

**THE FUTURE OF LOW CARBON TRANSPORTATION
FUELS AND CONSIDERATIONS FOR A NATIONAL
CLEAN FUELS PROGRAM**

HEARING

BEFORE THE

**COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE**

ONE HUNDRED EIGHTEENTH CONGRESS

FIRST SESSION

FEBRUARY 15, 2023

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COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

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WEDNESDAY, FEBRUARY 15, 2023

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee, met, pursuant to notice, at 10:02 a.m. in room 406, Dirksen Senate Office Building, Hon. Thomas R. Carper (chairman of the committee) presiding. Present: Senators Carper, Capito, Cardin, Merkley, Stabenow, Padilla, Fetterman, Lummis, Boozman, Mullin, Ricketts.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Good morning, everybody. This is the day after Valentine's Day. I hope you all had a great Valentine's Day. We did in our family. My wife renewed my contract for another year. It is a no-cut contract. I am hopeful that we can extend beyond that.

Those of you who know my wife know that she is a saint. We are welcoming some saints here this morning. Not the New Orleans Saints, but some saints nonetheless.

I will be honest with you. I hadn't really thought a lot about this issue that is before us today in the last year or two, but I think we are on to something here. I am excited about the hearing today. Senator Capito, Ben, and others really look forward to this hearing and what we are going to learn.

As I think you all know, today is the first Environmental and Public Works Committee hearing of this 118th Congress. Senator Capito and I are pleased to welcome our newest members, Senator Fetterman, Senator Mullin, and Senator Ricketts, as well. Great to see you again. Thanks for letting me come and visit with you earlier this month.

We are delighted to be with our returning members as well, not the least of those, my wingman from DelMarVa, Senator Cardin. I call him my DelMarVa buddy.

Over the last couple of years, this committee has played a vital leadership role in passing historic infrastructure and climate legislation. Much of our success was, I am proud to say, bipartisan. We have a couple of people here from Wyoming, and I quote another fellow from Wyoming, who used to say when he was actually sitting right out where you are, Chris, he said these words: "Bipartisan solutions are lasting solutions."

I see we have been joined by Senator Fetterman. Welcome, Senator Fetterman, I am glad to see you. Thank you for joining our committee and being a neighbor. We have Delaware, we have Maryland, we have Pennsylvania. That is a pretty good combination.

Over the last couple of years, this committee has played a vital leadership role in passing historic infrastructure and climate legislation. Much of our success was bipartisan. Looking ahead, I am eager to work with Senator Capito and with all of our colleagues here, Democrats and Republicans as well, as we aim to build on that record of success and further strengthen our economy at the same time. Together, I know we can continue to develop lasting solutions to some of our biggest challenges.

That brings me to the topic of today's hearing, and that is exploring policies that support the development and deployment of low-carbon transportation fuels.

As a Senator from the lowest-lying State in our Country, I can think of no greater challenge than the climate crisis. My colleagues have heard me say more times than they want to remember, Delaware is the lowest-lying State in America, our State is sinking, the seas around us are rising. That is not a good combination, so we want to make sure that we are doing everything we can to address that and create economic opportunity for the rest of our Country.

Last year, some of you may recall that the National Oceanic and Atmospheric Administration, affectionately known as NOAA, reported that there were 18 climate disasters in the United States, with losses exceeding \$1 billion each. Eighteen, exceeding \$1 billion.

They also approached a report, a year ago, that sea level rise is occurring even faster than predicted. Those 18 costly disasters underscore the urgent need for further action to reduce greenhouse gas emissions and to limit the impacts of climate change.

We were reminded by Albert Einstein years ago that "in adversity lies opportunity," and that is true here, as well, and those opportunities are, frankly, enormous. By tackling the climate crisis, we can continue to fuel the growth of clean energy jobs in our Country and reduce our dependence on foreign oil.

Again, to our newest members of this committee, including our neighboring Pennsylvanian and Senator Ricketts as well, my colleagues have heard me tell once or twice the story of a guy named Willie Sutton. I don't know if you have ever heard of Willie Sutton, a famous bank robber during the Great Depression.

He finally got caught and was dragged before the judge and jury and everything. The judge said to him, famously, "Mr. Sutton, why do you rob banks?" He replied, "Because, Your Honor, that is where the money is." When people ask me, "why do we focus on reducing transportation emissions?" I say, "Because that is where a good deal of the emissions come from."

For some time now, our Nation's transportation sector has remained the largest source of greenhouse gas emissions in the U.S. economy, accounting for more than 25 percent of emissions in America. I think power plants account for close to 25 percent. Another 20 percent comes from our manufacturing operations, think cement plants, think steel mills, and so forth.

Through the Bipartisan Infrastructure Law that we all participated in crafting and passing and the Inflation Reduction Act, Congress and the Biden Administration have made significant investments to support American clean energy and zero-emitting vehicles while also securing the domestic supply chain of critical minerals for electric vehicles.

Many Americans, including several members of this committee, are making the switch to electric vehicles and hybrid vehicles. Still, there is more that we can and must do to support cleaner fuels for the vehicles on our roads and provide greater certainty and flexibility for those who produce these fuels.

As a recovering Governor, while exploring ways to improve Federal policies, I often look to see what is working well in the States and try to replicate those efforts. I have called the States laboratories of democracy forever. They have been, and they continue to be laboratories of democracy for us to learn from.

States have learned from the Federal Government's mistakes when it comes to programs like the Renewable Fuel Standard. Many States, including Oregon and California, have implemented or are considering implementing technology-neutral low carbon fuel standards. These State-level programs have successfully advanced the production and use of cleaner fuels and kept consumers and compliance costs low while fostering local investment and job creation.

As we will hear today, these State programs have fuel flexibilities, greater long-term predictability, and cost-containment mechanisms that are not included in the Renewable Fuel Standard. Unlike the Renewable Fuel Standard, existing State programs often focus more on emissions reduction potential when determining what qualifies as a clean fuel. In addition to reducing the number of questions the States have to ask when determining which fuels qualify for a clean fuels program, this structure allows multiple options for obligated parties to comply.

For example, a wide range of stakeholders, including the Delaware City Refinery, about 20 miles from my house down the Delaware River, those stakeholders are interested in producing clean hydrogen as a qualifying clean fuel. They believe they can do so with their existing infrastructure to secure a stronger financial future and create new jobs. That is why we have invested significant Federal resources to support the development of clean hydrogen infrastructure in our Nation.

However, unlike existing State-level programs, the Renewable Fuel Standard does not currently consider hydrogen a clean fuel. Increasing the production and use of clean hydrogen is a key to reducing emissions in sectors of our economy that are difficult to decarbonize. Think large trucks, think buses, big buses.

The challenges with the Renewable Fuel Standard do not stop at hydrogen. As we are going to hear here today, there are challenges across clean fuel stakeholders, including biofuels, which we can address by moving toward a more technology-neutral approach.

With that, I welcome the discussion on the benefits of establishing a Federal Low Carbon Fuel Standard, a program that can provide certainty, provide predictability, and provide flexibility for

all stakeholders while also spurring innovation across clean fuel technologies to help us meet our ambitious climate goals.

My hope is that today's hearing is the first of many conversations on how we can bring industry together along with environmental groups, along with agriculture and stakeholders, to further decarbonize our Nation's transportation fuels while also supporting job creation across our Nation.

We look forward to hearing the perspectives of each of our witnesses here today. Before we do that, I want to turn to our Ranking Member, Senator Capito, for her opening statement. Senator Capito, it is great to be with you.

**OPENING STATEMENT OF HON. SHELLEY MOORE CAPITO,
U.S. SENATOR FROM THE STATE OF WEST VIRGINIA**

Senator CAPITO. Thank you, Mr. Chairman, and thank the witnesses for being here today. I think we have a great panel, so we will get to learn a lot about this.

For those unfamiliar with a Low-Carbon Fuel Standard, it is a regulatory process meant to advantage fuels that generate lower carbon emissions in their production and use over fuels that emit more. This may be achieved through financial incentives funded by the taxpayers, decreasing quotas or limits on market access for more emissive fuels, or a combination of the two.

I am very concerned by the concept of empowering bureaucrats to decide what fuel sources qualify, how, and what associated phase-outs may look like. It sounds like a combination of social cost of carbon and centralized economic planning.

We have watched administrations of both parties seesaw on the execution of regulatory programs that impact American energy prices, with experience revealing that heavy-handed regulatory approaches inevitably lead to reduced supplies and higher prices. Perhaps nowhere has the tug of war been more obvious than the EPA's Renewable Fuel Standard.

Speaking of that program, in December, EPA proposed the new RFS "Set" rule to establish the required volumes of biofuels to be blended with conventional gasoline and diesel for the next 3 years, 2023, 2024, and 2025.

As part of this proposal, EPA has allowed automakers contracting with certain renewable electricity producers to generate compliance credits, known as RINs, for the first time in this program. In fact, EPA says in their proposal that they are using the creation of electric RINs, or eRINs, which have a cash value, to incentivize increased vehicle electrification.

Yet another subsidy for EVs was not congressional intent, nor is it a reasonable interpretation of the statute. This eRIN proposal has aggravated proponents of the RFS, critics of the programs, and environmentalists alike, a rare trifecta. The fact that it is also formulated without any political accountability should cause us all significant concern.

Speaking of things to be concerned about, one State that has taken a lot of action recently on transportation fuels is California. California was the first State to adopt the LCFS. It is no coincidence that California's gas prices are more than \$1.20 higher than the national average due to its regulatory policies and taxes. A

study from the Stillwell Associates found that California's LCFS by itself has added more than 22 cents per gallon in 2022.

Oregon and Washington have followed suit in establishing their own LCFS programs and have seen their gas and diesel prices rise.

Last September, fuel prices in Oregon spiked 50 cents per gallon, the sharpest spike of any State in the Country. Washington's cap-and-trade and LCFS programs went into effect at the start of the year, and according to State legislators and Washington Independent Energy Distributors Association, gasoline has gone up by more than 34 cents per gallon and diesel by more than 43 cents on average as a result of the two policies in the past month and a half.

This stacked LCFS and other environmental regulations and taxes mean that residents of the West Coast States face the highest fuel prices in the lower 48. But don't worry, if these prices make your eyes water, you can just buy an EV. California is requiring 100 percent of new vehicles purchased to be zero-emission by 2035 through its Advanced Clean Cars II rulemaking. That target means higher costs for consumers to buy still-scarce electric vehicles and hydrogen vehicles and the potential disruption of inter-State commerce.

According to Kelley Blue Book, the average price of an electric vehicle in the United States as of August 2022 was \$66,000. That is more than the median household income in my State, which is \$50,000.

I don't have anything against EVs, and we will eventually get there. But I think people should be free to buy the vehicles they want and can afford. It also does not help that California has some of the most expensive and least reliable electricity in the Country, with even greater challenges ahead as nuclear and natural gas plants are forced to retire and the transportation sector is electrified. But those electricity prices can be a subject for a future hearing.

Looking at the statistics on fuel and vehicle prices at a time of significant and sustained inflation, I doubt my State and many others, particularly in rural America, will want to import the West Coast's policies, which will also bring higher prices for at-best hypothetical climate benefits.

This is especially true at a time of sustained high inflation, which, despite monetary policy and the Inflation Reduction Act, inflation remains stubbornly predicted to be between 4 and 6 percent, we saw the figures yesterday, of over 6 percent, well above the 2 percent target of the Federal Reserve, and is being forecast by groups like Apollo Global Management to be stuck there for the near-or medium-term.

An LCFS and these other cap-and-trade regulatory process will only accelerate and lock in those price increases at a time when American households and businesses can least afford it.

I look forward to the testimony and thank you again.

Senator CARPER. Thank you, Senator Capito.

As our new colleagues probably don't know, I go home at night, almost every night, to Delaware. I am able to take the train. Every morning when I head for the train station, I drive by a BP station where I bought gasoline for about 20 years for my 2001 Chrysler

Town and Country Minivan, which had 600,000 miles on it when I sold it for \$1 last year.

I no longer stop at the station and get gas, but every day I look at the price. I noted that yesterday the price was \$4.17 cents, which is down by more than \$1 from where we were maybe this time last year. My hope is that it will continue to trend down. We will see.

Anyway, we are going to have a healthy debate here, Senator Capito and I, we may have some differences here. This is something I am just learning about, and that is why we are having the hearing. Hopefully, we will all learn something, and maybe we will learn that there is a way to find, to join forces and move together down this road. I hope so.

Now, we are going to turn to our esteemed panel of witnesses. In a few minutes, we are going to hear from them in this order. First is Michael Graff, the Chairman and CEO of American Air Liquide Holdings Incorporated. He is also Executive Vice President and Executive Committee Member of the Air Liquide Group. We are delighted to see you. Thank you so much for joining us and thank you for your presence in our State.

Second, we are going to hear from Geoff Cooper, President and CEO of the Renewable Fuels Association, and finally, from Chris Spear, President and CEO of the American Trucking Association. Chris, it is very nice to see you again.

We are now going to begin our witness testimony. I am going to ask Mr. Graff if you will proceed with your statement. Your entire statement will be made part of the record. You may proceed as you wish.

Thank you so much. Welcome.

**STATEMENT OF MICHAEL J. GRAFF, CHAIRMAN AND CEO,
AMERICAN AIR LIQUIDE HOLDINGS INCORPORATED, EXECUTIVE
VICE PRESIDENT AND EXECUTIVE COMMITTEE MEMBER,
AIR LIQUIDE GROUP**

Mr. GRAFF. Chairman Carper, Ranking Member Capito, and members of the committee, on behalf of Air Liquide's more than 20,000 employees in the United States—

Senator CARPER. Excuse me, let me interrupt for just a second. My staff reminds me. It was not \$4.17, it was \$3.17. You are right. Hopefully it will continue to drop. I think it will. We will see. Thanks.

Mr. GRAFF. On behalf of our 20,000 employees in the United States, I thank you for the opportunity to testify today. My name is Mike Graff, and I am the Chairman and CEO of American Air Liquide, a world leader in sustainable technologies and solutions that help decarbonize the planet and advance a clean energy economy while creating high-paying careers.

It is a pleasure to be here today with Mr. Cooper from the Renewable Fuels Association and Mr. Spear from the American Trucking Association. I want to thank Mr. Spear and the ATA, with whom we worked closely during the pandemic to ensure patients and hospitals had the medical oxygen they needed to save lives. Thank you.

Mr. Chairman, it was Air Liquide's honor to host you, the Secretaries of Energy and Labor and the National Climate Advisor at our Innovation Campus Delaware last August. We share a core belief: clean energy is about lowering emissions and growing our economy while creating new, value-added jobs.

As the committee considers the establishment of a national clean fuels program, we urge you to ensure that any proposal is technology-neutral and enables emissions reductions through certainty and flexibility. These are essential to promoting private sector investment, creating jobs, and minimizing burdens on the American consumer.

Hydrogen plays an important role in decarbonizing the transportation sector, and Air Liquide is at the forefront of that effort. In Nevada, Air Liquide has invested \$250 million in the first world-scale liquid hydrogen production facility, with the capacity to supply renewable hydrogen for over 40,000 zero-emission hydrogen fuel cell vehicles. Much of this hydrogen is supplied to California under its LCFS.

Leveraging the versatility of hydrogen and regional energy ecosystems, Air Liquide is also involved in many hydrogen hub proposals, which include decarbonization of the transportation sector.

Mr. Chairman and Senator Fetterman, as mentioned, Delaware is home to our innovation campus, and Pennsylvania is home to 1,400 Air Liquide employees. As the headquarters of Airgas and Air Liquide Company, a hub here could unite the East Coast transportation system with the necessary renewable fuel infrastructure.

Ranking Member Capito and Senator Cardin, an Appalachian hub could leverage the region's abundant supply of natural gas, joint with carbon capture, to produce low-carbon hydrogen.

Senators Sanders, Whitehouse, and Markey, NYSERDA is leading the effort to convert the Northeast's abundant wind and hydropower to low-carbon hydrogen via electrolysis, which Air Liquide already does in this region with the world's first industrial scale PEM electrolyzer. Similar initiatives are underway in the Midwest, the Southwest, and the Gulf Coast. Any clean fuels program must have flexibility at its core to fully leverage hydrogen within the local energy ecosystem.

Air Liquide is a significant low-carbon fuel supplier that gives us insight into clean fuels programs like the California Low Carbon Fuel Standard and the Nation's Renewable Fuel Standard and their effects on private investment and on the market.

First, the California LCFS has reduced CO₂ emissions while stimulating private investment. Senator Padilla, the hydrogen and renewable natural gas that Air Liquide supplies to the California transportation market falls under the State's LCFS. We also supply hydrogen for the refining industry, which is also subject to the LCFS.

