissions, additional release of particulate matter. Anti-idling technologies in locomotives in yards as well.

So I would also add that as a transition, as we move into the next generation of locomotives and of power, increasing the use of biofuels, whether it is renewable diesel, whether it is other renewable fuels into the feedstocks of how we are powering our locomotives is absolutely key as well. So it is certainly a multi-pronged approach.

Senator Ricketts. Great. You know what, you just mentioned biofuels there. So according to a recent Blueprint for Transportation Decarbonization, biodiesel and renewable diesel can play a key role in reducing rail emissions, especially in the near and medium terms. Can you discuss how the industry is utilizing these fuels, and are there things Congress can do to ensure that these fuels are in sufficient supply and cost competitive?

Mr. Jefferies. Sure. So, increasing the percentage of biofuels in our overarching power structure, and whether that is again a mix of renewable diesel or biofuels, an 80/20 mixture there. What can Congress do? I think really hold a level playing field when it comes to how you approach sustainable fuel development, sustainable fuel subsidies, sustainable fuel feedstock, so that all modes have an opportunity to increase deployment.

So you want to raise availability, decrease the price, and that will increase use overall across all modes.

Senator Ricketts. Great. Then CARB is once again working toward a significant regulation to impact the transportation sector. How would the regulation being considered by CARB impact the functioning of the national network?

Mr. Jefferies. Well, you hit the nail on the head when you said national network. Our network is over 140,000 miles that operates in an interconnected nature. So locomotives and trains on the west coast end up on the east coast and mixed and matched throughout the network.

So really, when you are looking at a proposed regulation of that magnitude, it has national impacts, national consequences on the ability of the network to operate. We don't operate just within the bounds of one State. That is why we have Federal law that actually prohibits efforts along these lines when it comes to regulating new or retrofitted locomotives.

We think the appropriate place to have this discussion is at the Federal Government. We are happy to play a productive role in that process.

Senator Ricketts. Can you discuss what sort of impact this regulation would have on short line railroads?

Mr. Jefferies. Well, it would be nothing short of a death knell to about 25 percent of the short lines in California.

Senator Ricketts. Why do you say that?

Mr. Jefferies. Because on average, estimates show that to comply with the regulation, about 40 percent of the average short line revenue, average short line's revenue, would be required and dedicated to complying here. Frankly, 25 percent of the short lines in that

State, they can't function with that sort of cost structure.

So what is the result? The result is that freight is going to get diverted onto the highways, increasing congestion, with less efficient, more emissions transmitting, modes of transportation. So I think that is the opposite of the direction we want to go to. Again, this should be a collaborative effort focused on what the market can support when it comes to production and what our small businesses can afford when it comes to transitioning to a cleaner future.

Senator Ricketts. Are you familiar with what I mentioned in my opening remarks with regard to the Bailey Yard in North Platte and their battery electric locomotives? Are you familiar with that Union Pacific project by chance?

Mr. Jefferies. Yes.

Senator Ricketts. So how long do you think it would take, then, to get those implemented and be able to look at the feasibility with regard to those, and what they would be able to do going forward?

Mr. Jefferies. Well, certainly we are already deploying battery electric, as I said, in yards. There have been orders made by the railroads. I know one railroad is only getting half as many as they have ordered, because of production capability and availability when it comes to the batteries required. So there is a bit of a long lead time there.

But what we are really looking at is a generational fleet overturning, over a significant amount of time. These are long-life assets. We want to make sure we can continue to move America's freight. We all want to do a job in a way that reduces emissions and

continually reduces our environmental impact. But it has to be done in a way that can allow us to continue to operate, serve our customers, serve our communities, and that the production market can actually handle.

Thank you.

Senator Ricketts. Thank you, Mr. Jefferies. Thank you, Mr. Chairman.

Senator Markey. Thank you.

The Chair will recognize himself again. I am a technological optimist. It was the hydroelectric mills that brought my grandfather to Lawrence, Massachusetts, to work in the mills of Lawrence during the Industrial Revolution. Today we have new advances in battery technologies that we now celebrate. The American story is one of technological ingenuity.

We have heard from Mr. Rosen about advances in battery technology and catenary lines to power our railways. Our technological optimism and our well-trained union workers are our best source of clean and renewable energy. Combined with our existing technologies we can protect community health and support American innovation.

Ms. Torres, you painted this beautiful picture of a zero emissions future for communities. How far away from that are we in terms of the actual technology?

Ms. Torres. The technology is here now. It is time to work with EPA, elected officials, the Class One rails, the workers and our community members to get that transition moving into our communities that are most impacted. We have, as mentioned earlier, overhead

catenary that has been used and can be used as a bridge as well to still continue the work, and make it economically feasible as we continue with technology to advance.

Specifically zero emissions technology, we can continue to come back to assess the current technology available. It is here now, it is economically feasible. CARD mentioned around \$25 billion of savings, not to mention the health savings, to get to that.

But there is a lot of unintended costs that are not talked about when we look at this. Thank you.

Senator Markey. Thank you.

Mr. Rosen, my father was actually a local vice president in the UE. Obviously, I am familiar with the work ethic, people want to go to work, make good money, take care of their families. My father's son is a United States Senator, so thank you, UE, for helping to get that funding.

What kind of answer would you give to Mr. Jefferies saying, we just can't afford to, railroads have to purchase these more fuel-efficient trains in our Country. Workers want to make these trains, but they are saying, we can't afford to buy them. So what is your answer to him?

Mr. Rosen. The money is certainly there in the railroads. These are very profitable industries. They have returned a great return to their shareholders, to Wall Street, to the executives. And it is a question of priorities. It is also a question of how they want to look at the costs and benefits, too, because in the longer term, with the fuel savings that you will see, with the greater durability

actually of non-diesel locomotives, et cetera, it is an excellent long-term investment.

The problem is, they are operating according to the mandates of Wall Street, which are not so interested in what is going to happen in the long term, but what is going to happen in the next quarter. That is why they really need to be given a directive at this point by the government, you have to do this, if they want to remain in business.

They have shirked the responsibility for the last eight years. They should have had 30 percent at Tier 4 already, and it is less than 10 percent. That would have made a huge difference right now. It would have also resulted in some of the slightly better but not worst locomotives being moved down into the rail yards, where we have, I believe, the figure in Ms. Torres' documents that were presented as part of her written testimony, something like two-thirds of the locomotives in the rail yards are Tier 0 or Tier 0-plus. These are 30, 40-year-old locomotives. It is outrageous.

Senator Markey. So you are saying that the railway industry just isn't investing in these clean technologies? The union workers are ready to make, construct the new locomotive engines that would go to low or zero emissions standards, and the technology does exist. But the railways just refuse to do it, is that what you are saying?

Mr. Rosen. Absolutely. There has been deep, deep reductions in the number of workers making locomotives in this Country. Not because they are being made overseas, they are not being made at all. The rail industry just stopped ordering new locomotives, and are running the old ones to death. But it is also to the death of the American

population.