Second, the California LCFS employs a performance-based carbon intensity target and a fuels evaluation methodology that is agnostic about technologies and feedstocks. This is a key feature of the program designed to maximize the reduction of greenhouse gas emissions. However, given the number of fuel pathways requiring approval, a streamlined process through pathway standardization would be beneficial.

Third, policies that enable the use of renewable energy credits and environmental attributes enable investments that best use regional resources, infrastructure, and technologies to meet targets and increase the supply of low-carbon and renewable energy, ensuring consistency in the use of RECs and EAs across all feedstocks and processed energy, and in avoided emissions rules, would make the California LCFS more efficient.

Finally, the pathway approval process for the Renewable Fuel Standard is significantly delayed. Like many entities, Air Liquide has pending RFS pathway petitions. Ours seeks to qualify hydrogen for renewable natural gas. Despite favorable review by EPA, these pathways have not advanced. The RFS pathways process needs to be transparent and timely in order to advance the Nation's emission reduction goals.

In conclusion, we urge the committee to ensure that any national clean fuels program is technology neutral and enables emission reductions through the program's certainty and also flexibility.

Thank you for inviting me to participate today, and I welcome your questions.

[The prepared statement of Mr. Graff follows:]



Statement of Mr. Michael J. Graff

Chairman & CEO, American Air Liquide Holdings Inc.

Executive Vice President & Executive Committee Member Air Liquide Group

Before the Committee on Environment and Public Works

United States Senate

*Full Committee Hearing on the Future of Low Carbon Transportation Fuels and Considerations
for a National Clean Fuels Program*

Feb 15, 2023

Chairman Carper, Ranking Member Capito, and Members of the Committee, on behalf of Air Liquide's more than 20,000 employees in the United States, thank you for the opportunity to testify today on the *Future of Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program*. My name is Mike Graff, and I am the Chairman and CEO of American Air Liquide Holdings, Incorporated. Air Liquide is a world leader in sustainable technologies and solutions that can help decarbonize the planet and advance the transition to a clean energy economy while creating high paying careers in the sector. Our portfolio of sustainable solutions includes clean hydrogen energy, carbon capture technologies, biogas production, advanced membrane technologies and more.

Air Liquide recently had the honor of hosting Chairman Carper, Energy Secretary Jennifer Granholm, Labor Secretary Marty Walsh, and White House National Climate Advisor Ali Zaidi at our Delaware Research and Development facility. It was evident that we share a core belief: clean energy is not about lowering emissions at the expense of economic growth; it's about lowering emissions and *growing our economy*.

My testimony today will focus on achieving these twin goals as they relate to the role of clean hydrogen energy in the decarbonization of the transportation sector and the need for flexibility, certainty, and technological neutrality in doing so. These characteristics are critical to promoting private sector investment, creating jobs, and minimizing burdens on the American consumer.

The timing of this hearing is very important. As a nation, we have reached a critical point in the Clean Energy Transition: emissions reductions remain paramount; domestic energy security is

essential; and the passage of the *Inflation Reduction Act* and the *Bipartisan Infrastructure Law* illustrate the importance of the private sector and the federal government investing and working together. As we capitalize on this moment, the U.S. workforce and economy are poised to benefit from immense growth. At Air Liquide, we are not awaiting the Clean Energy Transition; we are advancing it.

My testimony today will explain hydrogen's role in the Clean Energy Transition and share important lessons learned from Air Liquide's experiences with the California Low Carbon Fuel Standard (CALCFS) and the nation's Renewable Fuels Standard (RFS):

- I. Hydrogen: Necessary to Advance the Clean Energy Transition**
- II. Hydrogen Hubs: The Connection to Low Carbon Fuel Standards**
- III. Certainty, Flexibility & Technological Neutrality: Essential Principles for Low Carbon Fuels Programs**
- IV. Lessons Learned: CALCFS**
- V. Lessons Learned: RFS Pathways Approvals Need Certainty and Timeliness to Advance the Nation's Clean Energy Transition Goals**

I. Hydrogen: Necessary to Advance the Clean Energy Transition

It's estimated that hydrogen, over the next 30 years, could grow to account for over 20 percent of the world's total energy demand. This would reduce annual CO₂ emissions by roughly 7 gigatons compared to today's levels, and contribute roughly 20 percent of the abatement required to limit global warming to two degrees Celsius, according to the Hydrogen Council's *Hydrogen for Net-Zero* study. According to the "Road Map to a U.S. Hydrogen Economy" produced by the Fuel Cell and Hydrogen Energy Association, by 2030, the hydrogen economy in the U.S. alone could generate an estimated \$140 billion per year in revenue and support 700,000 total jobs across the hydrogen value chain. In the U.S., hydrogen is projected to be even more robust by 2050 accounting for at least \$750 billion in revenue and 3.4 million jobs.

Air Liquide has a long history of leadership in establishing the markets of the future. As a pioneer in the hydrogen market, we have over 60 years of experience along the hydrogen value chain and in this time we have focused on hydrogen as a key molecule for investment, research and technology development. At Air Liquide, we are not just talking about the potential of hydrogen, we are investing in its future. In fact, we have committed to investing nearly \$10 billion in low-carbon hydrogen by 2035 as part of a plan to more than triple sales of hydrogen and help substantially curb emissions. With nearly 1,400 locations across every state in the United States, Air Liquide knows that these investments are more than facilities, they're the creation of clean energy careers in our communities.

Hydrogen alone will not drive the clean energy transition, but the clean energy transition will not happen without hydrogen.

II. Hydrogen Hubs: The Connection to Low Carbon Fuels Standards

According to the EPA, transportation accounted for nearly one-third of the greenhouse gas emissions of the United States in 2020, which means that the decarbonization of this market is essential to reaching the country's goal of achieving net-zero emissions economy-wide by no later than 2050. Policy mechanisms intended to address the GHG impact of transportation fuels include the federal Renewable Fuel Standard and the low-carbon fuel standards active in states like California. The utilization of hydrogen in programs such as these, coupled with the creation of regional hydrogen hubs, can magnify its decarbonization impact.

In 2022, Air Liquide opened its largest liquid hydrogen production facility in the world in North Las Vegas, Nevada. This \$250 million investment utilizes a steam methane reformer which, with biogas feedstocks and renewable power for liquefaction, provides low-carbon and renewable hydrogen to the mobility market in California. At full capacity, this facility can provide enough fuel to keep more than 40,000 hydrogen fuel cell electric vehicles on the road, significantly improving the supply to this critical market. With the investments made at this project, Air Liquide also developed the infrastructure necessary to attract other companies to move into the area, creating additional jobs and new revenue in a previously underdeveloped area.

In addition to the Nevada investment, Air Liquide is involved in a variety of hydrogen hub proposals, which reflect the local investments and versatility that hydrogen provides. The concept of hydrogen hubs, created by the *Bipartisan Infrastructure Law*, is intended to leverage a regional approach to building a network of interconnected hydrogen energy centers. The hubs concept is built on the utilization of local resources to generate hydrogen and to then deploy it across sectors. As the hub proposals develop, we can see this regional emphasis evolving:

- Chairman Carper and Senator Fetterman, in the midAtlantic, a regional hydrogen hub could unite the east coast transportation system with the necessary renewable fuel and refueling infrastructure. This region is of great importance to Air Liquide. Newark, Delaware is home to Air Liquide's Innovation Campus, which is continually advancing hydrogen research in the study and optimization of electrolysis; development of safety protocols for hydrogen refueling of boats and vehicles, in partnership with the DOE's Hydrogen-at-Scale Maritime project; as well as the development of a membrane technology capable of both upgrading biogas for renewable hydrogen production and for capturing carbon. Pennsylvania is home to almost 1,400 Air Liquide employees; and Radnor is the headquarters of Airgas, an Air Liquide company, with extensive history in the state including the operation of a nationwide high school welding program, including schools in Pennsylvania.
- Ranking Member Capito and Senator Cardin, an Appalachia hub could leverage the region's abundant supply of natural gas. Using carbon capture, we can produce low-carbon hydrogen from that supply and dramatically reduce transportation emissions compared to traditional transportation fuels.

- Senator Merkley and Senator Padilla, in the Northwest and in California, a hydrogen hub could support the region's ambition to adopt a 100% clean electricity standard. This renewable electricity could be used to produce renewable hydrogen through electrolysis.
- Senator Sanders, Senator Whitehouse, and Senator Markey, in the Northeast, the region's abundant wind and hydropower can also be used to create low-carbon hydrogen via electrolysis. Air Liquide is at the forefront of this technology as it operates the world's largest Proton Exchange Membrane electrolyzer currently in operation, utilizing hydropower from Niagara Falls to produce and supply the Northeast U.S. with low-carbon, renewable hydrogen.
- Senator Stabenow, in the Midwest, a hydrogen hub can serve to transform heavy duty transportation in the heart of the nation's mobility networks while leveraging the existing nuclear generating fleet.
- Senator Kelly, a regional hydrogen hub in the Southwest could utilize the region's vast solar and land resources to produce clean hydrogen, and has the ideal conditions for the storage of large volumes of hydrogen through salt caverns, for the benefit of Southwestern states and tribal organizations.
- In the Gulf Coast, hydrogen can serve as a decarbonization vector to reduce the carbon footprint of energy intensive industries such as the chemical sector. The Gulf Coast is home to the largest hydrogen production basin in the world, and boasts the infrastructure necessary to produce, transport and store hydrogen - including the world's largest hydrogen storage cavern, which we own and operate.

Investments in clean hydrogen, and its deployment into an LCFS or clean fuels program, regionally or nationally, can help ensure that the United States reaches its emissions reductions goals and remains the energy superpower of the future.

III. Certainty, Flexibility & Technological Neutrality: Essential Principles for Clean Fuels Programs

To support the expansion of clean energy and drive investments, policies should be certain, flexible, and technology neutral. Policies that frequently change make it difficult for a business to plan for large scale investments. Policies that are too onerous or prescriptive can unintentionally hinder the expansion of clean energy production and use. And to promote competition to drive innovation, policies should set a clear incentive structure and allow technologies to compete fairly. When considering a National Clean Fuels Program, the Committee should keep these goals in mind.

Fortunately, as mentioned, there are policies currently that drive clean production, like the California Low Carbon Fuel Standard (CA LCFS) and the Renewable Fuel Standard (RFS), that we can use as a model for enhancement and improvement.

Every hydrogen molecule sold from Air Liquide's facilities into the California transportation market falls under the CA LCFS, making Air Liquide a significant low carbon fuel provider. Additionally, Air Liquide's industrial operations supply the refinery industry, which also must comply with the CA LCFS. Finally, our biogas business provides renewable natural gas (RNG) into the LCFS markets and it generates renewable identification numbers (RINs) under the RFS. This broad view of the LCFS and RFS provides Air Liquide with unique expertise and insights into the programs and their effects on our markets.

IV. Lessons Learned: CA LCFS

A. Successful CA LCFS Elements: Emissions Reductions, Technological Neutrality, Energy Producer Flexibility

Air Liquide's experience in the CA LCFS program has given us a unique perspective on the model's flexibility, promotion of innovation and private investment, and its benefits to various parties.

- 1) CA LCFS: CO2 Emissions Reductions: By stimulating innovation and the market for low carbon alternative fuels, California's program has enabled the state's hydrogen market to quickly decarbonize and, with the introduction of infrastructure incentives (which subsidize the construction of fueling facilities), it has helped address the issue of consumers' limited access to stations. To be effective, a National Clean Fuels Program should provide consumers with a low cost renewable fuel option that can help meaningfully reduce CO2 emissions.

The growth of clean hydrogen is not only good for the market but it is greatly beneficial to communities. Environmental justice communities often are more disproportionately impacted by transportation-related emissions. The opportunity to transition buses and other heavy-duty vehicles to renewable fuels, including zero emission hydrogen fuel cell electric vehicles, has the benefit of decreasing conventional pollutants in these communities.

- 2) CA LCFS: Energy Technology Agnostic Pathway Evaluations Are Effective: Important to the effectiveness of the CA LCFS program is that it is based on a performance-based "carbon intensity" target and a methodology for the fair evaluation of fuels on an equal basis. It is not based on labels such as "renewable" or "green," which can mask large differences in the emissions associated with various fuels. The pathway evaluations are appropriately based on emissions from well to wheels with explicit, stable rules for accounting for direct and indirect emissions. Importantly, because the CA LCFS is based on the calculated carbon intensity of each fuel, it is agnostic about technologies and

feedstocks. It does not favor or disfavor any particular feedstock that goes into the making of a fuel, nor does it favor or disfavor any particular technology for producing a fuel. For example, a fuel produced from petroleum feedstocks, with capture and sequestration of the emissions resulting from the production process, may have a carbon intensity that is as low or lower than a “renewable” fuel that is produced with waste material or solar energy. This flexibility allows fuel suppliers to optimize their available feedstocks and best meet the low cost, low carbon solutions required by their customers.

- 3) CA LCFS: Flexibility for Clean Energy Producers Underpins the Program’s Success:
The CA LCFS allows the use of Renewable Electricity Credits (RECs) and biogas Environmental Attributes (EAs) to lower carbon intensity of feedstocks. Under the LCFS, this is known as “book-and-claim accounting.” Additionally, the CA LCFS also allows fuel producers to obtain credits for avoided emissions for some feedstocks.

Policies that enable the use of RECs and EAs enable investments that best use available resources, infrastructure, and technologies to meet targets. RECs and EAs allow for solution providers to invest in expansion of both the electric grid and the natural gas network while providing real carbon reductions. The use of RECs and EAs allows hydrogen to leverage the unique resources of different geographic regions. States in energy poor regions can utilize renewable or low carbon energy created in energy abundant regions. This allows for fuels, such as hydrogen to be produced where it is needed without being constrained by colocation of feedstock development and production.

When considering decarbonization objectives, flexibility is important. For example, a fuel producer that captures methane from a dairy manure digester can obtain LCFS credits for the avoided methane emissions that would have resulted if the methane had been allowed to escape to the atmosphere. Methane has a high global warming potential, so there is significant value in capturing methane emissions. In many instances, capturing methane emissions results in the production of a fuel with a negative carbon intensity; that is, the production and use of the fuel results in a reduction of GHG emissions. Furthermore, this allows for the increased supply of renewable hydrogen which reduces fuel prices, spurring the expansion of clean energy investments and jobs.

B. CA LCFS Areas for Improvement: Streamline Pathways Approvals, Support Market Growth & Innovation, Create Certainty

- 1) CA LCFS: Streamlining Pathway Approvals Would Improve Efficiency and Consistency:
The CA LCFS requires fuel supply pathways to be validated and approved. When considering a National Clean Fuels Program processes of establishing pathway approvals need to be streamlined and efficient. Ensuring consistency in the use of book-and-claim accounting across all feedstocks and process energy, as well as consistency in avoided

emissions rules, would make the program more efficient. For example, the CA LCFS recognizes reduced emissions from swine and dairy manure operations, but not from all manure operations. A flexible system should ensure equal treatment for all fuels and feedstocks, prioritizing low-carbon outcomes and not mandating specific pathways.

Pathways can also include the efficiency of the end user, encouraging high efficiency applications such as fuel cells over combustion systems - the Energy Economy Ratio featured in the CA LCFS is one method of incorporating vehicle efficiency. Additionally, consistent and equal application of the program to all value chain participants is important. Today in California, different parties (producer/dispenser/user) generate the LCFS credits depending on the fuel involved and how it is used.

- 2) CA LCFS: Design for Market Expansion and Growth: The objective of any program aimed at supporting new and more sustainable markets should be to encourage open market dynamics that drive innovation, investment, and sustainable growth. To achieve this, a National Clean Fuels Program should be built flexibly so that the system can react to market changes that may dilute the value of the program without having to completely rewrite the program. Another important feature that would support this aim is to have a system that enables credit/deficit reporting to be averaged over reasonable time periods (quarters) and across supply regions to allow suppliers to best balance regional supply/demand without jeopardizing energy resiliency.

As the energy transition continues to evolve, and new technologies and applications are developed, any potential National Clean Fuels Program should consider renewable fuels for transportation. This could include aircraft and sustainable aviation fuels, in addition to the maritime and rail sectors.

- 3) CA LCFS: Avoid Stranded Costs that Are Inherent in the CA LCFS System: While one of the strengths of the CA LCFS is that it is based on the carbon intensity of specific fuels, this also means that when a fuel-producing facility starts up, there may be insufficient data to determine the carbon intensity of the fuel for a long period of time. The LCFS requires 90 days of operational data in order to determine the carbon-intensity of the fuel and obtain a certification, and the LCFS does not allow a fuel producer to claim credits for a fuel before the calendar quarter in which a fuel's carbon intensity is certified. This can result in some stranded costs during facility startup and could potentially slow investments in clean energy projects. Regulations with a streamlined approach and the opportunity for retroactive credit earnings would be helpful.