Senator Markey. Yes. That is what it sounds like to me. These numbers are the most recent that I have. But only 7 percent of Class One locomotives were Tier 4 locomotives in 2020? Old locomotives that emit five times as much dangerous pollution as the current top tier of locomotives make up nearly one-fourth of all Class One locomotives? That doesn't sound like investment to me. That sounds like inaction to me, Mr. Rosen.

Mr. Rosen. Absolutely. That is what our concern is, and I think that is what you are also hearing from Ms. Torres on behalf of the environmental justice communities, too, that the time has run out for the rail industry to do this voluntarily on their own, driven by the market, whatever terminology they want to use. This is absolutely an area that is crying out for government intervention.

Senator Markey. Senator Ricketts?

Senator Ricketts. Thank you, Mr. Chairman.

Mr. Jefferies, it has just been described about the locomotives and the claim that the railroads are not replacing their engines. What, do you have any knowledge of what would the estimate be of the average lifetime of a locomotive? How much do they cost and how long are they expected to last?

Mr. Jefferies. An average locomotive costs about \$4 million, and upwards of a 40-year lifespan.

If I could make one comment on the investment discussion that occurred. The rail industry, I mentioned in my opening statement, invests about \$25 billion of its own dollars every year. The result

of that is the highest-rated infrastructure of any type in this Country as graded by the American Society of Civil Engineers. Again, that is privately owned, that is privately maintained.

It is not federally owned; it is not nationalized. Because take a look at that type of infrastructure, take a look at the northeast corridor, it is at about a \$100 billion investment deficit. This industry invests almost 19 cents per revenue dollar, that is six times more than the average industry.

So I don't want to hear that this industry isn't investing. We can talk about the turnover of the locomotive fleet, and absolutely, that is something we are interested in. That is why we have been out in revenue service when it comes to battery electric, when it comes to hydrogen. That is why we are deploying different types of power in our yards to reduce emissions.

It doesn't add up that the investment is not occurring there. We are happy to have that discussion about a new Federal standard, absolutely. But it needs to be done in an achievable manner.

Senator Ricketts. Also, one of the things that Mr. Rosen said was at the time the new regulations came out in 2014 it was estimated, and I presume it was by the EPA, that 30 percent of the Class One railroads would have Tier 4 engines by 2023, which is just next year.

Was the railroad industry consulted, do you know, as part of those estimates? I can tell you based on my experience with the EPA, they don't talk to industry when they make regulations. But I was not personally involved in any of this. Do you have any knowledge of this, by chance?

Mr. Jefferies. I certainly can't speak to the level of consultation or engagement that occurred. I know that based on my experiences with some other estimates that have occurred with other agencies, what is said and what is real doesn't always add up.

But again, we are investing literally billions in the modernization of locomotives, new types of locomotives. And any sort of mandate or forcing into purchasing Tier 4s right now, for those that want to get away from diesel, all that does is lock in diesel power for the next four decades.

So we are focused on the beyond. I think that is one area that Mr. Rosen and I can agree on, is that we do need to continue development of battery electric and we would say other alternate sources of power. We should all be working together toward that goal and figuring out the best way to get things into the marketplace at a faster clip.

Senator Ricketts. If I could just add on, talking about biodiesel and renewable diesel, which also reduces emissions, as we talked about, the EPA set their goals in the RVOs, the renewable volume obligations for the oil industry, at below what the current industry is actually producing. So once again, the EPA, not talking to industry.

But let's talk a little bit now about the catenary system that was described before for the electrification of it. What are your thoughts on this? Describe a little bit what would be some of the challenges to go to an electric system. Wouldn't you have to again build this through every one of those 144,000 miles you were talking

about?

Mr. Jefferies. Absolutely you would, and you would have to develop the power stations and power sources along those. Often, as you know, in the great State of Nebraska, we operate across very rural areas, where power sources aren't readily available. That is grid development that we would be responsible for. You are talking about hundreds of billions of dollars. You would have to rework tunnels, rework bridges, thousands of bridges, never mind what needs to be done on the locomotives themselves.

Certainly it works well in urban areas, up and down the northeast corridor. Absolutely. But you know, I take the train every time I go up to the northeast. But across a 142,000-mile network in a network that locomotives from one rail operate across another company's lines all the time, everything has to be interconnected, everything has to function seamlessly, that level of an endeavor, one, it is not realistic, and two, it just doesn't make sense for the future.

Senator Ricketts. And the estimate to do that per mile, do you know?

Mr. Jefferies. I think it is in the millions.

Senator Ricketts. And do you know, has anybody actually put pencil to paper to do the calculation to say, hey, if we were going to electrify this entire system, how much power generation would we need and how long would it take to do it?

Mr. Jefferies. I would venture to guess that no one has contemplated that. It is a leap of faith unlike any other.

Senator Ricketts. Do you know how long, assuming we could meet

the power generation standards, do you know how long it would take to actually do something like that, if you were going to try and do it?

Mr. Jefferies. Decades.

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

Mr. Rosen, kind of the same question to you. Has anybody done the calculations to know how much power generation we would need if we were going to electrify the entire rail system?

Mr. Rosen. There is actually somebody in this room who has done a lot of work on that from an organization called Solutionary Rail, who has some very creative ideas about how to do it. I will agree, this would be a project for the entire Nation that would probably take decades. It is probably the kind of investment that our Country needs to do. Whether the individual railroads would be willing to do that, left to their own, or whether it has to become something that the government has a direct role in is another question.

It also doesn't require putting catenary on every single mile. Because you can use the battery electric locomotives for some in-between sections. They can get well charged in the sections where you have the electric lines up, and then coast through the other areas on the battery electric, including places like tunnels, et cetera.

It does require probably rethinking the electrical grid. We need to do that anyway as a Country. We are converting our entire power system in this Country. We have to. This is not about, does it cost too much money or not. This is a question of, what is it going to cost the human race if we don't electrify everything.

Senator Ricketts. I see I am out of time, Mr. Chairman. Thank

you.

Senator Markey. The Senator from California, Senator Padilla.

Senator Padilla. Thank you, Mr. Chair. In my limited time, I am going to try to get through a couple of important issues, beginning with Ms. Torres. I know you are joining virtually. I want to thank you for testifying on behalf of the communities who are on the front lines of California's air pollution crisis.

I agree with how you described that rail pollution, it is a national issue with local impacts. While many Americans love getting untold numbers of products delivered to our doorstep, it does come at a significant cost to people who live near the ports and railroads that are the backbone, frankly, of America's goods movement infrastructure.

Ms. Torres, your written testimony shares that despite the EPA's efforts 15 years ago to update locomotive regulations, there are somehow still locomotives in rail yards that are 60 to 70 years old. So my question is, can you help explain how it is possible that a locomotive can operate its entire service life without having to reduce emissions?

Ms. Torres. Yes. That loophole, there wasn't a phase-out of any older trains or older locomotives. A lot of that happens with the rebuilding. So because it is refurbished, it does not have to meet the new emissions standards of that current year.

So if you are using older trains, and you are just refurbishing them, the standards are still from the 1960s, 1920s, therefore allowing the loophole of the current standards from 2008 for Tier 4 to

not have to be taken into consideration.

Senator Padilla. Great. That is very important for this committee to understand, something that we should absolutely try to address.

I also have, Mr. Chair, questions about our low-carbon fuel standards. California's low-carbon fuel standard is helping advance a wide range of clean fuels while at the same time keeping consumer costs down. California is probably the fifth largest economy in the world, on our way to becoming the fourth largest economy in the world, and in so doing, proving that it is possible to both grow our economy and reduce emissions. They are not mutually exclusive.

California's tech-neutral approach, greater long-term predictability, and cost containment mechanisms have provided both certainty and flexibility. Now, this program has been so successful that jurisdictions are joining California as you can see in the Pacific Coast Collaborative, a regional agreement between California, Oregon, Washington, and British Columbia, to strategically align policies to reduce greenhouse gas emissions and promote clean energy.

Mr. Jefferies, it is my understanding that the majority of the rail industry's use of low-carbon fuels, such as renewable diesel, is in California. What role does California's low-carbon fuel standard play in driving the use of low-carbon fuels in the rail industry on the west coast?

Mr. Jefferies. Well, certainly the use of low-carbon fuels, whether it is renewable diesel, whether it is biodiesel, is in heavy use in California. Of course, not exclusively in California.

Something we are proud of across the Country, and something we are working to do more of.

I can tell you this, that we absolutely support a mechanism at the Federal level that holds all modes equal when it comes to reducing the cost and increasing availability of low-carbon fuels. Because we absolutely think there is a big role to play there as we transition into the true next generation power sources.

Senator Padilla. I think we just identified an area of agreement.

Mr. Jefferies. That is why we are here.

Senator Padilla. So as you work to increase the use of low-carbon fuels across the rail industry, do you believe it would be helpful to have a national low-carbon fuel standard? I imagine you would agree, this would also reduce emissions in the rail industry, if we applied it nationally.

Mr. Jefferies. Well, we certainly support programs that, again, reduce the cost of renewable fuels and increase the availability. We do think it is critical at the Federal level that all modes be held equal.

Senator Padilla. That we will call a Federal standard.

Mr. Jefferies. As far as across different modes, the promotion, the incentives, et cetera, that will increase the use, that again, every mode is held harmless, held equal, and so that all, all modes can take advantage of this, and that the availabilities there add a price that incentivizes increased use.

I think we use different terms, but we are trying to get at the

same end game.

Senator Padilla. I appreciate that. And again, with California's experience as a model, setting the standard, technology neutral, and you can achieve both reduced emissions and economic growth, which I imagine you would agree with that as well.

And I emphasize this, Mr. Chair, because what I am hearing is that thanks to California's leadership in advancing a low-carbon fuel standard, the rail industry in California is moving to lower carbon fuels that result in these lower emissions.

So the written testimony Mr. Jefferies provided says "Policymakers should avoid imposing prescriptive means for reducing emissions in the rail industry." But I think the lesson here is that thanks to California's standard, the rail industry can and will reduce emissions. But without California's standard, industry would have just kept doing what it has always done in the past.

So it is not too far of a leap to suggest the same can be accomplished nationally with tighter EPA emissions standards. Without the new standards, industry will just continue to behave like the status quo.

So based on this committee's previous hearings on the low-carbon fuel standard and the testimony we have heard today, I see a clear need for a national low-carbon fuel standard. I hope, Mr. Chairman, that we can produce a bill in this committee to that effect.

Also, just the need for EPA to get moving on updated emissions standards.

Last but not least, Mr. Chair, I know my time is expired, I want

to thank you for Kike returning to the Dodgers.

[Laughter.]

Senator Markey. And on top of that, you are welcome for having Mookie Betts already be there to greet him from Massachusetts. We just hope it is the end of our generosity to L.A. It is hard to bear sometimes, watching those games.

So we thank the Senator from Los Angeles, and you know, Senator, Congressional expert is an oxymoron. There really is no such thing, it is like jumbo shrimp, oxymoron, Salt Lake City night life, no such thing.

[Laughter.]

Senator Markey. But I am now going to recognize a man who was elected to Congress 40 years ago and he has taken the train every single day. So I give you an expert, Senator Carper, the Chairman of the committee.

Senator Carper. Thanks so much. I have shared this story with some of my colleagues before. When my sister and I, we were born in West Virginia, a coal mining town, Beckley, and even after we moved away we would go back and spend our summers and visit our grandparents, our cousins and all.

One of our grandparents, my dad's parents, lived along a railroad track. We would almost faithfully every morning, when we were staying with those grandparent, about 10:00 o'clock in the morning, a freight train would come through. Probably not even as far as from here to that wall back there. My sister and I would stand at a fence that separated the rail track and my grandparents' house. We would stand

at that fence, and as the train got closer and closer, we would try to get the attention of the engineer by jumping up and down and pumping our arms, so that he might blow his whistle and recognize that we were alive.

One particular day this happened, and not only did he blow his whistle, but he stopped right in front of the house, I mean like right in front of the house. Off the train comes my grandfather, our grandfather, opens the gate and takes us by the hand, both of us, puts us up on the train, and we take off. It seemed like for about 500 miles, it was about 50 feet, maybe 500 feet.

And the train stopped, and my grandfather helped us get off the train and said, run back to the house, don't tell your grandmother.

[Laughter.]

Senator Carper. We ran back to the house, Grandma, Grandma, you will never guess what Grandpa did. And she said, oh, no he didn't do that, he'll go to jail. If he did it today, he would go to jail. And we might go with him.

Anyway, my involvement with trains started at an early age, and my interest continues to this day. I rode down this morning in Amtrak to get here.

I want to thank our chairman for holding the hearing today. Rail continues to be a key component of our U.S. transportation infrastructure and is the most fuel-efficient mode of surface land transportation that I think we have. I have used it for years.

To ship by rail a ton of freight from Washington, D.C. to Boston, Massachusetts, it takes about a gallon of diesel fuel. That is pretty

good for the economics. I am told by the barge people that sending stuff on barges can be even more fuel efficient, so they probably have something to say there.

But in everything we do, I think we ought to try to do better. The same is true for reducing emissions from all kinds of vehicles, including trains in our Country. Rail yards in particular often have a much higher density of local emissions. Reducing emissions at yards seems like low-hanging fruit when it comes to improving public health and climate outcomes.

I have a question for Ms. Torres that relates to this, and then maybe one for Mr. Rosen as well. Ms. Torres, where are you?

Ms. Torres. I am here, in San Bernardino, California.

Senator Carper. You are in California?

Ms. Torres. San Bernardino, California, yes.

Senator Carper. Good. Thanks for joining us. Could you briefly elaborate for us on the disproportionate health and economic burdens that are faced by communities near rail yards? Go ahead and then I have a second half.

Ms. Torres. Thank you for that question. Yes, for communities living by rail, kind of as you, you were growing up by a rail line, thank you for sharing that story, there is at least more than 90 percent of diesel exhaust, what I talked about earlier, particulate matter that is coming into our communities, not only from the rail line or rail yards, but what we like to call cumulative impacts as well.