V. Lessons Learned: RFS Pathway Approvals Need Certainty and Timeliness to Advance the Nation's Clean Energy Transition Goals

The RFS requires fuel supply pathways to be validated and approved, which can cause some clean energy sources to be unfairly treated. As an example, biogas which is captured and sold as renewable natural gas (RNG) to be used in a natural gas vehicle, is eligible to generate RINs under the RFS. If you were to use that same RNG to produce renewable hydrogen for use in a fuel cell vehicle, it would not generate RINs.

Air Liquide has three pending RFS pathway petitions pending to allow hydrogen from RNG to qualify, the first of which was submitted in 2016. Air Liquide, and other companies, have met with the Environmental Protection Agency (EPA) multiple times through multiple Presidential Administrations to discuss the petitions, but they have not advanced, and there is no clarity as to when, if ever, these petitions will be finalized.

This lack of movement and transparency could be remedied by a program with a simple methodology with clear boundaries on emissions from well-to-wheel along a production pathway. Such pathways should allow for the flexible use of RECs and EAs to promote entire energy markets and allow for full usage of our existing natural gas and electricity infrastructure. Regional, temporal, or "additionality" limits can artificially bias pathways and inhibit regional energy investments. It is also important to include and treat equally all energy and emission sources in the pathway evaluations including feedstock development and supply, production and process energy, distribution and supply, and end use including carbon abatement, if deployed.

Conclusion

In conclusion, at Air Liquide, we believe that decarbonizing the transportation sector is a mission that can only be achieved through collaboration - among industry, government and communities. We have the technologies and expertise needed to advance the energy transition through the use of renewable fuels. With supportive governmental policy and programs that provide certainty and are technologically neutral and flexible, we can ensure that the market and the U.S. consumer benefit from a clean energy system that is affordable.

Chairman Carper, Ranking Member Capito, and Members of the Committee, thank you for your time today. I look forward to answering your questions.

Senate Committee on Environment and Public Works
Hearing Entitled, “The Future of Low Carbon Transportation Fuels and Considerations for a
National Clean Fuels Program”
February 15, 2023
Questions for the Record for Michael Graff

Chairman Carper:

1. *Life cycle assessments (LCAs) have been applied in the development of transportation fuel policies in order to estimate and help reduce greenhouse gas (GHG) emissions from fuels such as electricity, biofuels, and hydrogen. Low-carbon transportation fuels can emit carbon dioxide (CO₂) and other GHGs at the tailpipe, during production processes, and through the wider supply-chain involved in the production and use of a type of fuel. Therefore, the measurements and methodology used to make determinations about the carbon intensity of a variety of different fuels are adequately robust.*
 - a. *What key components or considerations should be included in developing a framework or methodology for measuring and analyzing the carbon intensity different of fuel types?*

We recommend a life cycle assessment (LCA) methodology that includes all of the emissions from well-to-wheel as these are directly controlled by the fuel producer and this provides an incentive to improve the carbon footprint of all stages of production from feedstock acquisition through production, distribution, dispensing, and usage. The inclusion of wider supply chain emissions including equipment procurement, manufacturing, and disposal should not be included in the LCA as it is generally not under the control of the fuel provider and is not easily quantified on a “per gallon of fuel equivalent” basis.

It is important that an LCA creates a standard that can accommodate a variety of hydrogen production processes and energy sources including production from existing and developing electrochemical and thermochemical processes using renewables, biomass, nuclear, and traditional fossil fuels. Hydrogen production has the flexibility to utilize electricity, natural gas, renewable natural gas, certified low-methane intensity natural gas, etc. as production feedstocks. Accommodating the widest variety of production methods is in the best interest of the United States as it enables each region to maximize their potential feedstocks and energy resources while addressing the local concerns related to the environment, economy, and society.

It is also critical to the development of hydrogen production infrastructure to allow fuel producers to use market mechanisms, including renewable energy credits (RECs), power purchase agreements (PPAs), and environmental attributes (EAs) associated with renewable natural gas, to reduce the carbon intensity of fuels. Providing the broadest flexibility for renewable energy credits, and enabling them to be managed through the existing market

programs provides the most robust solutions to the market while optimizing energy resources across regions and reducing overall production costs.

Lastly, the process of approving LCA pathways needs to be efficient and timely. In state LCFS programs, 45Q Tax Implementation, and in the Renewable Fuel Standard, we have experienced significant delays in having pathways approved. These delays can be a critical barrier to executing projects and in enabling markets, and they need to be addressed in regulation with a maximum period for evaluations and approval or other similar process requirements. For many production pathways, a default or standard suite of preapproved pathway models can greatly simplify the reporting and administration.

b. How should a federal low carbon fuel program's LCA analysis best address data verification for carbon emissions?

In the implementation of a national low carbon fuel program, it is important that carbon reduction reporting be accurate, verifiable, and auditable while keeping the administrative burden of compliance to a minimum. Our experience with third party verifications has been favorable and we would consider this an acceptable option.

c. Current LCAs used in existing low carbon fuel standards differ notably in their implementation, data quality, modeling approaches, and key assumptions. Are there existing lifecycle greenhouse gas emissions models that you are particularly supportive of? If yes, which approaches/models and why?

While there are a variety of models available that could be used in this LCA evaluation, it is the assumptions, pathway boundaries, and eligibility criteria used in the models that are typically most important to determining the efficacy for use in policy. The GREET “fuel-cycle” model is the best representation of “well-to-wheel” emissions analysis for hydrogen that is familiar and trusted by stakeholders with precedent in the California LCFS program and IRC 45V. In setting the lifecycle emissions boundary for an LCFS, it would not be appropriate, however, to also include the “vehicle cycle” model, which incorporates the lifecycle emissions of automobiles, from raw materials mining to vehicle disposal. Given the manner that hydrogen is produced, the “vehicle cycle” model would not provide the most accurate understanding of the lifecycle emissions for hydrogen.

2. *Is there anything else that you would like to provide the Committee that was not included in your testimony or discussed during the hearing?*

TOPIC 1 - The Need for Flexible Usage of Environmental Attributes in the IRA

The IRA in general and IRC 45V in particular have the potential to greatly accelerate the energy transition in the United States by enabling low cost, low carbon hydrogen production. To achieve this, it is essential that hydrogen is produced at scale. The private investment needed to produce at scale requires the market to have favorable economics and steady growth.

45V, when combined with flexible access to low cost feedstocks, will enable hydrogen production at market prices comparable to diesel fuel. This price parity will enable the transition of very difficult to decarbonize transportation markets at a potentially historic rate. With the momentum of the mobility sector, we anticipate the broad use of hydrogen in decarbonizing other markets including power generation, industrial processing, and commercial/residential applications.

It is crucial that there are no arbitrary market barriers to the use of low-cost and renewable power. The added costs of hydrogen production necessary to accommodate such barriers, including short-term temporal matching, requirements to use energy resources co-located or restricted to those in nearby geographic regions, and the requirement for simultaneous investments in new electricity production through “additionality” will curtail the economic advantages of 45V and stall the investments in new hydrogen production.

There has been much discussion around regulations for how these market-based mechanisms could be used, including limitations on the use of EAs and RECs with regards to temporal matching, geographic location, and additionality.

Temporal matching: The time period over which EAs and RECs can be used and the need for matching to power curtailment must be workable for industry and should not require overly burdensome and expensive compliance and monitoring processes which significantly extend project development timelines and drive up costs.

Short matching periods are problematic in that they require significant overbuilding of production assets and energy storage technologies that can remove the potential benefit of the 45V and kill potential investments and corresponding reductions in carbon emissions. Temporal matching of wind and solar necessitates overbuilding electrolyzer capacity by three to four times and adds requirements for large scale storage, increasing the capital cost of production facility equipment dramatically.

Geographic restrictions By limiting the use of EAs and RECs to local or co-located projects, we unnecessarily lose the ability to leverage the existing national network of energy production, which encourages further investments in this critical infrastructure. In order to maximize nationwide investment in clean energy, offering as much flexibility in sourcing energy as possible will be needed.

Requiring co-location of clean hydrogen production alongside renewable energy or biogas facilities would contradict the intent of this credit to promote clean hydrogen production in all regions and it would severely limit the effectiveness of the credit, drive up production cost, slow job growth, and delay decarbonization efforts.

Additionality: Tying the use of EAs and RECs to new energy production assets through “additionality” will put an unnecessary burden on all new energy projects and prevent hydrogen producers and clean electricity producers from optimizing available energy and investments. The intent of allowing EAs is to provide flexibility and promote further investment in renewable electricity production. Additionality requirements would disadvantage hydrogen production over other renewable energy uses not subject to these standards and this would curtail the growth of the domestic hydrogen production market.

We strongly encourage engagement with the Department of Treasury on this critical issue to ensure that the potential for the IRA to enable hydrogen’s role in the energy transition not be lost in overly restrictive controls on EA usage.

TOPIC 2 - The Carbon footprint of Fossil Fuel Based Hydrogen

During the February 15 hearing, a concern was raised from a study entitled How Green is Blue Hydrogen?. The paper is based upon an evaluation of the carbon footprint of hydrogen produced using fossil based natural gas with carbon capture and storage. Particular emphasis in the paper is placed on the role of fugitive methane emissions in evaluating the carbon footprint of the produced hydrogen recognizing that methane has a significantly larger global warming potential relative to carbon dioxide.

Fugitive emissions from natural gas processing play an important part in determining the carbon footprint of any energy pathway. Appropriate accounting for this is an important step in evaluating the impact of energy vectors on the environment. Because the study is dependent upon key, inaccurate assumptions, we believe the study reaches a faulty conclusion about the emissions from natural gas based hydrogen.

It relies on a 3.5% rate of methane fugitive emissions upstream of the reforming plant (associated with natural gas extraction, compression, transport and storage). This value is a top-down estimate for U.S. gas production but there is great disparity at a global level as shown by databases such as the IEA methane tracker database, which shows a world average of 1.6%¹. The

¹ <https://www.iea.org/reports/methane-tracker-2020/methane-from-oil-gas>

authors assume a carbon capture rate of 85% on CO₂ from the process and 65% on CO₂ from flue gas and assume that the additional energy to run the carbon capture is provided by burning natural gas. This does not represent state of the art technology which shows a capture rate of more than 95% on CO₂ from the process and more than 90% on CO₂ from flue gas².

Perhaps most important to note is that the study's conclusion of the inferior environmental performance of hydrogen while compared with other energy sources (natural gas, diesel) is only true when these fuels are burned and valued only for their thermal energy. In fact, when using hydrogen in a fuel cell, the efficient conversion to electricity (60% efficiency according to DOE³) means that significantly *less* energy is required and the overall carbon footprint greatly reduced.

While we agree that the evaluation of the impact of methane fugitive emissions can play a critical role in determining the environmental footprint of any energy pathway, this study draws conclusions with assumptions that we believe are not representative of the real world usage of hydrogen. While we envision a zero carbon future enabled by green hydrogen, all forms of hydrogen can have a role in reducing our carbon footprint and enabling this outcome.

TOPIC 3 - RFS and Pending H₂ Pathways

The Renewable Fuel Standard (RFS) requires fuel supply pathways to be validated and approved, which can cause some clean energy sources to be unfairly treated. As an example, biogas, which is captured and sold as renewable natural gas (RNG) to be used in a natural gas vehicle, is eligible to generate renewable identification numbers (RINs) under the RFS. If you were to use that same RNG to produce renewable hydrogen for use in a fuel cell vehicle, it would not generate RINs.

Air Liquide has three pending RFS pathway petitions to allow hydrogen from RNG to qualify, the first of which was submitted in 2016. Air Liquide, and other companies, have met with the Environmental Protection Agency (EPA) multiple times through multiple Presidential Administrations to discuss the petitions, but they have not advanced, and there is no clarity as to when, if ever, these petitions will be finalized.

EPA has already approved renewable compressed natural gas and renewable liquefied natural gas from waste-derived biogas as an acceptable fuel pathway, identified as Pathway Q in the final rule published on July 18, 2014 (79 FR 42128). Air Liquide's hydrogen pathway petitions merely seek approval for taking this fuel pathway one step further by processing the renewable natural gas into renewable hydrogen via steam methane reforming. Approval of hydrogen pathway

² https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3820744

³ <https://www.energy.gov/eere/fuelcells/articles/fuel-cells-fact-sheet>

petitions would support continued investment in diversifying our energy resources, building additional energy security and potentially yielding new technological advances.

RNG to hydrogen provides one of the few pathways for truly negative net carbon transportation fuels, better than battery electric or electrolytic hydrogen from the grid or from dedicated wind and solar. Using RNG as a feedstock, directly replacing natural gas in existing hydrogen production facilities, provides one of the best opportunities to decarbonize these production facilities, leveraging the billions of dollars invested over the past few decades and allows for immediate conversion. Because of these advantages, RNG-based hydrogen constitutes the majority of hydrogen fuel supplied to the California market today. In most cases this feedstock is a mix of landfill and dairy digester fed pathways leading to transportation sector decarbonizing faster than the electric grid. This accelerated development can happen outside of California with the approval of hydrogen RIN pathways.

Ranking Member Capito:

1. *Mr. Graff, thank you again for your comments in support of a hydrogen hub in Appalachia. Are there any hurdles to deploying carbon capture technologies as you look to produce low-carbon hydrogen using natural gas?*

Thank you Ranking Member Capito. We look forward to leveraging the unique resources of West Virginia, notably natural gas, to help the region become a leader in clean hydrogen.

Carbon capture is a well understood and commercialized technology and it can be used to produce low-carbon hydrogen from natural gas. Notably, Air Liquide has developed a suite of carbon capture solutions called CryoCap™, which features our proprietary technology that can reduce CO2 emissions by 90% at a steam methane reformer (SMR).

Of course, any effort to reduce carbon emissions will incur additional costs. Incentives such as IRC 45Q, IRC 45V, and grants created by the Bipartisan Infrastructure Law help companies such as Air Liquide implement carbon capture technologies, while still providing competitively priced hydrogen to customers.

A key challenge remaining is ensuring the use or permanent sequestration of CO2 after capture and transport. Encouraging new products for the CO2 market and streamlining Class VI well permitting would notably assist this effort. For sequestration, simplifying long-term CO2 liability management and monitoring requirements, including transfer to a state or federal agency, will motivate well operators to move forward very quickly.

In addition to the long-term sequestration of carbon, options for carbon utilization need to be appropriately supported. Carbon utilization has the potential to provide feedstocks for alternative liquid fuels production, cement and building materials manufacturing, energy feedstock extraction, food and beverage, and other critical industries. We would encourage the Department of Energy to review the applications currently pending “pre-certification” at the

department. Without action by DOE, companies remain unable to make long-term investments in carbon utilization projects.

Senator CARPER. Mr. Graff, thanks so much. Great to see you, and thank you. Our best to you and the team you lead back in Delaware and across the Country and around the world. Thank you.

Mr. Cooper, Carper welcomes Cooper. Capito welcomes Cooper.

**STATEMENT OF GEOFF COOPER, PRESIDENT AND CEO,
RENEWABLE FUELS ASSOCIATION**

Mr. COOPER. Chairman Carper, Ranking Member Capito, and members of the committee, good morning. My name is Geoff Cooper, and I am the President and CEO of Renewable Fuels Association, the leading trade association for the U.S. ethanol industry.

I appreciate the opportunity to share our industry's perspective on the future of low-carbon fuels and the potential for a Federal Clean Fuels Program. The transportation sector, as you said, Mr. Chairman, is the leading contributor of greenhouse gas emissions in the United States, accounting for nearly one-third of total emissions annually. Although transportation emissions have fallen slightly from their peak in 2006, the pace of emissions reduction must rapidly accelerate in the years ahead if we are to meet the Administration's goals of net-zero emissions by 2050.

We believe a properly structured Clean Fuels Program offers the best opportunity to rapidly reduce carbon emissions from the transportation sector while simultaneously enhancing energy security, creating jobs, and reducing tailpipe pollution linked to poor air quality and health challenges.

RFA supports the development of a national program that is truly technology-neutral and performance-based. In essence, a Clean Fuels Program sets annual greenhouse gas reduction requirements for the transportation sector, and then it allows the marketplace to determine the most efficient and economical ways of achieving those reductions without dictating the use of specific fuels or vehicles.

Under a well-designed policy, we believe renewable fuels like ethanol offer an effective and immediate solution for decarbonizing the transportation sector, including light and heavy-duty vehicles, rail, marine, and even aviation fuels. Today's corn ethanol already cuts greenhouse gas emissions by approximately 50 percent on average compared to gasoline.

With the increased adoption of low-carbon farming practices, Carbon Capture Utilization and Storage, and other technologies, the U.S. ethanol industry is well on its way to producing net-zero carbon corn ethanol. In fact, RFA's member companies have pledged that the ethanol they produce will achieve a 70 percent reduction compared to gasoline by 2030 and a net-zero carbon footprint by 2050 or sooner.