So when we talk about the locomotives that are coming and are

idling for more than 30 minutes, that is 30 minutes of direct exposure of diesel particulate matter that community is suffering with. That is leading to cancer, cardiovascular --

Senator Carper. I am sorry, I am being summoned to come to another hearing. The Finance Committee is meeting right now, we are having a live vote and a business meeting and they need my presence to come and vote with respect to pharmacy benefit managers. It is a big issue and I have to go.

I am going to ask you to respond to the question for the record.

Mr. Chairman, I have a couple of other questions for Mr. Rosen, and I apologize profusely. But I have been here for a long time and still haven't learned how to be in two places at once.

[Laughter.]

Senator Carper. Thank you all. This is really important stuff, and I am grateful that you are holding this hearing.

Senator Markey. He is not ubiquitous, but he is omniscient.

[Laughter.]

Senator Markey. So now we will go back to the non-expert part of the hearing. I recognize Senator Ricketts for another round of questions.

Senator Ricketts. Thank you very much, Chair Markey.

What I would like to do is for the record submit this letter from the diesel folks.

Senator Markey. Without objection, so ordered.

[The referenced information follows:]

Senator Ricketts. Thank you very much.

I would actually like to talk a little bit more about what my colleague from California was talking about with regard to the renewable fuels, and just hit upon again how I think this is an area of common agreement that using more renewables is something that will help us reduce emissions, whether we are talking about biodiesel or renewable diesel, and the failure of the EPA to actually establish the renewable volume obligations at a level that we actually already produce in the industry today.

What that does is it discourages more investment. In Nebraska, we have a soybean crush plant that is being invested in in North Fork, and another one in David City. So the industry was making those investments. And now I am told with these renewable volume obligations that the EPA is failing to show that it even actually lives up to what we are doing already, we are going to see a curtailment of the types of investments like we see in North Fork and David City.

So if we want to see more renewable diesel and more biodiesel, we are going to have to have the EPA collaborate on renewable volume obligations so the industry will continue to invest and be able to make sure that we have more available to be able to use. Because I think that is one of the things, as the Senator was talking about, we do find agreement, we may not agree exactly on how to implement it, but we certainly agree that encouraging more renewable fuels is something that is going to be important.

One of the things I would like to hit upon, and Ms. Torres, I

didn't get a chance to ask you, but if you knew, on that whole electrification, the catenary system, are you aware of anybody who has done some work, some pencil and paper work, on what it would take to be able to power that if we were to going to go down that path?

Ms. Torres. For the United States, not the exact numbers. But we do have numbers that show it would be transitional, very feasible. That is in my written testimony.

Senator Ricketts. Okay, great. Thank you very much. I appreciate it.

Now, one of the things that I wanted to hit upon is, when you are talking about your members considering the purchase of a new locomotive, Mr. Jefferies, can you give us some insights on some of the specifications that they are considering when they think about, okay, it is time to buy a new locomotive? What is the process? What do they consider? How do they do that investment?

Mr. Jefferies. Well, first and foremost, demand. You have to have something to move with that locomotive. So the market has to drive those investment decisions. I am certainly not going to represent myself as having any sort of authority or expertise on the individual investment decisions that each of the railroads makes. Obviously, that is their prerogative.

But you need to look at one, capability, does the locomotive have the ability to haul heavy freight long distances? What is the role of the locomotive, is it to be used in yard, is it to be used locally, is it to be used out on the national network for long freight? Do you have the ability to charge it, to power it appropriately?

Really, we are looking at 40-year assets. So it is just like when we engage in infrastructure investment on the network. If you are taking a single track and you are double tracking that, that is an investment that has to be, the return on that occurs over decades and decades and decades.

So these are very significant investments for very long periods of time. As we sit here today, railroads are investing upwards of over a billion dollars. I know one railroad, retrofitting, modernizing 600 locomotives, many of which I believe are being done by the company that Mr. Rosen's works at. And that is over a billion-dollar endeavor. And that is going to result in lower emissions of all kinds.

Senator Ricketts. So you mentioned, though, that somebody had ordered the battery electric locomotive and only was able to get half as many as they ordered. Can you talk more about what is the cause of why they could want to order batter electrics and not get them delivered?

Mr. Jefferies. I think it was due to battery availability that one of the OEMs was running into challenges with. But again, that is kind of how the process works at the outset.

But the encouraging thing is, I think we do see a future there. One of my railroads had a long-term project that had a battery electric working with diesel out in revenue service, a proof of concept. The results were favorable. So the progress continues, and the work continues. So I think it is important that we keep an all-of-the-above strategy, whether it is renewable fuels, whether it is

battery electric, whether it is hydrogen, whether it is alternate means, that allows us to continue to do R&D to identify what the best long-term prospects are. And again, keeping in mind that it is an interconnected national network where everyone's system needs to be able to function with the others in a seamless manner.

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

Senator Markey. Thank you, Senator.

When I was a boy, I still live in the very same place, but when I was a boy, one block from my house to the left of our house was the electric trolley that went into Boston from Malden, all day, every day. We didn't have air conditioning, so especially in the summer it was like the sounds of the night was hearing those trolleys go in and out, electric trolleys, by the way. We had already invented the future and then tore it down and had diesel buses instead take people into Boston from Malden.

On three blocks the other side of my house were the railroad tracks for the freight and the commuter rail to go from Boston to Lawrence and beyond all day long, every single day. So the sound of trains on both sides of my house, just so many nights I would just go to sleep listening to those trolley cars.

I think everyone has a train story in their life. It was a big part of my life, that is for sure. The question really is, how quickly can we move to this new era.

So I think what I heard was that the industry invests \$23 billion a year in infrastructure. I think that is what I heard you say, Mr. Jefferies. And you are proud of that. So that would be \$230 billion

in investment over a 10-year period.

The new locomotive engines cost \$4 million, not billion, \$4 million, and a \$230 billion investment over a 10-year period. And that is investment that you are already making.

So a reprioritization would clearly get a big payoff in terms of reduced emissions and this transition to the new technology. That is what is kind of hard to understand, the funding is clearly there. So I guess when I look at that very simple arithmetic, it is not calculus, it is not trigonometry, it is just \$4 million for an engine, and \$230 billion that you are going to invest otherwise.

What percentage of that could be dedicated to this new mission?

Mr. Rosen, again, why doesn't the railway industry want to make this transition? What is their problem?

Mr. Rosen. I will add another piece of simple math I have just done in my head while sitting here, having heard earlier that the lifespan of a locomotive is up to 40 years. That means that 2.5 percent of the fleet has to be replaced every year. There has been eight years since the new standard.

Senator Markey. Good point.

Mr. Rosen. Eight years times two and a half is 20 percent right there. And what they have been doing is upgrading very old locomotives which allows them to keep them at much lower standards, as you heard Ms. Torres explain, rather than moving to the newer ones. It is a simple reason, it is greed. It is a little cheaper, at least in the short run, at least in what they can show on their quarterly statements, than buying the new locomotives which will actually make a

real difference in people's lives in this Country and will for a long time to come.

Senator Markey. So according to my, I don't even call it math, it is just arithmetic, the industry makes about \$20 million a day in net profit, \$20 million in a day. So if you just took one day's, that is five new trains, five new electric engines. Take two days, you get 10. Is that asking for too much out of the profit of an industry that they move in that direction?

But what you are saying is, it is not benign neglect, that Senator Moynihan used to talk about when he was in the Senate, this is more designed neglect. They have a plan not to do this, not to upgrade, even though the technology is there, even though the rest of the world is moving rapidly technologically on all fronts. But the railway industry is stuck back in this ancient era.

I love the sounds of the trains from my youth. But I can't believe that those same trains are still running on the tracks, and that 2.5 percent every year have to get replaced, and they are saying, we are not going to replace them.

Again, you just come back, I guess it is a profit motive, is that all it is, Mr. Rosen?

Mr. Rosen. I believe the railroads are in business to make profit, not to move transport. They move transport in order to make profit. This is a fundamental issue. It is the way our economy is structured. If we are going to have an economy structured that way, the government has to intercede in order to make sure they do what is needed by the greater society. Because they are not structured to

worry about the society.

Senator Markey. And the society, of course, does suffer. We know that there are higher asthmas, cancers, the closer you are to anything that is emitting these greenhouse gases.

A fact sheet published by the Association of American Railroads states that the cost of converting half of the existing locomotive fleet to catenary rail would be \$100 billion. But Martin Oberman, who is the chair of the Surface Transportation Board, in a speech to the North American Rail Shippers Association in 2021, said Class One railroads have taken home an astounding \$183 billion in buybacks and dividends since 2010.

That is money not spent on safety, not spent on workers, not seen as cost savings to consumers. That is just money that goes back to the shareholders.

So again, Mr. Rosen, why can't that money be used to invest in electrification? And I will ask you, Mr. Jefferies, why can't a certain percentage of that money be used for electrification? Mr. Rosen?

Mr. Rosen. We would certainly say that it not only can be, it should be. If the railroads want to maintain themselves as private profit-making businesses, then they have to get a lot more responsible and have to stop standing in the way of what the society needs. If not, maybe we do need to look at the alternatives that have developed in many other countries, where because it is long-term investments involved, it has been decided it is going to have to be done on a national basis, and there has been nationalization of the railroads

and other industries.

I don't think that is what the railroads want to see. But if they don't start acting responsibly, I think it is what the people of this Country are going to demand.

Senator Markey. Again, Mr. Jefferies, I have a nostalgia for the past, but at a certain point in time it has to be replaced with a vision for the future. And that vision has to be articulated by every American industry, knowing how serious climate change is and what the response is going to be. Especially if there are non-greenhouse gas emitting engines that are available and can be manufactured.

My question to you is, that is a lot of dough. That is a lot of dividends. From my perspective, why can't that money be used to invest in electrification, Mr. Jefferies?

Mr. Jefferies. So to go back to the beginning, it is average \$25 billion a year in private investments, so you are right, over 10 years, \$250 billion, and the result of that is the Nation's highest-rated infrastructure of any type. If my colleague wants to nationalize the rail network, I would just say take a look at the American Society of Civil Engineers' grades of publicly owned infrastructure, which pales in comparison to the grade it gives the Nation's freight railroads.

Senator Markey. I don't want to get into a debate about nationalization. I want to get into a debate about why can't a much higher percentage of that \$250 billion go over to \$4 million locomotives that are all ready? Why can't that happen? Why can't the industry just say, we are going to make a commitment to doing that

because we want to pay our fair share in reducing the danger that greenhouse gases play, and especially the other emissions that go into the neighborhoods where the trains go by?

Mr. Jefferies. So, 40 percent of long-haul freight, less than 2 percent of transportation related emissions. Again, we are not saying that is good enough. There is more work to do. That is why we have railroads investing over a billion dollar in new locomotive technology. That is why we are deploying and exercising battery electric out in revenue service. That is why we are putting battery electric switcher locomotives in yards. That is why we are using zero-emissions cranes.

Is it going to happen overnight? Absolutely not. Even if we could flip a switch, the production capacity is not there.

So to suggest that there is some sort of willful negligence, I think is frankly irresponsible, when you look at the environmental profile of the industry and the investments that are made compared to practically every other industry as a percentage of revenue.

To be clear, I think we all have the same goals here.

Senator Markey. I am just saying, every other industry is moving and they can articulate the plan. Electric has to be our future. And by the way, electric is the industry's past. So it is not like you don't know how to do this if you want to do this. It is just that you are kind of stuck in neutral on this.

Mr. Jefferies. Every one of my railroads has emissions reductions initiatives, science-based target initiatives, including net zero emissions within the coming decades. So the commitment is

there, the effort is there.

Senator Markey. But the commitment to electric trains is not there. And that is the future. It will be the future of the world. We have workers ready to make them right now, and the engines are there ready to be --

Mr. Jefferies. I think we would respectfully say that it needs to be a multi-pronged approach.

Senator Markey. Oh, I get it. We don't want to take out your other prongs. We just want you to add this prong. We don't know why you are taking out the electric prong.

Mr. Jefferies. I think our testimony reflects that it is absolutely part of the strategy. Maybe we are not buying --

Senator Markey. No, you are not.

Mr. Jefferies. -- more than you would like, the production capacity has to be there, it has to make sense, it has to work, it has to move freight, we have to be able to serve customers, we have to be able to serve communities.

Senator Markey. It is just a technologically retrograde industry. It is not moving to the future of technology. You are doing okay, but that is not what this era calls for. The ocean off of Miami Beach is 100 degrees right now.

Mr. Jefferies. They should be moving more by freight rail.

Senator Markey. Canada is on fire. Greece is on fire. It has been above 110 degrees in Phoenix for the last four weeks. Everyone else is paying attention to it. We just want the board of directors of your association to pay attention to it, too, and say, let's go

back at the table, let's look at these engines, they are there, workers are ready to go, technology is ready to go, and we are just going to up our share of commitment to it. And you just seem to be saying, no, we are not going to.

Mr. Jefferies. That is absolutely not what I am saying. The commitment is there.

Senator Markey. A commitment to a much higher share of all-electric trains? Is that what you are saying, the commitment is there?

Mr. Jefferies. I am saying, look at the investments, read my testimony.

Senator Markey. You are not saying that. You are saying that, we have a multi-pronged approach to avoid the central question of this era, which is electric, are we moving there, are we going to do it. And here, it is not like we are waiting for Elon Musk to show up, it is already there ready to go. It is an existing technology.

The Senator from Wyoming, I apologize for going on.

Senator Lummis. Thank you, Mr. Chairman.

Mr. Jefferies, can you explain to me what the current commercial readiness is of zero emission locomotives?

Mr. Jefferies. I will say we put battery electric out into revenue service with R&D with support of diesel locomotives. And we have been pleased with the returns on that R&D demonstration programs. We have deployed and purchased battery electrics, waiting on those to be delivered. Some have gotten into yards. Absolutely see promise there.

But widescale production to replace thousands of locomotives is not a capability.

Senator Lummis. How long would it take, reasonably based on today's current commercial readiness, how long would it take to replace all diesel locomotives with electric? How many decades?