Clean fuel policies have already been implemented at the State level, as you pointed out, Mr. Chairman, and several countries are beginning to implement their own programs. While existing State programs like the California LCFS have been successful in reducing emissions and driving investment, certain design shortcomings have at times undermined the technology—neutral intent of those programs and limited the ability of some low-carbon fuels to provide greater greenhouse gas emissions benefits.

Still, ethanol and other liquid biofuels have accounted for nearly three-quarters of the total carbon reductions that have been achieved under the California LCFS since it began in 2011.

If implemented on a national scale, a Clean Fuel Program will need to be designed in a way that avoids picking technology winners and losers and drives the greatest greenhouse gas emissions reductions at the lowest cost. A nationwide program should use consistent, science-based, and transparent life cycle analysis methodologies like the Department of Energy's GREET model for determining the carbon intensity of all fuel and vehicle options.

Two, it should set clear and predictable annual greenhouse gas emissions reduction requirements and then stick to those targets. Three, it should adopt rules for credit generation that are consistent across all fuel and vehicle pathways.

Four, it should include flexibility for low-carbon fuel producers to demonstrate process improvements and carbon intensity reductions across their entire supply chain. Five, it should include complementary measures to remove technical and regulatory barriers that artificially limit greater use of certain low-carbon fuel options, like the current barrier we have in place today that prevents the sale of E15 during the summer months.

In closing, we believe a well-designed national program has enormous potential to quickly reduce greenhouse gas emissions from the transportation sector and help our Nation achieve net-zero emissions by 2050. We look forward to working with the committee as it continues to consider a nationwide clean fuels standard.

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

[The prepared statement of Mr. Cooper follows.]



**TESTIMONY OF
GEOFF COOPER,
PRESIDENT & CEO, RENEWABLE FUELS ASSOCIATION
BEFORE THE
U.S. SENATE, COMMITTEE ON ENVIRONMENT & PUBLIC WORKS
HEARING ON
“THE FUTURE OF LOW CARBON TRANSPORTATION FUELS AND
CONSIDERATIONS FOR A NATIONAL CLEAN FUELS PROGRAM”**

FEBRUARY 15, 2023

Chairman Carper, Ranking Member Capito, and Members of the Committee, thank you for the opportunity to testify today. My name is Geoff Cooper and I am the President and Chief Executive Officer of the Renewable Fuels Association (RFA), the leading trade association representing the U.S. ethanol industry.

RFA’s mission is to drive expanded demand for American-made renewable fuels and bioproducts worldwide. Founded in 1981, RFA serves as the premier organization for industry leaders and supporters. With over 300 members, we work every day to help America become cleaner, safer, and more economically vibrant.

We thank the Committee for convening this timely hearing, and I appreciate the opportunity to share our industry’s unique perspective on the future of low carbon transportation fuels. RFA supports the development of a technology-neutral, performance-based national Clean Fuels Program (CFP), and we believe low-carbon renewable fuels like ethanol offer enormous potential to decarbonize the transportation sector under a well-structured program. We commend the committee for thinking carefully about these issues.

I. Summary of Testimony

The transportation sector is the leading contributor of greenhouse gas (GHG) emissions in the United States. Although GHG emissions from transportation have declined slightly after peaking in 2006, the pace of emissions reduction must rapidly accelerate if the nation is to meet the Biden Administration’s goals of achieving a 50-52 percent GHG

reduction by 2030 and net-zero GHG emissions by 2050.¹ Rapid decarbonization of the transportation sector is also crucial for meeting U.S. commitments under the Paris Climate Agreement.

While policies such as the Renewable Fuel Standard (RFS), the Inflation Reduction Act (IRA), and light-duty vehicle fuel economy and tailpipe standards (CAFE/GHG) will play a vital role in reducing GHG emissions from transportation, other complementary solutions will also be required to truly decarbonize the sector by mid-century. If properly structured, a national Clean Fuel Program (sometimes called a Low Carbon Fuel Standard or Clean Fuel Standard) offers the best potential to rapidly accelerate the decarbonization of the transportation sector, while simultaneously enhancing energy security, creating jobs, and reducing tailpipe emissions of pollutants linked to poor air quality and human health challenges.

Low-carbon renewable fuels like ethanol offer an effective and immediate solution for further reducing carbon emissions from liquid fuels across all segments of the transportation sector. Today's corn-based ethanol already cuts GHG emissions by approximately 50 percent, on average, compared to gasoline. With the increased adoption of climate-smart farming practices, Carbon Capture Utilization and Storage (CCUS), and other technologies, the U.S. ethanol industry is well on its way to producing zero-carbon corn ethanol. In fact, in a July 2021 letter to President Biden, RFA's member companies pledged that the ethanol they produce will achieve a 70 percent GHG reduction, on average, compared to gasoline by 2030 and a net-zero carbon footprint by 2050 or sooner.² But for this vision to become a reality, the biofuels industry needs smart policy and regulation, including:

- fairness and consistency in how the carbon footprint of different fuels and vehicles is measured;
- removal of unnecessary regulatory barriers that are blocking the use of fuel blends that contain higher levels of ethanol, such as 15 percent ethanol blends (E15);

¹ The White House. April 22, 2021. "FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Energy Technologies." <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/>

² Letter from RFA member companies to President Joseph R. Biden. July 27, 2021. <https://ethanolrfa.org/file/2036/RFA-Net-Zero-Commitment-Letter-to-President-Biden--1.pdf>

- continued investment in storage and distribution infrastructure for higher ethanol blends like E15 and flex fuels like E85;
- implementation of strong Renewable Fuel Standard volume requirements in 2023 and beyond;
- equitable incentives for the production of flex-fuel vehicles that can operate on fuels containing up to 85 percent ethanol; and
- a well-structured nationwide clean fuels policy.

Clean fuel policies have already been implemented at the state level (e.g., California and Oregon), and several countries are in the process of implementing their own programs (e.g., Canada and Brazil). While the existing state programs have been successful in reducing transportation-related GHG emissions and driving investment in new clean fuel technologies, certain design flaws and implementation challenges have, at times, undermined the technology-neutral intent of these programs and unnecessarily limited the ability of some low-carbon fuels to provide greater GHG benefits.

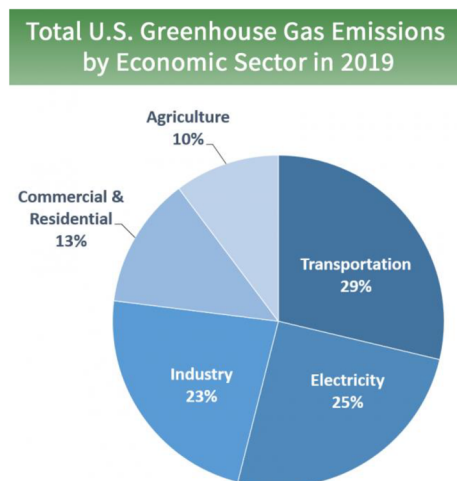
If implemented on a national level, a CFP will need to be carefully designed in a way that avoids picking technology winners and losers and drives the greatest GHG emissions reductions at the lowest cost. A nationwide CFP should use consistent, fair, and science-based lifecycle GHG analyses for all fuel and vehicle options; set clear and predictable annual GHG reduction requirements; allow low-carbon fuel producers to demonstrate continuous improvement if their individual carbon footprints; include cost-containment measures; and include complimentary measures to remove technical barriers that artificially limit greater use of low-carbon fuels.

II. As the leading source of GHG emissions in the United States, the transportation sector must be a central focus for national decarbonization efforts.

According to the U.S. Environmental Protection Agency (EPA), the United States was responsible for 6.57 billion metric tons of carbon dioxide equivalent (MT CO₂e) in 2019.³ As shown in the chart below, the transportation sector accounted for approximately 29 percent of total U.S. GHG emissions in 2019, followed by the electricity generation sector at 25 percent. GHG emissions from transportation

³ U.S. EPA. "Sources of Greenhouse Gas Emissions." Viewed Feb. 8, 2023. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> (Data from 2019 is used throughout this testimony rather than data from 2020, the most recent year for which data is available, due to the abnormal market conditions experienced in 2020 related to COVID-19).

primarily result from the burning of fossil fuels (mainly petroleum) in passenger cars, trucks, ships, trains, and planes.



Source: U.S. Environmental Protection Agency (2021)

The increased use of renewable fuels like ethanol has already helped reduce GHG emissions from the transportation sector, and EPA notes that “using renewable fuels such as low-carbon biofuels” is an important GHG “reduction opportunity” for the sector.⁴

After peaking at 1.98 billion metric tons of carbon dioxide equivalent (MT CO₂e) in 2006, transportation-related GHG emissions fell 12 percent to 1.75 billion MT CO₂e in 2012 and stood at 1.87 billion MT CO₂e in 2019—6 percent below 2006 levels.⁵ Recent research shows that the use of biofuels under the Renewable Fuel Standard resulted in the cumulative avoidance of nearly 1 billion metric tons of GHG emissions from the transportation sector between 2008 and 2020, equivalent to 75 million MT CO₂e per year.⁶

⁴ *Id.*

⁵ U.S. EPA. “Greenhouse Gas Inventory Data Explorer.” Viewed Feb. 8, 2023.
<https://cfpub.epa.gov/ghgdata/inventoryexplorer/>

⁶ S. Unnasch and D. Parida. “GHG Reductions from the RFS2 – A 2020 Update.” Life Cycle Associates Report LCA.6145.213.2021. February 11, 2021. Prepared for Renewable Fuels Association.
<https://ethanolrfa.org/file/748/LCA - RFS2-GHG-Update 2020.pdf>

Despite progress in reducing GHG emissions from transportation, the sector remains as the most substantial source of emissions in the United States. Thus, transportation fuels and vehicles should be the central focus of a national strategy to swiftly reduce GHG emissions. Without smart policy initiatives to drive rapid decarbonization in the transportation sector, it will be impossible to achieve net-zero GHG emissions economy-wide by 2050.

III. Renewable fuels like ethanol offer an effective and immediate solution for decarbonizing liquid fuels across all segments of the transportation sector. A well-structured national clean fuel policy would leverage the carbon reductions provided by ethanol.

Ethanol has an important role to play in reducing GHG emissions from the transportation sector. Today's corn starch ethanol already reduces GHG emissions by roughly half, on average, compared to gasoline. According to the Department of Energy's Argonne National Laboratory, typical corn ethanol provides a 44 percent GHG savings compared to gasoline, even when unverifiable emissions from direct and indirect changes in land cover/land use are included.⁷ When corn ethanol is compared directly to gasoline (i.e., no indirect emissions included for either fuel), Argonne National Laboratory finds that corn ethanol reduces GHG emissions by 52 percent, on average, versus gasoline. Similarly, researchers affiliated with Harvard University, MIT, and Tufts University concluded that today's corn ethanol offers an average GHG reduction of 46 percent versus gasoline, including land use change emissions.⁸

In addition, the California Air Resources Board (CARB) has conducted extensive lifecycle analysis and certified that ethanol produced from the cellulosic biomass found in corn generally reduces GHG emissions by 70-80 percent compared to gasoline; more than 140 million gallons of ethanol from corn-based cellulosic biomass was used in California in 2021, reducing GHG emissions by nearly 800,000 MT CO₂e.⁹

Overall, CARB found that from 2011 to 2021, the use of ethanol from all feedstocks cut GHG emissions from the California transportation sector by 31 million MT CO₂e, more than any other fuel used to meet the state's Low Carbon Fuel Standard (LCFS)

⁷ Lee, U., Kwon, H., Wu, M. and Wang, M. (2021), Retrospective analysis of the U.S. corn ethanol industry for 2005–2019: implications for greenhouse gas emission reductions. *Biofuels, Bioprod. Bioref.*, 15: 1318-1331. <https://doi.org/10.1002/bbb.2225>

⁸ Melissa J Scully *et al* (2021), Carbon intensity of corn ethanol in the United States: state of the science. *Environ. Res. Lett.* **16** 043001. <https://iopscience.iop.org/article/10.1088/1748-9326/abdeo8>

⁹ CARB. "LCFS Pathway Certified Carbon Intensities." Viewed Feb. 7, 2023. <https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>

requirements.¹⁰ All liquid biofuels—including ethanol, renewable diesel, and biodiesel—accounted for 74 percent of the carbon reductions delivered under the LCFS from 2011 through 2021.¹¹ Similarly, ethanol has generated 45 percent of the carbon reductions achieved under Oregon’s Clean Fuel Program (CFP) since its inception 2016.¹² When combined with biodiesel and renewable diesel, liquid biofuels have accounted for 87 percent of total GHG reductions under the Oregon CFP.¹³

With the rapid emergence of new technologies and more efficient practices, even greater GHG reductions are coming to the corn ethanol sector. In fact, analysis by the U.S. Department of Agriculture found that some biorefineries are likely to produce corn starch ethanol that offers a 70 percent GHG reduction versus gasoline as soon as this year.¹⁴

Indeed, the U.S. ethanol industry is well on its way to producing corn ethanol that is fully carbon neutral. With the adoption of CCUS, biogas and renewable electricity substitution, and climate-smart farming practices, corn ethanol is expected to achieve net zero emissions, on average, by 2050 or sooner. A landmark 2022 study examined numerous technology pathways for corn ethanol producers to achieve net zero emissions, concluding that “...ethanol producers can achieve extremely low corn ethanol emissions and fill a critical need in tomorrow’s zero-carbon economy.”¹⁵ The study found that the corn ethanol industry is likely to meet its goals of producing net-zero ethanol, on average, well before 2050. In fact, RFA’s member companies are so confident about the promise of carbon neutral ethanol that they adopted a resolution in 2021 to achieve a net-zero carbon footprint, on average, for ethanol by 2050 or sooner. This pledge was memorialized in a letter to President Biden last July.

It is important to note that the expansion of low-carbon ethanol production in the United States has *not* resulted in cropland expansion or conversion of native lands (e.g., forest or grassland) to agriculture. As shown in the chart below, the U.S. EPA’s annual

¹⁰ CARB. “Low Carbon Fuel Standard Reporting Tool Quarterly Summaries.” Viewed Jan. 20, 2023. <https://ww2.arb.ca.gov/resources/documents/low-carbon-fuel-standard-reporting-tool-quarterly-summaries>

¹¹ *Id.*

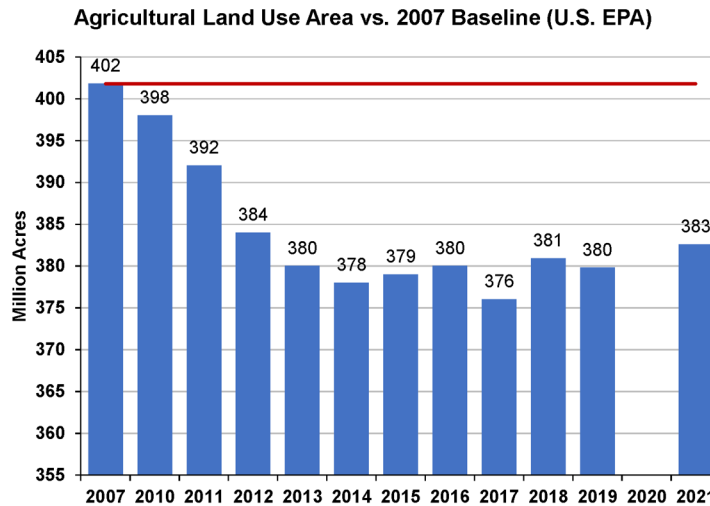
¹² Oregon DEQ. “Quarterly Data Summaries.” Viewed Feb. 8, 2023. <https://www.oregon.gov/deq/ghgp/cfp/Pages/Quarterly-Data-Summaries.aspx>

¹³ *Id.*

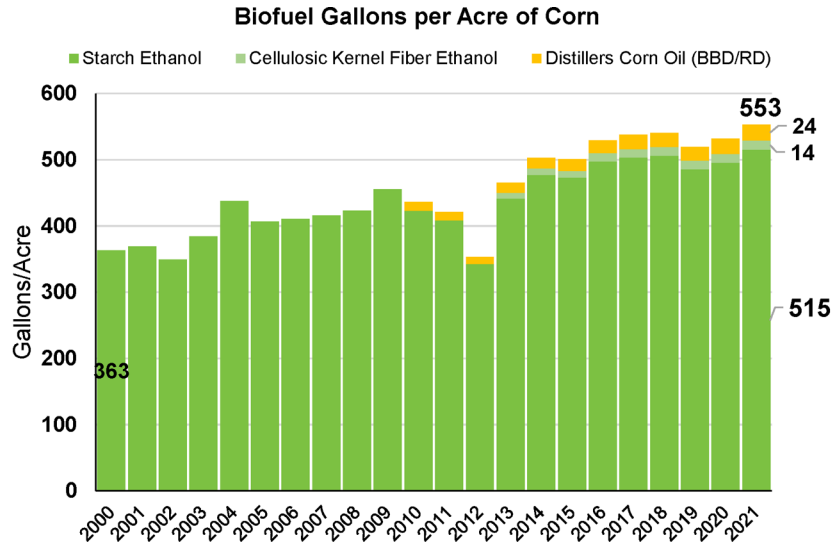
¹⁴ Jan Lewandrowski, Jeffrey Rosenfeld, Diana Pape, Tommy Hendrickson, Kirsten Jaglo & Katrin Moffroid (2020). “The greenhouse gas benefits of corn ethanol – assessing recent evidence,” *Biofuels*, 11:3, 361-375, DOI: [10.1080/17597269.2018.1546488](https://doi.org/10.1080/17597269.2018.1546488) <https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488>

¹⁵ Emery, Isaac. Informed Sustainability Consulting (2022). “Pathways to Net-Zero Ethanol: Scenarios for Ethanol Producers to Achieve Carbon Neutrality by 2050.” Prepared for the Renewable Fuels Association. <https://d35t1svevk4d42.cloudfront.net/file/2146/Pathways%20to%20Net%20Zero%20Ethanol%20Feb%202022.pdf>

analysis of U.S. agricultural land area continues to show that the amount of land engaged in agricultural production is well below the level in 2007 when the RFS2 was adopted by Congress. Over the last 10 years, the U.S. agricultural land area has averaged 380 million acres, which is 22 million acres less than the agricultural land area in 2007, according to EPA.