Mr. Jefferies. I would venture multiple decades. If you could flip a switch and the capability was there, yes.

Senator Lummis. Have you done cost-benefit analysis, knowing that your emissions from rail collectively are about 1.7 percent of all transportation related emissions of greenhouse gases, have you done a cost-benefit analysis for comparing rail to automobile to airlines in terms of the benefit compared to the cost of doing these kinds of conversions to electric?

Mr. Jefferies. I opened the hearing by saying, and I think you hit the nail on the head, that 40 percent of long-distance freight, less than 2 percent of transportation emissions. You want to reduce emissions right now, move more goods by freight rail.

Senator Lummis. Regarding California's Air Resource Board's move toward a regulation that would ban freight rail industry from operating a large portion of their locomotives in California based on its age unless the locomotive is zero emissions, how would that regulation impact the functioning of the national network and short line railroads?

Mr. Jefferies. Well, national rail network is the key. It is an interconnected national network that operates in interstate commerce, not strictly within the bounds of one State. That is why our

regulations and the rules which we operate under are done at the Federal level. States do not have jurisdiction to determine the fate of our industry in interstate commerce.

With that, you also need to have the capability of doing, back to your first question, of a conversion. If you are going to require a zero emissions locomotive right now, you have to have the capability to produce that at scale. And that doesn't exist. We need to get there.

I think we are all collectively working toward this goal, while it may not sound like it today. But again, we are proud of our environmental profile. We have more work to do, and that is why we are committed to doing that work and making the related investments.

Senator Lummis. Do we have enough solar and wind related electricity to handle an entire fleet of locomotives that are zero emission, run on electricity?

Mr. Jefferies. I certainly can't begin to answer that question. I know that the additional capacity required would be fairly dramatic.

Senator Lummis. We have learned recently that the greenhouse gases that are emitted just in order to manufacture solar energy is three times more than the United Nations originally thought. Do you think that that should be factored into the total emissions of greenhouse gases and the sources of them?

Mr. Jefferies. Senator, I can only focus on my industry, and our efforts to reduce emissions. I think you are hitting on a broader question that is for folks to debate who are bigger experts than I by every stretch of the imagination. But certainly, we need to be aware

of the broader impacts of policy decisions and not have on blinders.

Senator Lummis. Mr. Rosen, in your written testimony you noted that over 75 percent of Class One railroad fleet was a Tier 2 locomotive, or an earlier model. With those locomotives being ineligible to operate in California soon, won't that result in a shift away from rail and to other modes? How would we get from the Long Beach Port to unload goods, how would we get that to the border of California and Nevada without rail?

Mr. Rosen. Well, we won't. What you will see is that the locomotive manufacturers in this Country will actually start generating locomotives again. Right now, they aren't being ordered.

The facility my union represents in Erie, Pennsylvania has a capacity, without any expansion, they have done this in past years, of 1,000 locomotives a year. We are probably a little over half of the total capacity in the Country right now. It is a little hard to tell, because everybody else is just flat on their back because the railroads have not been ordering new locomotives. They have not been ordering Tier 4 locomotives, which is why the numbers are so low.

It is an outrage. And that could be done. They could have been doing it all these past years, as we have been discussing here. When there is demand, you get supply. And the same will be true in terms of being able to move over to, to the extent there is a holdup on battery locomotives because of batteries, I think you are seeing that enveloped in a number of industries. You are also seeing huge investments going on right now in part through programs that Congress funded, and you are going to see a tremendous expansion of capacity

for producing batteries over the next couple of years.

Senator Lummis. Well, I will tell you, being from Wyoming, I don't mind admitting that I am getting a little resentful of California not wanting to look at industrial-scale wind farms, because it destroys their viewshed. But they are perfectly willing to destroy the Wyoming viewshed with as many industrial scale windfarms as we can get transmission lines from Wyoming to California.

It is interesting that the people who demand wind and solar energy do not want the industrial-scale energy produced in their State. They want it produced in my State. I am getting to the point where I am a little sick of it.

But that is it. Thank you, Mr. Chairman. I yield back.

Senator Markey. Thank you, Senator.

One argument against strengthening rail standards is that it will push more goods to be transported by trucks. However, we are strengthening the standards for our heavy-duty vehicles at the same time. So it stands to reason that railroads shouldn't be left to lead the race to the bottom. Everyone else is increasing their standards, we are promulgating regulations for everybody else. California is doing that as well. The railway industry wants to be on the side.

Ms. Torres, the rail industry claiming that moving freight by rail is more efficient than move freight by truck, is that going to remain true in California, especially considering the recent agreement between the State and truck manufacturers to create a path to achieve 100 percent zero emission truck sales?

Ms. Torres. As of this year, it will be cleaner and healthier

for communities to transport by trucks. Unfortunately, rail is falling behind, its negligence to invest in zero emissions technology that is already here.

We are not against rail or the freight system. We just want to electrify it to have some relief to our communities that are exposed to these carcinogenic diesels.

Senator Markey. So you believe, Ms. Torres, that it is possible to address emissions from both heavy-duty trucks and from locomotives at the same time?

Ms. Torres. Yes, it is. It is very possible and very needed to address both of those measures, not just looking at the greenhouse gases, but the health aspect, too, of what we call air pollutants.

Senator Markey. Absolutely.

Mr. Rosen, are the railroads buying green locomotives at a rate that is maxing out your production?

Mr. Rosen. We are in the single digits, when we could be producing 1,000 of Tier 4 and some mix within that of green locomotives that aren't being completely non-emitting. But again, replacing the worst that is out there right now with Tier 4 as a stopgap while we make the bigger transition is well worth doing. They need to make up for lost time by doing that. But we could be starting to get a lot of the green locomotives out the door, and the orders aren't there.

Senator Markey. Ms. Torres, could you briefly elaborate on the disproportionate health and economic burdens faced by communities near rail yards? Ms. Torres, could you hear my question?

Ms. Torres. Yes, sorry, the hardware world, my apologies.

Communities of color and low-income communities are the ones who deal with the diesel emissions at higher rates, both particulate matter and NOx. It is not just the diesel coming from the locomotives, but diesel coming from switchers that are as old, older than us in the room.

The equipment that is being used in the rail intermodal facilities in the port, I know folks have mentioned that there is work to get those into low emissions. But the technology has been there for a lot of that here to be zero emissions. That could be something that eases a lot of that burden on communities. Not only are we seeing those impacts, like I mentioned, there is the noise, the light.

And many of you all know, living by rail lines and rails that are still not looked int, a lot of our community grows vegetables and fruits. We don't know what is being contaminated by the diesel over the years going through their yards, if there is water pollution or soil pollution. Unfortunately, if the data is out there, we don't see it. We don't see data from the rail yards.

So as of now, what is known is the air quality impacts, because we have done that research. I would love to see the rails' research on all the other impacts.

Senator Markey. Yes. So we know it is real. When I was a boy, I grew up in Ward Two in Walden. Every city has an environmental sacrifice ward. So I grew up in that Ward. Trains were on one block this side, three blocks the other side. The Malden River was three blocks, and the train rode right next to the Malden River.