The reduction in cropland area during a period of growth in ethanol production is explained by significant gains in efficiency—both on the farm and at the ethanol biorefinery. Between 2005 (the year RFS1 was adopted) and 2021, the amount of corn produced per acre of land increased 19.5 percent—from 147.9 bushels per acre to a record 176.7 bushels per acre. Meanwhile, the amount of ethanol produced per bushel of corn has increased from an average of 2.6 gallons per bushel in 2005 to over 2.9 gallons per bushel in 2021. At the same time, ethanol biorefineries have also diversified the types of renewable fuels and co-products they are producing, with most facilities now producing starch-based ethanol, cellulosic ethanol, and distillers oil used for renewable diesel or biodiesel. Overall, as shown in the chart below, these compounding efficiency gains have led to a 52 percent increase in the amount of biofuel produced per corn acre since 2000. At 553 gallons of biofuel per acre, the average U.S. corn acre produces more renewable fuel today than the average sugarcane acre in Brazil, while also generating nearly 1.5 tons of high-protein animal feed.



In addition to its environmental benefits, ethanol also makes a vital contribution to our nation's economy. The 199 ethanol biorefineries across the country serve as crucial drivers of employment and income in the communities in which they operate. Even as Russia's invasion of Ukraine caused a global energy crisis in 2022, and even as abnormally high inflation rates impacted the U.S. economy, the production of 15.4 billion gallons of ethanol directly employed nearly 79,000 American workers in the manufacturing and agriculture sectors. In addition, the ethanol industry supported 343,000 indirect and induced jobs across all sectors of the economy. Meanwhile, the industry generated \$35 billion in household income and contributed \$57 billion to the national Gross Domestic Product (GDP) in 2022.¹⁶

These significant employment impacts and economic contributions should be taken into consideration by Congress as it examines potential future energy and climate policies that may impact the biofuels sector.

While ethanol's use historically has been as a motor fuel for light-duty vehicles, new innovations and emerging technologies are underscoring ethanol's carbon reduction

¹⁶ J.M. Urbanchuk (ABF Economics). "Contribution of the Ethanol Industry to the Economy of the United States in 2022." Forthcoming (February 2023).

benefits across *all* segments of the transportation sector, including light-, medium-, and heavy-duty vehicles; the marine sector; and even the aviation sector, through the utilization of ethanol as a feedstock in the production of sustainable aviation fuels (SAF). A properly structured CFP could accelerate the expansion of ethanol and other low-carbon, renewable fuels into all of these market segments.

IV. A well-designed national clean fuels policy would drive investment in a broad and diverse portfolio of low-carbon fuel solutions.

While ethanol and other renewable fuels would likely play an important role in delivering carbon reductions under a national CFP, the beauty of a well-designed program is that it does not pick technology winners and losers. A CFP sets specific carbon reduction requirements for the transportation sector, then lets the marketplace determine the most technologically and economically efficient methods of achieving those carbon reductions.

Thus, under a truly technology-neutral policy, the marketplace would determine the optimal combination of low-carbon fuels and vehicle technologies to achieve the goals of the program. Despite some design and implementation shortcomings, clean fuel programs in California and Oregon have driven substantial increases in the use of a wide array of low-carbon transportation fuels, including ethanol, renewable diesel, biodiesel, renewable natural gas, electricity, hydrogen, renewable gasoline, alternative jet fuel, and others. The fuel diversity that results from such a portfolio approach has obvious economic and energy security benefits.

While the use of low-carbon electricity in electric vehicles would very likely be one promising option for some parties to meet the requirements of a national clean fuel policy, it is widely acknowledged that electrification alone cannot deliver the GHG emissions reductions necessary to achieve a 50-52 percent reduction nationwide by 2030 and net-zero emissions by 2050.

The contribution of electric vehicles to decarbonization efforts will be constrained—especially in the near term—due to the sheer size and scale of the U.S. light-duty vehicle fleet and the amount of time required for the fleet to turn over. On average, consumers keep their vehicles for more than 12 years, meaning that an internal combustion engine (ICE) vehicle purchased today will likely still be in use well beyond 2030.¹⁷ Today, there are more than 267 million passenger cars, SUVs, pick-ups, vans, and other light-duty

¹⁷ IHS Markit. “Average age of cars and light trucks in the US rises to 12.1 years, accelerated by COVID-19.” June 14, 2021. <https://ihsmarkit.com/research-analysis/average-age-of-cars-and-light-trucks-in-the-us-rises.html>

vehicles registered in the United States.¹⁸ Just 3.3 million of those vehicles—or 1.2 percent—are battery electric or plug-in hybrid electric vehicles,¹⁹ meaning the other 99 percent are ICE vehicles that operate on liquid fuels.

While electric vehicle sales are growing, they continue to represent a relatively small share of overall light-duty vehicles sales (i.e., electric vehicles accounted for 5.8 percent of light-duty vehicle sales in 2022).²⁰ Growth in electric vehicle sales is expected to continue in the decades ahead, but there is significant uncertainty and debate around the rate of growth. For example, the Energy Information Administration’s (EIA) *Annual Energy Outlook 2021* forecast that roughly 80 percent of new light-duty vehicles sold in the U.S. in 2050 will be powered by an ICE that requires liquid fuel.²¹

Even with increased electric vehicle sales expected in the years ahead, it would take decades to entirely turn over the fleet (assuming consumer acceptance of electric vehicles would allow a complete transition). As such, hundreds of billions of gallons of liquid fuel will continue to be used in ICE vehicles for many years to come. To achieve true carbon neutrality in the U.S. transportation system by mid-century, strategies focused on decarbonizing those liquid fuels will need to be undertaken.

The dangers of over-reliance on electrification for achieving carbon reduction in the transportation sector were highlighted in a recent study by Rhodium Group. “We are still a long way from being on track to net-zero emissions by 2050,” the report found. “Electric vehicles alone will not get the U.S. to net-zero by 2050.” Rather, the report concluded that “...a portfolio of strategies is the lowest cost and most likely to succeed. While efficiency improvements and vehicle electrification can cut transport emissions by up to two-thirds by 2050, *low-GHG liquid fuels are needed to fill the remaining gap* and achieve net-zero emissions in the transportation sector by mid-century.”²² Indeed,

¹⁸ Federal Highway Administration. Highway Statistics 2020. “State Motor-Vehicle Registrations – 2020.” <https://www.fhwa.dot.gov/policyinformation/statistics/2020/mv1.cfm>. (Note: 8.3 million motorcycles and 1 million buses are excluded from the 267 million figure.)

¹⁹ Argonne National Laboratory. “Light Duty Electric Drive Vehicles Monthly Sales Update.” Jan. 2023. <https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates> (Note: Argonne reports, “In total, 3,268,828 PHEVs and BEVs have been sold since 2010.” We assume all of those vehicles remain in service today, which likely results in overestimation of the share of the fleet comprised by EVs.)

²⁰ Sean Tucker. Kelley Blue Book. Jan. 17, 2023. “New Car Sales Fell in 2022, But New Electric Car Sales Rose Dramatically.”

²¹ U.S. EIA. “Annual Energy Outlook 2021: Transportation.” Feb. 3, 2021.

<https://www.eia.gov/outlooks/aeo/pdf/05%20AEO2021%20Transportation.pdf>

²² Rhodium Group (2021). “Closing the Transportation Emissions Gap with Clean Fuels.” Available at: <https://rhg.com/research/closing-the-transportation-emissions-gap-with-clean-fuels/> (emphasis added)

President Biden himself has also acknowledged that “...you simply can’t get to net-zero by 2050 without biofuels.”²³

V. In order to achieve optimum GHG emissions reductions, a national clean fuel program must be carefully designed to maintain technology neutrality.

The overarching goal of an effective CFP is to steadily reduce GHG emissions from the transportation fuel sector without picking technology winners and losers. The program must be fuel- and vehicle-neutral and should avoid discriminating against, or disproportionately favoring, any specific fuels or vehicle technologies.

A CFP sets annual GHG reduction requirements, then allows transportation fuel suppliers to determine the most efficient ways of achieving those reductions without dictating the use of specific fuels or vehicles. All fuel production methods (or “pathways”) are assigned unique carbon intensity (CI) scores that represent the full lifecycle GHG emissions associated with the production and use of the fuel (sometimes called “well-to-wheels” or “cradle-to-grave” emissions). Fuels supplied to the marketplace that have a lower CI than the annual GHG reduction requirement generate credits, while fuels that have a higher CI than the annual requirement generate deficits. A party is in compliance with the annual standard when credits offset deficits.

RFA believes the development of any national clean fuel program must be guided by the following principles:

- The program should take a market-based approach that sets clear and predictable annual GHG reduction requirements, then allows the marketplace to determine the most cost-effective means for achieving the reductions.
- Credits toward complying with clean fuel program obligations should be generated only for the use of fuels that deliver actual, verifiable carbon reductions.
- Any clean fuel policy must use transparent and science-based lifecycle analysis. Because lifecycle analysis is the “engine that drives a CFS,” it is imperative that clean fuel programs are based on sound science and transparent lifecycle accounting methodologies. One such methodology is the Department of Energy Argonne National Laboratory GREET model, which is accepted worldwide as the

²³ The White House. Remarks by President Biden on Lowering Energy Costs for Working Families. April 12, 2022. <https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/04/12/remarks-by-president-biden-on-lowering-energy-costs-for-working-families/>

most robust and authoritative tool for lifecycle carbon accounting for a wide array of transportation fuels. The GREET model is also updated once annually to incorporate the latest data. Legislation establishing a national CFP could use the same approach to specifying lifecycle analysis methodologies that was used by Congress for non-aviation fuels in sections 45Z (Clean Fuel Production Credit) and 45V (Credit for Production of Clean Hydrogen) of the Inflation Reduction Act.

- Lifecycle accounting of all transportation fuel options must use consistent system boundaries for analysis of all fuels. If indirect GHG effects, leakages, “rebound effects,” etc. are considered and included as part of the CI score for one fuel type, those same effects must be simultaneously analyzed, with the same rigor, and included in the CI scores for all fuel types.
- Lifecycle accounting should allow for unique production pathways and be flexible enough to incorporate the variable carbon impacts of different feedstock extraction and production practices for all fuel pathways (e.g., extraction of various minerals for EV batteries, differences in agricultural practices for biofuel feedstocks, differences in extraction methods for various crude oil sources, etc.) Specifically, lifecycle accounting for biofuels should be allowed to include the soil carbon sequestration benefits associated with certain cropping systems and practices. Additionally, lifecycle accounting for biofuels should not take a “one-size-fits-all” approach to estimating the emissions associated with agricultural feedstock production. Biofuel producers should have the ability to demonstrate variations and improvements in the carbon intensity of farm-level feedstock production practices.
- Fuel efficiency ratios (sometimes called “energy economy ratios”) should be equitably applied under a national CFP. Under existing state-level programs, the drivetrain of electric vehicles is assumed to be 3-4 times more efficient per unit of energy than a conventional ICE drivetrain running on regular gasoline (i.e., an EV is assumed to travel 3-4 times further on one unit of energy than a conventional ICE vehicle on one unit of energy). The application of this efficiency ratio results in very low CI scores for electricity used in EVs, making that technology pathway more attractive as a means of compliance with annual standards. More efficient liquid fuels in optimized engines (e.g., high-octane fuels used in high-compression ratio engines) should also have the ability to use an energy efficiency ratio under a national CFP (i.e., a high-compression ratio engine using a 98 RON octane fuel will travel 1.1-1.2 times further per unit of

energy than a conventional internal combustion engine running on regular gasoline).

- A national CFP could include measures to contain or limit the cost of compliance. Such measures add stability and certainty to the clean fuel program. For example, the California LCFS has a cap on credit prices of \$200 per metric ton (adjusted for inflation). This containment mechanism has helped stabilize the program and soften the economic impacts on the supply chain and consumers. Similarly, a floor price for credit values could be considered to ensure that a positive market signal is maintained in order to facilitate compliance with long-term GHG reduction requirements.
- Credits should not be selectively awarded to businesses simply for installing certain low-carbon fuel distribution infrastructure (such as EV fast-chargers). The infrastructure itself does not generate actual GHG reductions; and, there is no guarantee that the infrastructure will actually be used to distribute only low-carbon fuels. Similarly, credits should not be selectively awarded to businesses who make alternative fuel vehicles that may or may not actually use low carbon fuels.

Finally, the benefits of a clean fuel program can only be fully realized if complementary policy and regulatory measures are adopted to remove technical and regulatory barriers to low-carbon fuel options and open the marketplace. For example, measures to encourage the production and sale of flex fuel vehicles (FFVs) capable of running on high levels of low-carbon ethanol (e.g., E85) should be considered in tandem with a CFP. Ensuring parity in the regulation of fuel volatility (RVP) is another example. Similarly, tax incentives and/or grant funding for the installation of low-carbon fuel infrastructure at retail stations should be maintained or expanded.

RFA is an active participant in multiple coalitions advocating for the creation of a technology-neutral national CFP. We generally support the principles and policy design concepts developed by those organizations, and we encourage the Committee to consider them as discussions around a national program continue to develop.^{24,25}

VI. Interaction with other policies

²⁴ For a more detailed discussion of desirable design principles, see “A Clean Fuels Policy for the Midwest: A [White Paper](#) from the Midwestern Clean Fuels Policy Initiative.” January 7, 2020. RFA was actively involved in the preparation of this white paper.

²⁵ Drive Clean, Statement of Principles. <https://www.driveclean.us/#statement-of-principles>

As with any potential new energy or climate policy, the interaction of a possible national CFP with existing state and federal policies and regulations must be carefully considered. RFA believes a national CFP should be developed and implemented in a way that complements existing energy and climate policies and regulations. Specifically, we believe the interaction of a potential national CFP with the following existing policies and regulations deserves special consideration:

- **State LCFS and CFP programs:** As detailed earlier in this testimony, clean fuel programs are already in place at the state level. California’s LCFS has been in operation since 2011 and Oregon’s CFP has been in operation since 2016. In addition, Washington began implementation of its own Clean Fuel Standard on Jan. 1, 2023. Several other states are considering clean fuel programs as well, including Minnesota, New York, New Mexico, Michigan, Ohio, and others. With proper coordination and harmonization of key provisions, RFA believes it is possible for state programs to work in concert with a federal program. However, we believe a single nationwide CFP would be preferable to multiple state programs, each of which might have its own unique characteristics.
- **Renewable Fuel Standard:** A well-designed national CFP would complement—not conflict with—the existing RFS program. While the RFS does have statutorily prescribed GHG reduction requirements, the primary statutory purpose of the RFS is “to move the United States toward greater energy independence and security...”²⁶, and the renewable fuels used to comply with the program were primarily intended by Congress “to replace or reduce the quantity of fossil fuel present in a transportation fuel.”²⁷ The fundamental purpose of the RFS is to stimulate the production and use of large volumes of renewable fuels to replace fossil fuels—particularly imported crude oil—in an effort to enhance energy security. As evidenced by the impact of Russia’s invasion of Ukraine on U.S. gasoline prices, this objective remains as relevant today as it was in 2007 when Congress created the RFS2 as part of the Energy Independence and Security Act. Meanwhile, the express purpose of a clean fuel standard is to reduce GHG emissions from the transportation sector. While reduced petroleum dependence and enhanced energy security may be co-benefits of a clean fuel program, the RFS takes a more direct and purposeful approach to those objectives. The interaction of the RFS with state and potential national clean fuel programs has been rigorously studied by energy policy experts, with the Food and Agriculture Policy Research Institute concluding that the two programs would be

²⁶ Public Law 110–140 (Dec. 19, 2007) at 1.

²⁷ *Id.* at 30.

“mutually reinforcing” and “the compliance costs of meeting one of the requirements is lower in the presence of the other policy.”²⁸ Similarly, Rubin and Leiby (2013) found that a national LCFS and the RFS would have a degree of “mutual reinforcement” that tends to increase the use of more advanced biofuels beyond the effect of either policy by itself.²⁹ RFA strongly believes that a national CFP should complement the existing RFS program, as the two policies have distinctly different primary objectives but would act in a mutually reinforcing manner.

- **Vehicle Tailpipe GHG Standards:** EPA has implemented tailpipe GHG emissions standards for light-duty on-road vehicles since 2010 and medium- and heavy-duty vehicles since 2011. These regulations are implemented in tandem with the Dept. of Transportation’s fuel economy regulations as part of a harmonized “CAFE/GHG” regulatory regime. To date, EPA’s standards have focused only on tailpipe GHG emissions resulting from fuel combustion in a vehicle’s engine, while disregarding upstream emissions related to fuel production. Because a well-structured CFP takes a full “well-to-wheels” lifecycle approach to measuring emissions related to the production and use of a fuel in a vehicle (*including tailpipe emissions from fuel combustion*), a separate program regulating tailpipe emissions may be duplicative and unnecessary. As discussions of a potential national CFP proceed, we encourage the Committee to consider ways in which EPA’s existing tailpipe GHG standards could be replaced by, or integrated into, a CFP that uses a full “well-to-wheels” lifecycle GHG approach.
- **Clean Fuel Tax Incentives:** The recently enacted Inflation Reduction Act (IRA) included a suite of tax incentives intended to spur increased production of low-carbon fuels. In particular, the IRA extended existing tax credits for biodiesel, renewable diesel, and second-generation biofuels, while also creating a new Clean Fuel Production Credit (Section 45z) and new Sustainable Aviation Fuel credit (Section 40B). The Act also includes numerous tax incentives designed to stimulate increased production of clean hydrogen and low-carbon electricity for transportation. RFA believes a national CFP would be complementary to, and distinct from, these tax incentives; a CFP is designed to compel the *use* of low-carbon fuels, whereas the IRA tax incentives are designed to stimulate *production* of clean fuels (which may, in turn, be used to satisfy the

²⁸ Jarrett Whistance, Wyatt Thompson, Seth Meyer, “Interactions between California’s Low Carbon Fuel Standard and the National Renewable Fuel Standard,” Energy Policy, Volume 101, 2017, Pages 447-455, ISSN 0301-4215, <https://doi.org/10.1016/j.enpol.2016.10.040>

²⁹ Jonathan Rubin, Paul N. Leiby, “Tradable credits system design and cost savings for a national low carbon fuel standard for road transport,” Energy Policy, Volume 56, 2013, Pages 16-28, ISSN 0301-4215, <https://doi.org/10.1016/j.enpol.2012.05.031>

requirements of a clean fuel program). Again, however, we believe it is crucially important to use a consistent lifecycle GHG analysis methodology for both a national CFP and the tax incentives under the IRA that require fuel producers to determine a CI score for their fuels.

VII. Conclusion

On behalf of the members of the Renewable Fuels Association, thank you again for the opportunity to share our perspective on the future of ethanol and other low carbon fuels, and the potential for a national CFP to rapidly decarbonize the U.S. transportation sector. We believe a well-designed national CFP has enormous potential to substantially reduce GHG emissions from transportation and help our nation achieve its goal of net zero carbon emissions by 2050.



March 14, 2023

The Honorable Thomas Carper
Chairman
Committee on Environment and Public Works
U.S. Senate
Washington, DC 20510

The Honorable Shelley Moore Capito
Ranking Member
Committee on Environment and Public Works
U.S. Senate
Washington, DC 20510

Dear Chairman Carper and Ranking Member Capito,

Thank you again for the opportunity to testify before the Committee on Environment and Public Works on February 15, 2023, regarding "*The Future of Low Carbon transportation Fuels and Considerations for a National Clean Fuels Program.*" It was an honor and a privilege to provide the U.S. ethanol industry's perspective during the hearing.

Please find attached my responses to the follow-up questions I received from the Committee on March 6, 2023. Please do not hesitate to contact me or Troy Bredenkamp, Senior Vice President of Government Affairs, at (202) 289-3835, with any questions.

I look forward to continuing this important conversation with the Committee.

Sincerely,

A handwritten signature in black ink that reads "Geoff Cooper".

Geoff Cooper
President and CEO
Renewable Fuels Association

Senate Committee on Environment and Public Works
Hearing Entitled, “The Future of Low Carbon Transportation Fuels and Considerations for a
National Clean Fuels Program”
February 15, 2023
Questions for the Record for Geoff Cooper

Chairman Carper:

1. Life cycle assessments (LCAs) have been applied in the development of transportation fuel policies in order to estimate and help reduce greenhouse gas (GHG) emissions from fuels such as electricity, biofuels, and hydrogen. Low-carbon transportation fuels can emit carbon dioxide (CO₂) and other GHGs at the tailpipe, during production processes, and through the wider supply-chain involved in the production and use of a type of fuel. Therefore, the measurements and methodology used to make determinations about the carbon intensity of a variety of different fuels are adequately robust.
 - a. What key components or considerations should be included in developing a framework or methodology for measuring and analyzing the carbon intensity different of fuel types?

Response: In order to achieve its objectives, a national Clean Fuels Program must be based on robust, transparent, and verifiable lifecycle greenhouse gas (GHG) assessment methods. Fuel carbon intensity estimates (“CI scores”) should include all upstream and downstream GHG emissions directly attributable to the production and use of the fuel, including emissions related to: production/extraction of all raw materials and feedstock used in the fuel production process; transportation of the fuel feedstock to processing/refining facilities; upgrading, processing, and/or refining of the feedstock into fuel; transportation of the finished fuel to the point of consumption; and consumption/combustion of the fuel in a vehicle. In other words, GHG emissions directly related to all supply chain activities should be included in the fuel’s CI score. This is often referred to as a full “well-to-wheels” LCA.

LCAs for a Clean Fuels Program must also use consistent analytical boundaries for *all* fuel types, meaning each fuel’s CI score should be based on emissions related to the same upstream and downstream supply chain activities.

There are two general approaches to LCA: attributional analysis and consequential analysis. An attributional LCA attributes GHG emissions to each stage of a fuel’s production and use lifecycle based on the energy consumption and other factors related to each stage. That is, attributional LCA estimates the GHG impacts that are attributable to the production and use of a specific product. A consequential LCA attempts to estimate the economy-wide GHG effects resulting from market responses induced or caused by an increase in the production and use of a certain product. An example of consequential LCA is the GHG “rebound effect” (e.g., increased use of electricity for transportation in one jurisdiction leads to lower world crude oil consumption and, in turn, lower crude oil prices. As a consequence of the lower crude oil prices, crude oil

consumption increases in a separate jurisdiction and the resulting increase in GHG emissions in that jurisdiction is then added to the CI score of the electricity).

RFA believes attributional LCA is best suited for a Clean Fuel Program, as the activities and emissions directly related to producing and using a product are measurable, verifiable, and controllable. Conversely, consequential LCA primarily relies on assumptions about market responses to an increase or decrease in the production of a product; consequential LCA uses economic modeling scenarios to estimate GHG emissions. Thus, consequential LCA results often involve a high degree of uncertainty and often cannot be verified.

Regardless of which approach is chosen, what is most important for a Clean Fuels Program is that the same approach is used for all fuels (i.e., if a consequential LCA approach is chosen, it must be used consistently to develop CI scores for *all* fuels). Unfortunately, some existing low-carbon fuel programs use consequential LCA to develop CI scores for some fuels, but attributional LCA to derive CI scores for other fuels. This results in apples-to-oranges comparisons among different fuel types.

LCAs should also be based on the latest available empirical data whenever possible. Policymakers and regulators should strive to ensure that the data used to inform LCA is regularly updated/refreshed and based on actual measurements when possible.

Transparency is also a key consideration for LCA methodologies. Affected parties and the public should have access to the variables/data used in LCA, and every step of the methodology used to estimate CI scores should be easy to follow and straightforward. The models used to determine CI scores should be publicly available. The use of proprietary tools or “black box” LCA models and methodologies should be avoided at all costs.

Section V of my written testimony includes further discussion of the LCA principles that we believe warrant consideration as the Committee discusses a Clean Fuels Program.

- b. How should a federal low carbon fuel program’s LCA analysis best address data verification for carbon emissions?

Response: A common adage used in LCA is “if you can’t measure it, you can’t manage it,” meaning accurate measurement and verification are vitally important in facilitating continuous improvement and carbon reduction. Accurate verification methods are also crucial for demonstrating compliance and maintaining the integrity of regulatory programs intended to drive carbon reduction. If LCA methods hold individual actors responsible for emissions over which they have no control, there will be no ability or incentive for those actors to improve their carbon performance. This is a weakness of consequential LCA, which often assigns unverifiable indirect GHG emissions or “leakages” to products whose manufacturers have no ability to control those emissions.

In an attributional LCA system, producers are able to verify the energy use and other inputs involved in the production of a product (e.g., using invoices, receipts, bills of lading, certificates of analysis, and other common supply chain documentation). Existing registration, reporting, recordkeeping, and attestation requirements under the Renewable Fuel Standard and current state

clean fuel programs (e.g., Oregon's CFP) offer reasonable models for LCA verification under a potential national Clean Fuel Program.

- c. Current LCAs used in existing low carbon fuel standards differ notably in their implementation, data quality, modeling approaches, and key assumptions. Are there existing lifecycle greenhouse gas emissions models that you are particularly supportive of? If yes, which approaches/models and why?

Response: We agree that there are notable differences in the LCA approaches used for existing renewable and low-carbon fuel programs. RFA supports the use of the Department of Energy Argonne National Laboratory GREET (Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation) model for the purposes of conducting LCA for transportation fuels. The GREET model is: updated with the latest data at least once annually; inclusive of more fuel and vehicle pathways than any other LCA tool; transparent, available to the public, and relatively easy to use; peer-reviewed by leading LCA practitioners worldwide; and recognized and used worldwide by businesses, academia, and governmental bodies.

In addition, while the Argonne GREET model generally uses an attributional LCA approach, the model does have flexibility to include potential consequential effects for some fuels. Suggestions that the Argonne GREET model does not have the capacity to estimate or include potential indirect land use change emissions are patently false. Rather, the Argonne GREET model explicitly includes a module that allows the user to estimate direct *and indirect* LUC emissions. In fact, in recent years, the Argonne team, in conjunction with Purdue University and the University of Illinois system, have conducted more rigorous analysis on potential biofuels indirect ILUC than any other academic, NGO, or governmental entity. Thus, if a decision is made to use consequential LCA for *all* fuels under a Clean Fuels Program, the Argonne GREET model is already well suited to accommodate such analysis.

It is also important to note that there is very recent precedent for using statute to prescribe the use of the Argonne GREET model for transportation fuel LCA under federal regulatory programs. More specifically, Sections 45Z (Clean Fuel Production Credit) and 45V (Credit for Production of Clean Hydrogen) of the Inflation Reduction Act explicitly require the use of the Argonne GREET model for LCA on non-aviation fuels.

2. Is there anything else that you would like to provide the Committee that was not included in your testimony or discussed during the hearing?

Response: My written testimony made reference to a study that was forthcoming at the time of the hearing. The study, which examined the employment and economic impacts of the U.S. ethanol industry in 2022, has subsequently been completed and publicly released. The study found that the production of 15.4 billion gallons of ethanol in 2022 directly employed nearly 79,000 American workers in the manufacturing and agriculture sectors. In addition, the ethanol industry supported 343,000 indirect and induced jobs across all sectors of the economy. Meanwhile, the industry generated \$35 billion in household income and contributed \$57 billion to the national Gross Domestic Product (GDP) in 2022. The complete study is available [here](#).

My written testimony also referenced a study examining the GHG reductions achieved under the Renewable Fuel Standard. Subsequent to the hearing, that study has been updated and publicly released. The study, conducted by Life Cycle Associates, concluded that “The RFS2 has resulted in significant GHG reductions, with cumulative CO2 savings of 1,212 million metric tonnes over the period of implementation to date. The GHG reductions are due to the greater than expected savings from ethanol and other biofuels, including continuous technology investments reducing the carbon intensity (CI) for corn ethanol.” The complete study is available [here](#).

Senator Kelly:

1. As you know, Arizona, Oregon, and many other western states have begun to pursue partnerships with the Forest Service to remove dead and dying trees and other underbrush from federal lands to reduce the risk of wildfire. In Arizona, the Four Forests Restoration Initiative, or 4FRI, has been working for over a decade to develop a public-private partnership where private entities conduct thinning operations in four of Arizona’s national forests to reduce wildfire risk. One of the biggest challenges this initiative faces is finding viable end-markets for low-value forest products. Frustratingly, one end-market which is not available for these products on a federal level is biofuels, because the Renewable Fuel Standard does not allow biomass from federal lands to be used in biofuels. Mr. Cooper, as Congress considers legislation to update the Renewable Fuel Standard (RFS) or establish other clean fuels standards, do you believe that biomass from federal lands could be a viable clean fuel option?

Response: We agree that the RFS program’s exclusion of low-value forestry waste/products sourced from federal lands is unfortunate and misses an opportunity to expand low-carbon bioenergy production. Forestry waste biomass could serve as an important feedstock source for potentially large volumes of low-carbon biofuels. In addition, controlled combustion or biochemical conversion of forestry waste to produce biofuels is far more climate-friendly than open field burning or other forestry waste disposal methods. We continue to believe certain aspects of the RFS program’s current exclusion of biomass from federal lands could be addressed through administrative action by EPA, without the need for legislation.

However, as the Committee considers potential legislation to establish a national Clean Fuel Program, we agree that sustainably harvested forestry waste from federal lands should be explicitly identified and included as an approved feedstock for low-carbon fuel production. That said, we believe provisions allowing biomass from federal lands to qualify under a national CFP must be carefully crafted. Specifically, RFA believes such provisions should: 1) require that biomass materials from federal lands must be harvested in accordance with all federal laws, regulations, and land-use plans and designations; and 2) explicitly restrict the types of biomass materials that can be harvested from federal lands so that old growth trees and stands are protected.

- a. How have states with clean fuels programs treated biomass from federal lands?

Response: It is RFA’s understanding that existing state clean fuel programs (e.g., California’s Low Carbon Fuel Standard and Oregon’s Clean Fuel Program) do not exclude the use of low-

carbon fuels produced from sustainably harvested forestry waste/biomass materials sourced from federal lands.

Senator Fetterman:

1. Approximately 70% of ethanol travels by freight. The Renewable Fuel Alliance has testified about concerns with timeliness, stability, and affordability for customers in the ethanol and agriculture sectors. What can be done to improve wait times for freight transport of ethanol?

Response: The ethanol industry is highly dependent on efficient and timely rail service. More than 70 percent of the ethanol produced at U.S. facilities ships by rail to its initial destination, along with large volumes of co-products like distillers grains animal feed and distillers corn oil. Unfortunately, the quality of rail service in recent years has deteriorated and U.S. ethanol producers have experienced unpredictable service, lengthy delays, and record-high shipping costs. These disruptions have occurred with much greater frequency in recent years. While RFA has engaged directly with the rail industry in an effort to address these problems and improve reliability, rail service disruptions continue to plague the industry.

RFA believes many of the current problems in rail service stem from a labor shortage in the sector, which in turn has led to fewer trains and engines on the rails. The rail industry workforce today is about 16% smaller than it was in 2019 due to workforce reductions during COVID-19 and other factors. Trains and engines in service are down by a similar percentage over the same period. We encourage Congress to consider measures that can help address the shortage of rail workers in a timely manner, so that the number of trains and locomotives on the system catches up to rapidly rising shipping demand.

RFA has also actively engaged with the Surface Transportation Board (STB), and we appreciate the assistance the STB has provided in helping to address specific service disruptions. Still, we encourage STB to do everything in its power to increase oversight over rail carriers and ensure more timely service. We also encourage STB to consider expanding its use of emergency service orders in cases where protracted rail service delays and disruptions threaten the economic viability of facilities and businesses dependent on rail transportation.