But right next to the Malden River was also the coal company, the chemical company, every Converse All-Star was made right along the Malden River. There was always a big cloud over Ward Two with all the factories spewing toxics going up into the air.

When you are 10 years old and your mother says, Eddie, whatever you do, don't swim in the Malden River, it made a lot of sense when you looked at it, because it was black with a pre-Jimi Hendrix purple haze over it.

So I knew I wasn't Tom Sawyer on the Mississippi. I knew that. I also knew that I lived in that Ward. Ward Three wasn't like that, Ward Five wasn't like that. There were nice, tree-lined streets. But Ward Two, we had a different life. Trains, polluted river, factories.

Obviously, the health consequences were run by people who lived in Ward Two, not Ward Three, not Ward Five, Ward Seven. It was right there in Ward Two. So we all know this now, in retrospect, how obvious that was. We can't use a river as a dumping ground for all this stuff. You can't use the air. You can't use the land to do it.

I guess, Mr. Jefferies, that is all we are really saying to your industry. You just have to move with the times, you have to move with them. Electric is the future. We have to move much more substantially toward the mitigation of the harms which are run by those people who live in the environmental sacrifice zones. That is where your trains are, that is where the diesel trucks are. Across the board, we are trying to solve that problem, because we know that there are higher levels of asthma and cancers that people suffer from.

While we know you have to have a bottom line and returns to

shareholders, there is also a responsibility to deal with the consequences of the way in which you move your trains around the Country. So this is just going to be a spotlight that is going to increase in its intensity on your industry, Mr. Jefferies. That is all I want to tell you. It is not going away. Everyone else realizes that the time has come, the jig is up, we have to do something here to protect those people who live in those areas.

Increasingly, even in Ward Two, they are now more Black, they are more Brown, they have replaced the families that have already moved on to Ward Three and Ward Five and Ward Seven. So that is really the challenge, these people who get left behind and suffer the consequences of it. We shouldn't accept that.

We just hope your industry will go back and reevaluate this obstinate, obdurate opposition that you have, and denialism that you are bringing in in terms of your goals. Because there is so much more than you could do and do it in a cost-effective way.

Let me turn to you, Senator Ricketts.

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

Mr. Jefferies, it was referenced about the \$25 billion that your industry invests on an annual basis, or the \$250 billion over 10 years. Is that investment entirely locomotives?

Mr. Jefferies. No, it is throughout the network, the infrastructure, equipment, et cetera.

Senator Ricketts. So what are some of the other things that you have to invest in to run a railroad?

Mr. Jefferies. A hundred and forty thousand miles of rail,

ballast, ties, tunnels, bridges, technology.

Senator Ricketts. So you are saying there is other infrastructure there, like, let's just take the rails. That seems like it is a pretty big job to invest in the rails to try to keep it as safe as possible, right? I know the railroads invest in additional technology to try and find defects in the rails, is that right?

Mr. Jefferies. Absolutely.

Senator Ricketts. And you have to replace parts of the rails all the time, right?

Mr. Jefferies. Absolutely. There is core maintenance and there is CapEx expansion.

Senator Ricketts. That is a significant part of that investment we are talking about, is that fair?

Mr. Jefferies. One hundred percent. We are one of the most capitally intensive industries out there.

Senator Ricketts. And the same thing for the rolling stock, not just the locomotives, but you have to have the cars to go along with it, is that right?

Mr. Jefferies. Certainly, absolutely.

Senator Ricketts. And you are investigating new technology to try and make those safer all the time, again, looking at and fixing wheels and things like that, and that all costs money as well, that is part of that investment? Is that right?

Mr. Jefferies. Of course, yes. Absolutely.

Senator Ricketts. So it is not just into locomotives that you are investing in, that is fair. It is just part of the overall mix of

all the things it takes.

Mr. Jefferies. It is part of the portfolio, absolutely.

Senator Ricketts. So we also talked about the investment returns going on here, do you happen to know off the top of your head how much, we are talking about all the, we have publicly traded companies, Union Pacific, BNSF, how much of that stock is in the hands of everyday Americans through pension plans and 401(k)s and stuff like that? Do you know?

Mr. Jefferies. I would venture the vast majority.

Senator Ricketts. So when we are talking about your providing shareholder returns, that is actually helping middle-income Americans retire, right?

Mr. Jefferies. Absolutely.

Senator Ricketts. So that is part of what we are talking about. Mr. Rosen, when you are talking about nationalizing railroads, I just looked at the example of Amtrak. I don't think that is a very successful standard, or you can look at it on bigger scales, like the Soviet Union, and I don't think that is necessary a solution, getting back to Mr. Jefferies' point about the quality of the infrastructure there.

Mr. Jefferies, also when we are talking about like this battery technology, to your knowledge, has anybody done the estimate of how much we will need to have, how many batteries we will need to have if we were going to totally electrify, use all battery electric?

Mr. Jefferies. I have not seen that.

Senator Ricketts. So nobody has looked at it to see how much

lithium, cobalt, graphite, anything like that?

Mr. Jefferies. I would say it is a substantial amount.

Senator Ricketts. It would be a substantial amount. And do you know where those things are primarily mined and processed?

Mr. Jefferies. Well, I know a lot of it comes from countries that may or may not have our best interests at heart.

Senator Ricketts. Absolutely. The People's Republic of China, specifically, I believe the number has about, for example, lithium has about 50 percent of it, mines and processes 50 percent and processes about 60 percent. I know that other rare earth elements it is an even higher percentage than that.

That would make us dependent on our chief adversary in the world. We spent a lot of research and time and so forth with the shale revolution that made us not dependent on OPEC, and now we are talking about putting us, making us dependent on our chief adversary in the world which we know is trying to replace us as the global power by 2049. Xi Jinping has said that, I think we ought to take him seriously on it.

So now we are talking about national security issues if we are going to make ourselves more dependent. Wouldn't it seem reasonable that if people would demand that we go to batteries that we actually have, I don't know, say some sort of inventory of where these rare earth elements are? Do you know, has anybody done that sort of thing?

Mr. Jefferies. I don't, but I absolutely agree. Look, I support battery electric, let's be clear. But I also support opportunities to make sure we are acquiring necessary minerals and feedstocks from

allies if not domestically. We have the strongest environmental laws of any country; we have the safest worker protection laws of any country on the globe. I don't understand why we wouldn't embrace the opportunity to get those resources from home or from allied countries or friendly countries.

Senator Ricketts. I just had a meeting today with the Clean Freight Coalition, which actually had many of your competitors and partners in it, talking about some of these standards. One of the things they related to me was that California actually has the oldest trucking fleet in the Nation, because of the standards that they are doing.

So you may say that all the new trucks that are going to be sold are going to be zero emission or whatever, but what that, at least in California, the trucking industry has demonstrated, according to the Clean Freight folks that I was talking to today, that they actually, they don't buy the new ones, they actually keep the older ones running around. Because maybe for some of the reasons you talked about, you just can't buy enough of them.

I know that talking to some of the trucking companies that it is not feasible right now to run long-haul trucks across the road using battery because it just isn't devoted to the charging.

So I think your concerns are well founded that we think about how is this all going to happen. And if we do want to have a bigger overall plan to address these things, whether it is going to be through electrification or battery electric or whatever it is going to be, somebody actually has to think about this to say, how feasible is

this over what period of time before we drive regulations that are going to have unintended consequences, such as maybe what we are seeing here in California with the trucking industry.

With that, Chairman Markey, I yield back.

Senator Markey. We are going to conclude the hearing. We are going to give each of our witnesses one minute to tell us what you want us to remember about your testimony here today. Then I will turn to the Ranking Member for his concluding statement, and I will make mine.

We will begin with you, Mr. Jefferies, we will begin in reverse order of the opening.

Mr. Jefferies. This is a new one for me, at the end of a hearing, to talk.

I think contrary to an observer of this hearing might think from today, I absolutely think we have the same goals. We all want the same outcomes here. I think it is a matter of how we get there and the paths by which we take.

Certainly, I am proud of our environmental profile, I will say it one more time, 40 percent of long-haul freight, less than 2 percent of transportation related emissions. Work continues to drive that down, including other types of emissions as well. And we can debate, and we have debated, whether or not our approach is the most desirable approach amongst all stakeholders.

But we feel strongly about where we are going. We have made strong commitments and we are going to live up to those commitments and continue to make the investments necessary to meet those

commitments. At the end of the day, it is all about making sure we can serve the customers and communities that we operate and we support. We are going to continue to work to do that.

Thank you for the opportunity to be here today.

Senator Markey. Mr. Rosen, you have one minute.

Mr. Rosen. Thank you very much, and thank you for holding this hearing today. I think it has been very useful for the American people.

I would say there is a point of agreement here that all modes do need to be cleaned up. But trucks are being cleaned up. There are new regulations coming for heavy trucks, et cetera. We need to have this for rail also.

I also would agree we want to move more off of the roads and onto rail, absolutely. Both passenger and freight needs to be done. But it needs to be done with an understanding that rails are going to be as clean as possible.

We just don't see that that is going to happen, given the structure of the rail industry, without Federal and State governments taking steps to ensure that it happens. So we are in favor of the EPA allowing States to set higher standards. But we would really love to see the EPA set higher standards at the Federal level, and we would love to see Congress take action on this overall, and to assist in making sure this happens.

Lastly, I will say, I am apparently a lot more optimistic, as somebody who has actually spent my life around manufacturing, in the know-how of American companies to build the things that need to be

built. Because I have heard a lot of excuses here as to why things just can't get done. We have good old American know-how. Everything that needs to be done has already been shown it can be done or will be in production very shortly. We should be looking ahead and making sure those get into place.

Senator Markey. Ms. Torres, you have the final word.

Ms. Torres. Thank you all for today. I hope we are committed to working together as Congress, as community members, as the Class One rails, as workers, to move the EPA toward the Tier 5 emissions standards all across the Nation.

We heard it by several folks that it can't just be a State entity doing it. I would also urge EPA and for Congress to urge EPA to allow our [inaudible] in California and to follow that for the rest of our communities in the network and across the 13 million that are working and living, dealing with cancer risk. Up to 22 years of their lives being taken out because we continue to run, again, zero, one and two rail in this Country.

We are not against the rail or the freight system. We are made from that system. We just want to be alive to keep sustaining that system in a more cleaner and electric way. It is the future. We can't allow for only trucks and other modes to move toward electric and zero emissions. We need our rail systems, who have hardly any regulations, to move in that direction. Our communities' lives should not be put into a price.

Thank you.

Senator Markey. Thank you so much, Ms. Torres. Thank you to all

of our witnesses.

I will turn to Senator Ricketts for a closing statement.

Senator Ricketts. Thank you very much, Chairman Markey, for holding this important hearing to talk about what the rail industry is doing with regard to innovation and reducing emissions.

I do think it is important that as we think about the regulations that we don't do things that are going to have unintended consequences. While I am very confident in American know-how and ingenuity, we have to be able to plan. The reason we are successful is because we plan to be successful, not because we throw out things and see if it can happen.

In fact, when you talk about the heavy trucks, in my conversations with Michael Regan at the EPA and Joseph Goffman, there has not been done any planning to figure out how we are going to address some of the issues, like two 8,000-pound batteries in a truck that is hauling freight which cuts its freight capacity in half, which means then you need to have twice as many trucks and twice as many truck drivers, when we have a shortage of truck drivers as it is.

So I think there are issues that have to think through and be reasonable about what kind of time frame we can actually expect. I think that is one of the things we found for the rail industry here today, is that while we all broadly have the same goal, reducing emissions, how we go about it and what kind of regulations are put in place to do that will have unintended consequences that could have adverse effects that need to be thought through and planned out.

With that, Mr. Chairman, I will turn it back over to you.

Senator Markey. Thank you, Senator.

I am just going to follow up for a second on what Mr. Rosen commented on earlier. This is a very, very profitable industry. Very profitable. Rail has a 41 percent operating margin, 41 percent operating margin. Incredible. Seven billion dollars in net profit per year. Great business to be in in 2023. And it costs \$ million per new electric train.

So a profit is really only what you have after you have already made all your necessary expenditures. Then what is left over is your profit.

So if you decide to not invest in non-polluting electric trains, if you decide to just stick with those trains that are polluting, that is a decision. Therefore, your profits are higher.

On the other hand, if instead of \$7 billion a year, incredibly profitable industry, the industry only made \$6 billion a year but took \$1 billion, put it into electric trains every year, that would be 250 new engines every year, 2,500 over 10 years. Just \$1 billion less in profits per year. Then the industry would be saying, well, that is the cost of doing business, then we take our profits after that.

So it is a conscious decision which the industry has to make. I understand that there is going to be decisions that are made that are just totally, let's max out in terms of our own financial benefit, we who are the owners of the company, we who are running the company, we who are the principal beneficiaries of the wealth that is created by the company.

But there are other responsibilities as well. And a responsible

industry would say, yes, we know we have to do something about this, we are part of the community as well. And we can still get incredibly rich and reduce the harm that is caused to other people who live nearby.

So I am a technological optimist. I believe we can do this. I believe that it is all there for America to be the lead. I believe in American innovation. I believe in American ingenuity. I believe in the American workers. I believe they can get this done for us.

So I think that today we not only illustrated the problem, but illuminated the path forward. We need to modernize our emissions standards for locomotives to clean up our air, to protect the health of rail workers and communities and to revitalize American manufacturing and good union jobs.

I ask unanimous consent to enter into the record additional materials submitted by our witnesses and stakeholders and other Senators that relate to today's hearing.

Without objection, so ordered.

[The referenced information follows:]

Senator Markey. For any Senators who wish to ask additional questions for the record, you will have 10 business days, until August 9th, 2023, at 5:00 p.m. in order to insert those questions, and then we would ask our witnesses to, in a timely fashion, return the answers to those questions to the committee.

With that, this hearing is adjourned.

[Whereupon, at 4:24 p.m., the hearing was adjourned.]