Ranking Member Capito:

1. Is the Renewable Fuels Association supportive of deploying carbon capture utilization and storage technologies?

Response: Yes, the RFA is highly supportive of deploying carbon capture utilization and storage (CCUS) technologies. We believe CCUS has the potential to substantially reduce greenhouse gas emissions related to U.S. energy production and use at a relatively low cost compared to other options. In fact, a recent study by Informed Sustainability Consulting found that CCUS is the most promising technology for significantly reducing the carbon intensity of ethanol and will be instrumental in helping ethanol producers achieve net zero carbon emissions by 2050 or sooner. According to the report: "Ethanol fermentation creates a remarkably high-purity stream of CO₂, which many facilities already utilize as an added-value coproduct. Sequestering this carbon in

geological formations is one of the largest and most effective actions producers can take to reduce the carbon intensity of corn ethanol.”

In addition, a 2022 technology assessment conducted by the Government Accountability Office (GAO) found that out of all the potential sources of CO₂ for CCUS (e.g., power generation, cement, iron and steel, direct air capture, ethanol, etc.), ethanol is the most promising in the near-term. The GAO report found ethanol biorefineries offer 1) the lowest cost of CO₂ capture; 2) the highest CO₂ concentration and purity; and 3) a high number of potential capture sites. These benefits led GAO to give ethanol biorefineries the highest “technology readiness” score of all potential CO₂ capture sites.

Because CCUS offers massive potential to help reduce carbon emissions from ethanol production and use, RFA has actively advocated for policies and regulations (e.g., the section 45Q CCUS tax credit) that create investment certainty in CCUS technology and infrastructure. We look forward to continuing our work with the Committee on policies that support increased deployment of CCUS.

Senator Mullin:

1. Mr. Cooper, in your testimony you stated that any potential Clean Fuels Program should be “fueled and vehicle-neutral”. Are the recently proposed changes to the Renewable Fuels Standard program, specifically the proposal for light-duty vehicle manufacturers to generate electricity RINs, vehicle-neutral?

Response: As expressed in both my written and oral testimony, RFA strongly believes a national Clean Fuel Program (CFP) must be designed in a way that ensures a level playing field and does not pick technology winners and losers. Under a federal CFP, fuels should be judged strictly on their lifecycle carbon intensity; policymakers and regulators should avoid the use of accounting gimmicks that unfairly promote one technology at the expense of others.

While the objectives of the Renewable Fuel Standard (RFS) are different from the objectives of a CFP (i.e., the RFS was intended to drive expanded renewable fuel use to enhance U.S. energy security, stimulate the farm economy, *and* reduce GHG emissions), RFA strongly believes the Environmental Protection Agency must use a fair and consistent approach to RIN generation for *all* renewable fuels. By proposing to allow electric vehicle manufacturers to generate e-RINs, EPA is creating a novel and complex approach that is entirely inconsistent with well-established regulations for RIN generation. Since the beginning of the RFS program, the renewable fuel producer has been the entity that generates the RIN—not vehicle manufacturers or some other entity in the supply chain. **EPA’s proposal is not technology-neutral.** It appears inconsistent with the statutory purpose of the RFS, which is to drive production and use of low-carbon renewable fuels—not the production of certain vehicle technologies. Thus, RFA has opposed EPA’s proposed approach to e-RIN generation and we have encouraged the Agency to ensure final methods for e-RIN generation are consistent and fair.

Senator CARPER. Mr. Cooper, thanks. It is great to see you, and thank you for joining us.

We have been joined by the Senior Senator from the great State of Michigan, Senator Stabenow, who is also not just a member of the Ag Committee, but the Chairman of the Ag Committee. She might serve on the Finance Committee together with some of you.

The Finance Committee is going to have a confirmation hearing this morning for the Administration's nominee to head up the IRS, Danny Werfel, not the football player, the public servant. He has invited me to come and introduce him. I will be slipping out in about 10 minutes or so, but I will be back shortly. Senator Capito has agreed to hold the gavel until I get back.

Chris Spear, I already gave you a short introduction. I will just say again, it is great to see you. Welcome. Thank you very much for all you do and for your testimony today. Welcome.

**STATEMENT OF CHRIS SPEAR, PRESIDENT AND CEO,
AMERICAN TRUCKING ASSOCIATION**

Mr. SPEAR. Thank you, Mr. Chairman, Ranking Member Capito, and members of the committee. I really appreciate the opportunity to testify on behalf of the American Trucking Association. For 90 years, the ATA has helped Congress shape solutions to our Nation's energy and environmental challenges. Today's hearing is no exception.

The trucking industry starts with "yes." The ATA was a proud supporter of the bipartisan IJJA. Prior to passage, ATA testified 25 times before the House and Senate, including this committee, sharing how our Nation's decaying infrastructure has given competitive aid to rising global powers, like China. In short, our first-world economy cannot survive with third-world infrastructure. Thank you for recognizing that.

To predict the future of low-carbon transportation, one should start with the IJJA's ability to eliminate congestion. Right now, our industry loses \$75 billion a year sitting idle in traffic. That is 425,000 drivers sitting for an entire year. That is 6.87 billion gallons of wasted fuel pumping 67.3 million metric tons of CO₂ into our environment.

In short, if you want to eliminate emissions, start with the top 100 traffic bottlenecks, of which 22 are in States represented by members of this committee.

IJJA moneys are more than adequate for fixing existing roads and bridges. There is plenty more for new capacity too, including truck-only lanes, bypasses, bridges, and parking. There is no reason this Administration should have to pick favorites.

Another example: ATA worked with the EPA producing phases one and two emissions reduction rules. To date, 98.5 percent of all emissions have been removed from our tailpipes. In fact, 60 trucks today emit what one truck emitted in 1988.

These two rules alone cut CO₂ emissions by 1.37 million metric tons, saved \$220 billion in fuel costs, and reduced oil consumption by 2.5 billion barrels of oil.

The ATA and the ETA created the SmartWay Program, saving participating fleets more than four billion gallons of fuel, over \$19 billion at today's costs. Those fuel savings resulted in massive

emission reductions of 2.7 million short tons of nitrogen oxide, 112,000 short tons of particulate matter, and 143 million metric tons of CO₂, all by putting the safest, newest, and most environmentally friendly equipment on our roads.

This is not a debate about if we get to zero, but when. We will get there, not just on the timelines proposed by California. Their excluding our industry in a mad dash to zero makes their timelines and targets not only unachievable, but guarantees they will fail.

To get to zero, we have to be honest and we have to be transparent about the road ahead. Sourcing rare materials needed for millions of 5,000-pound truck batteries, the infrastructure needed to charge them, and the additional electricity needed to power our trucks, full-scale, doesn't yet exist, and won't, if you allow California to set the Nation's standard.

Trucking now moves 72.5 percent of our Nation's freight tonnage. Over the next decade, trucks will be tasked with moving 2.4 billion more tons of freight than they do today. The moment that slows or stops, Americans, your constituents, are going to want answers.

The responsible approach is also the realistic approach. Achievable timelines and targets do matter. The ATA will continue supporting policies that are responsible, realistic, and inclusive of our industry.

Our written testimony provides this committee with just that, targeting IIJA moneys to reducing congestion, creating cost parity between current and future equipment and fuel sources, and the low-hanging fruit, such as drayage, port interconnectors, and safe, secure truck parking.

We are committed to a cleaner environment, and we have proven it. We simply ask that we be realistic about the path forward. Do that, and we will post the best environmental gains possible.

I thank the committee and yield.

[The prepared statement of Mr. Spear follows:]



Statement of

Chris Spear
President and CEO of the
American Trucking Associations

Before the

Committee on Environment and Public Works
United States Senate

Hearing on

“The Future of Low Carbon Transportation Fuels and Considerations for a
National Clean Fuels Program”

February 15, 2023

Introduction

Chairman Carper, Ranking Member Capito, and Members of the Committee, I appreciate the opportunity to testify before you today on behalf of the American Trucking Associations (ATA). ATA is a 90-year-old federation and the largest national trade organization representing the 7.65 million men and women working in the trucking industry. As a fifty-state federation that encompasses 34,000 motor carriers as well as their corresponding suppliers, ATA represents every sector of the industry including less-than-truckload (LTL) and truckload carriers, intermodal trucking companies, agriculture and livestock transporters, auto haulers, household goods movers, and more.

If the United States is to remain the world's leading economy, it must prioritize investments in infrastructure and a resilient transportation network that can withstand supply chain pressures. The trucking industry is tremendously grateful to Chairman Carper, Ranking Member Capito, and those members who worked across the aisle over the past two years and passed legislation to make generational investments in our roads and bridges. Implementation of the IIJA, and specific provisions of the Inflation Reduction Act (IRA), will play a significant role in both safeguarding our supply chain resilience and in meeting important goals for environmental sustainability in freight transportation.

The purpose of today's hearing is to examine the future of low carbon transportation fuels and considerations for a national clean fuels program. On this issue, the trucking industry starts at yes. We recognize the immense importance of reducing emissions and reducing our environmental footprint. To that end, we have an admirable story to tell about decades of successful efforts to eliminate and reduce harmful pollutants by shaping achievable regulations and participating in voluntary programs. We look forward to working with Members of the Committee to formulate future regulations to improve sustainability that are both ambitious and achievable.

Highways are the lifeblood of our economy. Decades of underinvestment have decreased road safety, hindered the efficient movement of goods, and made our economy less competitive. More than 80% of U.S. communities rely *exclusively* on trucking to meet their freight transportation needs, and trucking currently moves more than 70% of the nation's annual freight tonnage.¹ Over the next decade, trucks will be tasked with moving 2.4 billion more tons of freight than they do today, and trucks will continue to deliver the vast majority of goods to American communities.² Congress must continue working to ensure that IIJA funding goes towards eliminating congestion and freight bottlenecks. Doing so will benefit every American by lowering emissions, increasing road safety, and making supply chains more efficient.

Our nation's truck drivers deserve the best infrastructure in the world to earn a living. America's roads are their offices. According to the most recent data from the Bureau of Labor Statistics, truck driver is a top-5 occupation in 30 states, including nine of the 19 states represented by the members of this Committee.³ The trucking industry offers those drivers fulfilling careers with family-sustaining salaries, with truckload drivers earning a median amount of \$69,687 per year, not including benefits.⁴ This represents an 18% increase in truck driver pay since 2019, an admirable increase compared to other

¹ *U.S. Census Bureau Commodity Flow Survey*. U.S. Census Bureau, 2017.

² *Freight Transportation Forecast 2020 to 2031*. American Trucking Associations, 2020.

³ *Occupational Employment and Wage Statistics by State*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/oes/tables.htm>, May 2021.

⁴ *2022 ATA Driver Compensation Study Executive Summary*. American Trucking Associations, June 30, 2022. Available online at: https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_2022_Driver_Compensation_Study_-_Press_Executive_Summary.pdf (accessed January 19, 2023).

trades.⁵ These remarkable men and women – whether they work as company drivers, independent contractors, or owner-operators – should not have their ability to earn limited by hours spent idling on congested highways, burning unnecessary fuel and wasting valuable hours-of-service.

Aggressive emissions reduction goals are important and necessary. However, to give industry a realistic chance to achieve these noble goals, it is critical that policymakers account for the economy’s increasing demand for trucking services and the current national driver shortage. Trucking is facing dire shortages of drivers and other highly trained professionals such as diesel mechanics. In 2022, the shortage of qualified drivers reached a near-record high of 78,000.⁶ This shortage is expected to increase to 160,000 drivers by 2031 absent any changes to the status quo and we will need to hire 1.2 million new drivers over the next decade.⁷ The deployment of new cleaner diesel trucks, battery electric vehicles, and alternative fuel vehicles means that we also need to recruit and train a new generation of maintenance technicians, electricians, and computer engineers to keep those trucks on the road. These realities must be reflected in the timelines and goals of any regulations that impact trucking.

The trucking industry includes companies of all sizes working in a wide range of specializations. According to June 2022 statistics from the U.S. Department of Transportation (USDOT), 95.7% of private and for-hire motor carriers operate 10 or fewer trucks and 99.7% operate fewer than 100 trucks.⁸ Whereas larger fleets can leverage their economies of scale to absorb cost increases over the short term and continue investing in new equipment and technologies, the thousands of smaller fleets that ensure our nation’s supply chain resilience struggle to overcome such challenges. Lofty goals and timelines for major policy changes will not work if they do not account for the limited financial flexibility of the small and medium-sized fleets that will be forced to comply.

Trucking has made enormous progress in reducing emissions while relying on diesel as the key fuel source for our industry. New technologies that capture diesel pollutants are already reducing the environmental footprint of our supply chains. Trucking is an active partner with federal agencies on national sustainability initiatives and emissions reductions goals that are *ambitious yet achievable* for fleets of all sizes. This Committee can help trucking achieve greater success in these areas by (1) focusing on forward-leaning investments in infrastructure that reduce congestion; (2) encouraging investments in new, clean trucks, new anti-pollution technologies, and sustainable fuels; and (3) considering solutions to key issues such as aging drayage fleets and a national shortage of truck parking.

Thank you for holding today’s hearing to consider these critical issues. I look forward to working with you to share information about the trucking industry and inform potential legislative solutions to protect the safe and efficient movement of our nation’s goods.

The Facts on Trucking’s Environmental Progress

The trucking industry has a positive story to tell about our ongoing emissions reduction and sustainability initiatives. We look forward to building on that history and working with agencies and stakeholders to develop achievable national emissions regulations that will have significant environmental benefits without imposing disruptive cost increases on small trucking companies.

⁵ *Ibid.*

⁶ *ATA Driver Shortage Update 2022*. American Trucking Associations, October 25, 2022. Available online at: https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_Driver_Shortage_Report_2022_Executive_Summary_October22.pdf (accessed January 19, 2023).

⁷ *Ibid.*

⁸ *ATA Economics and Industry Data*. American Trucking Associations, 2022. Available online at: <https://www.trucking.org/economics-and-industry-data>

In 2006, our industry began phasing out harmful sulfur in diesel fuel, and practically eliminated sulfur oxide emissions. ATA championed two separate Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA) regulations in 2011 and 2016, establishing the first-ever truck engine and vehicle greenhouse gas (GHG) emission and fuel consumption standards—known as Phase 1 and 2, respectively. In total, between 2014 and 2027, the combined Phase 1 and 2 GHG standards stand to cut CO₂ emissions by 1.37 billion metric tons, saving vehicle owners and operators \$220 billion in fuel costs, and reducing oil consumption by up to 2.5 billion barrels of oil over the lifetime of the vehicles sold under the program.

Another example of trucking's commitment to environmental sustainability is our history of working with EPA to reduce emissions through the voluntary SmartWay program. SmartWay partners have saved billions of dollars in fuel costs, reduced oil consumption, and eliminated millions of tons of air pollutants. EPA estimates that the program has helped its partners save 357 million barrels of oil since 2004.⁹ If one barrel of oil produces 11 to 12 gallons of diesel fuel,¹⁰ that means trucking companies participating in the SmartWay program have saved more than 4 billion gallons of fuel—over \$19 billion at current prices—in the last eighteen years. Critically, those fuel savings resulted in massive emissions reductions of 2.7 million short tons of nitrogen oxide (NO_x); 112,000 short tons of particulate matter, and 143 million metric tons of CO₂.

The trucking industry supports cleaner transportation technologies and fuels to protect our environment and communities. However, I must note that fleets do not make trucks, they are the consumers who purchase them. Each purchase is a decision based on a fleet's ability to maintain the vehicle, fuel it, keep a driver in the seat, and move freight. In the current trucking marketplace, it is simply impossible to replace fleets of diesel trucks with battery electric or alternative fuel vehicles on the timetables proposed by regulations like those in California, and similar rules under consideration in other states. As recently as last year, prices for new, cleaner diesel trucks skyrocketed because of a lack of availability due to the semiconductor shortage. Prices for new zero emission trucks are two to three times higher than diesel trucks, making them unaffordable for most fleets. These marketplace dynamics make well-intended mandates for deployment of near-zero or zero-emissions equipment impossible to meet for small and medium sized trucking companies.

Increasing the cost of fuel will not move the needle on large-scale substitution of electric, hydrogen, or alternative fuel models for diesel trucks until those options become more financially feasible for small fleets. However, there are environmental gains to be achieved simply through replacing old equipment with new, cleaner diesel trucks. It would be a mistake to let perfect be the enemy of good, and small steps toward meaningful progress are still steps in the right direction. One of the primary ways our industry has achieved tremendous emission reductions is through advancements in engines and emission control systems that make today's trucks significantly cleaner than past models. A new truck today emits 99% fewer particulate matter emissions than one in 1985, and 99% fewer nitrogen oxide (NO_x) emissions than one in 1975. By comparison, 60 trucks today emit what one truck emitted in 1988.

We strongly support full funding for the EPA's Diesel Emissions Reduction Act (DERA) program and thank the Committee for increasing program funding under the IRA. As the Committee is aware,

⁹ *SmartWay Program Successes*, U.S. EPA, Available online at: <https://www.epa.gov/smartway/smartway-program-successes>.

¹⁰ *Frequently Asked Questions*, U.S. EIA, Available online at: <https://www.eia.gov/tools/faqs/faq.php?id=327&t=10>

additional DERA funding will help the EPA accelerate the turnover of legacy diesel fleets that use older engine technology and get new, clean equipment on our highways.

ATA joined an industry coalition in advocating for \$150 million for the DERA program in FY2023 and is grateful that Congress provided \$100 million (a slight increase over the FY2022 funding level) in the most recent omnibus spending bill. DERA investments complement effective state and local air programs. According to the August 2022 DERA Report to Congress, EPA estimates that from FY2008-FY2018, DERA programs achieved a reduction of 491,000 tons of nitrogen oxide; 16,800 tons of particulate matter; 65,000 tons of carbon monoxide; and 5,307,100 tons of carbon dioxide while saving 520 million gallons of diesel fuel.¹¹ The trucking industry looks forward to continuing its support for this valuable emissions reduction program.

With an eye towards increasing coordination among private sector stakeholders in support of sustainability, ATA is proudly leading the establishment of a coalition to address energy, emissions, and environmental challenges in trucking. This coalition will bring together ATA, the Truckload Carriers Association (TCA), the National Tank Truck Carriers (NTTC), the Engine Manufacturers Association (EMA), and America's Truck Dealers (ATD) to serve as a collective voice for the industry to policy makers, media, and the public on lowering trucking emissions and improving fuel use in our supply chains. We look forward to growing this exciting initiative and sharing data and information with the Committee as the group takes shape.

The trucking industry looks forward to not only continuing the successful emissions reduction efforts it has already undertaken, but to finding additional ways to reduce our emissions footprint. There is ample precedent for making progress on these issues with federal programs that work collaboratively with trucking stakeholders rather than forcing unworkable mandates on these companies. I am optimistic we can find solutions that continue reducing our emissions profile, are technology neutral, do not significantly burden the industry with new costs, and which are widely available to all segments of the industry. I look forward to working with Members of the Committee, federal agencies, and our partners in the supplier community on achieving these goals.

Challenges of Overambitious State-Based Regulations

To be clear, ATA was a participant in litigation against both the California and Oregon state Low Carbon Fuel Standards prior to their taking effect. We challenged those rules in part because they increased diesel prices and in part because a patchwork of state-based regulations makes it more difficult for companies to operate in interstate commerce. Key issues like emissions reduction are areas where a single national standard is necessary to ensure companies transporting freight are not forced to become creative with how, where and when they purchase new equipment to remain compliant (or where they purchase fuel to reduce costs when that is an option).

California regulations should not automatically become the template for establishing the next national low-NOx standard, for example, nor the template for increasing national fuel prices. Federal standards for these areas need to be technologically and economically achievable, without impeding supply chain operations or business planning for the trucking industry and those who rely upon us to deliver their freight. Low Carbon Fuel Standards create enormous hurdles for small trucking companies because of the impact on fuel prices and the downstream consequences of a lessened ability to invest in new, clean trucking technologies.

¹¹ *Diesel Emissions Reduction Act (DERA): Fifth Report to Congress, EPA, August 2022. Available online at: <https://www.epa.gov/dera/diesel-emissions-reduction-act-dera-reports-congress>*

Trucking is keenly aware of the costs of new requirements and their impacts on energy supplies and supply chains. Projecting forward, fleets are apprehensive about product unavailability, infrastructure delays, and high upfront equipment and supply costs that will undoubtedly eat into their narrow profit margins. Driving down the costs of new technology through new incentives and repealing old disincentives like the federal excise tax on heavy duty trucks will accelerate trucking's adoption of clean technologies and deployment of new equipment. Increasing the trucking industry's operating costs for trucks currently on the road will only slow that process.

Considerations on Fuels Regulations and Their Impact on Trucking

According to the American Transportation Research Institute's (ATRI) annual survey of the industry, fuel is the second-highest operating cost for trucking and accounts for 22% of the motor carriers' average marginal costs.¹² That same survey noted that from 2020-2021, the average marginal cost per mile of fuel increased at nearly three times the rate of the overall annual average marginal cost per mile of operation. Finally, the report shows that fleets of twenty-six trucks or fewer paid the highest fuel costs per mile among truckload fleet respondents, nearly 20% more than fleets with over 1,000 trucks. When energy prices spike due to global events or new regulations, the costs fall the hardest on these small businesses and family trucking companies. ATA welcomes the opportunity to work with this Committee on *ambitious yet achievable* solutions that reduce the vulnerability of our supply chains to such volatility and that lower costs for our members.

Recent price surges for diesel fuel hit trucking hard, costing the industry tens of billions of dollars. These cost increases led to bankruptcies, increased costs for American consumers, and difficult decisions by fleets of all sizes on how much they could invest in new, cleaner trucks. In 2019, U.S. trucks consumed 45.6 billion gallons of distillate fuel—of which 36.5 billion gallons were diesel.¹³ The trucking industry's fuel bill in 2019 was \$112 billion when prices were \$3.00/gallon. However, diesel prices rose throughout 2022, reaching a high of \$5.81/gallon—90% higher than 2019 average prices. This increase resulted in an annual diesel fuel bill exceeding \$200 billion for the American trucking industry, nearly a \$100 billion yearly increase.¹⁴

Those estimates are based on national average retail fuel prices. Looking specifically at California and Oregon, two states which enacted Low Carbon Fuel Standards, the prices spiked far higher. Two weeks after national diesel prices peaked at \$5.81/gallon, Oregon diesel prices peaked at \$6.47/gallon.¹⁵ The average price for diesel in Oregon as of a week ago was \$4.78/gallon, 4% higher per gallon than the national average and 25.5% higher than the national average a year ago.¹⁶ In California, which last year saw a new record high average price of \$7.01/gallon, the average diesel price last week was \$5.70/gallon, which is 24% higher than the national average and 49.7% higher than the national average a year ago.¹⁷

¹² *An Analysis of the Operational Costs of Trucking: 2022 Update*, American Transportation Research Institute, August 2022.

¹³ *ATA Economics and Industry Data*. American Trucking Associations, 2022. Available online at: <https://www.trucking.org/economics-and-industry-data>

¹⁴ ATA Analysis based on EIA fuel pricing data. Available online at: <https://www.eia.gov/>

¹⁵ 2022 Oregon Gas Price News, AAA, Updated December 2022. Available online at: <https://info.oregon.aaa.com/2022-oregon-gas-price-news/>

¹⁶ Oregon Average Gas Prices, AAA, Updated daily and accessed 10 February 2023. Available online at: <https://gasprices.aaa.com/?state=OR>

¹⁷ California Average Gas Prices, AAA, Updated daily and accessed 10 February 2023. Available online at: <https://gasprices.aaa.com/?state=CA>

There are practical obstacles to simply transitioning away from diesel vehicles to solve the issue of fuel prices and reduce the carbon intensity of trucking. Battery and alternative fuel vehicles are not available to fleets in sufficient numbers and at affordable prices, even in states like California that have placed unrealistic timelines mandating a transition from diesel trucks. Another problem with the unachievable mandate is that the infrastructure to support those vehicles is also not yet in place. For battery electric trucks, few public fast charging stations currently have the space and infrastructure needed to accommodate heavy-duty vehicles, and building more stations could exacerbate the existing shortage of safe commercial truck parking.

The difference in price is stark – hundreds of thousands of dollars for battery electric compared to diesel versions, and the number of models that are commercially available is limited to a small selection. Long-haul heavy trucks with significantly heavier batteries suffer from limited range and reduced payload capacity. While some of these challenges can be mitigated with longer payback periods or the installation of private or semi-private charging facilities, we know this technology will require unprecedented advancements in battery range, capacity, and power grid integration to become a truly viable option for most operators.

The path forward will require increased clean power generation and a strengthened energy grid through investments in the IIJA and IRA. Agencies need to work with trucking interests and stakeholders including our current ecosystem of fuel providers as they consider the path towards emissions reductions through electrifying transportation and incentivizing the use of low- and zero-emission fuels. Trucking and our fuel providers have a symbiotic relationship that can be leveraged to reduce the costs and disruption from this transition. Distribution of IIJA alternative fuel grant dollars and funding for electrification will be most impactful and will help facilitate the market development for those technologies if our longstanding, trusted fuel provider partners play a role in our clean energy future.

To the point of needed investments in our power grid to support battery electric vehicles, and specifically heavy-duty trucks, the statistics on the amount of energy that will be consumed following that transition are astounding. A recent study from ATRI found that electrification of the U.S. vehicle fleet would consume 40.3% of the current total electricity demand when our aging grid can hardly sustain its current energy needs.¹⁸ In California, where rolling blackouts are not uncommon, utilities would need to generate an additional 57% of their current total electricity output to support an electric vehicle fleet.¹⁹

We also know the United States' minerals supply chains are not prepared for the scale of sustainable procurement needed to transition our freight economy to battery electric technology. To produce the lithium-ion batteries that would theoretically power the hundreds of thousands of long-haul power units needed to meet the Administration's emissions goals, we would need tens of millions of tons of cobalt, graphite, lithium, and nickel, which could take as long as 35 years to acquire given current levels of global production.²⁰

We encourage a holistic view of the emissions impact and carbon costs of securing these minerals, refining them, and then manufacturing the batteries that will be needed for heavy-duty trucks – from

¹⁸ *Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet*, American Transportation Research Institute, December 2022. Available online at: <https://truckingresearch.org/2022/12/06/charging-infrastructure-challenges-for-the-u-s-electric-vehicle-fleet/>

¹⁹ *Ibid.*

²⁰ *Ibid.*

“well to wheel” to truly understand the environmental impacts and carbon intensity of the transition away from diesel fuel. For instance, in the case of lithium mining, production creates considerably more CO₂ and pollution, and consumes more resources, than does the manufacture of materials for internal combustion engines. In some operations, a minimum of one million gallons of water are necessary to produce a single pound of lithium.²¹

Interestingly, the Biden Administration’s multiagency *U.S. National Blueprint for Transportation Decarbonization* identifies battery electric technology as a “limited long-term opportunity” in the long-haul segment and points out better-positioned opportunities for hydrogen and sustainable liquid fuels.²² These alternatives offer advantages in energy density, comparable refueling times with diesel fuel and, in the case of biodiesel and renewable diesel, compatibility with many current internal combustion engine configurations. Despite the aggressive timelines set out by the state of California to mandate battery electric vehicle manufacture and fleet sales, the Administration’s blueprint notes longer, more manageable timelines extending out to 2050.²³ A diverse, interstate industry such as trucking will benefit from these more manageable timelines, and a recognition that a one-size-fits-all approach does not work on a national basis. A battery electric truck with a charging capacity of 1500 kWh might have a 500-mile range in warm, sunny Southern California or Texas, but it would have significantly less range in a cold winter on mountain roads in Wyoming or West Virginia.

When battery electric vehicles are not the answer, federal support should refrain from playing favorites, and instead assist in the buildout of alternative fuel facilities. Proposals for hydrogen infrastructure for trucks need to ensure that the infrastructure is in place where that technology best fits in supply chains. Where lifecycle emissions can be reduced by deploying renewable diesel and renewable natural gas, those fuel stocks need to be available for trucking.

How Congress Can Help with Ambitious Climate Goals for Trucking

An ideal future for zero emissions in trucking is one in which congestion-free highways facilitate the interstate movement of clean vehicles that are affordable for fleets of all sizes. These trucks would be powered by renewable fuels or fast charging networks that are accessible nationwide and governed by harmonized national standards rather than a patchwork of state laws. We can avoid crippling our supply chains in pursuit of this outcome only if state and federal policymakers listen to industry stakeholders about where investments are most impactful and what a realistic timeline looks like.

Underpinning all the following recommendations is the need for a long-term, stable revenue source. We need to have the dedicated resources to maintain and improve our nation’s highway system if we seek to remain the world’s leading economy. Without a stable revenue source, it will be difficult for states to commit to funding crucial and expensive projects. The fuel tax has, for at least a century, provided the preponderance of that stable income. However, because Congress has failed to increase the rate of the federal tax since 1993, inflation has significantly reduced the value generated by the tax. While the fuel tax will likely have to be replaced or supplemented, it will be a viable revenue source for at least the next decade, and the rate of tax should be raised and indexed to inflation.

In the meantime, the Administration should work with Congress, States, and the private sector to find a viable replacement for the fuel tax (and other Highway Trust Fund income sources such as the outdated

²¹ *Ibid.*

²² *The U.S. National Blueprint for Transportation Decarbonization*, page 50, U.S. Department of Transportation, January 2023.

²³ *Ibid.*

12% federal excise tax on heavy duty vehicles) that can provide stable highway funding for the foreseeable future. The IIJA included funding for State, national, and local pilot programs to explore new revenue sources. ATA looks forward to working with the U.S. Department of Transportation and grant recipients to implement a robust and comprehensive research and testing program.

Target IIJA Funding at Reducing Congestion

As technologies for clean vehicles mature and the infrastructure buildout continues for electric and alternative fueled passenger and commercial vehicles, the greatest near-term reductions in emissions must come from dedicating infrastructure funding towards reducing and eliminating congestion. Reducing idling hours and time wasted in stop-and-go traffic on our nation's highway bottlenecks will make more efficient use of every gallon of fuel burned, as well as benefit our nation's truck drivers and highway safety. Congress should ensure that highway funding is directed to new construction that targets those chokepoints.

Highway congestion adds nearly \$75 billion to the cost of freight transportation each year.²⁴ In 2016, truck drivers sat in traffic for nearly 1.2 billion hours, equivalent to more than 425,000 drivers sitting idle for a year.²⁵ This caused the trucking industry to consume an additional 6.87 billion gallons of fuel in 2016, representing approximately 13% of the industry's total fuel consumption, and resulting in 67.3 million metric tons of excess carbon dioxide (CO₂) emissions.²⁶

Congestion serves as a brake on economic growth and job creation nationwide. A first-world economy cannot survive a developing-world infrastructure system. As such, the federal government has an obligation to ensure that necessary resources are available to address this self-imposed and completely solvable situation. ATA encourages USDOT to prioritize the discretionary program resources made available by the IIJA to address major freight bottlenecks. Furthermore, given the importance of the National Highway System—and especially the Interstate System—to the supply chain, a greater share of federal investment should be directed toward the maintenance and improvement of these highways that are key freight corridors.

Last week, ATRI released their annual report on the national top 100 freight bottlenecks.²⁷ This report uses extensive GPS data to identify granular chokepoints on our interstates and specific data showing where vehicles are forced to slow down or sit idle. This year's list includes locations in 31 states, including 22 in states represented by Members of this Committee. These points of congestion are brakes on our economy and pain points for all of America's drivers as they sit idle side-by-side with commercial motor vehicles.

Beyond addressing the major problems caused by congestion, we must continue investing in America's freight intermodal connectors—those roads that connect ports, rail yards, airports and other intermodal facilities to the National Highway System. These heavily trafficked roads are an essential part of the freight distribution system that have been historically neglected in spite of their importance to the nation's economy, and to emissions reduction efforts in states with significant intermodal activity. Just 9% of connectors are in good or very good condition, 19% are in mediocre condition, and 37% are in poor condition.²⁸ Not only do poor roads damage both vehicles and the freight they carry, but the

²⁴ *Cost of Congestion to the Trucking Industry: 2018 Update*. American Transportation Research Institute, Oct. 2018.

²⁵ *Ibid.*

²⁶ *Fixing the 12% Case Study: Atlanta, GA*. American Transportation Research Institute, Feb. 2019.

²⁷ *Top 100 Bottlenecks -- 2022*. American Transportation Research Institute, 2022.

²⁸ *Freight Intermodal Connectors Study*. Federal Highway Administration, April 2017.

Federal Highway Administration (FHWA) found a correlation between poor roads and vehicle speed. Average speed on a connector in poor condition was 22% lower than on connectors in fair or better condition.²⁹ FHWA further found that congestion on freight intermodal connectors causes 1,059,238 hours of truck delay annually and 12,181,234 hours of automobile delay.³⁰ Congestion on freight intermodal connectors adds nearly \$71 million to freight transportation costs each year.³¹

Although the IJIA did not set aside funding for either highway bottleneck elimination or intermodal connectors, these projects are eligible for funding under several of the discretionary programs, including the Nationally Significant Freight and Highway Projects Program, the Bridge Investment Program, the National Infrastructure Project Assistance Program, and the Local and Regional Project Assistance Program. Congress should provide the necessary oversight to ensure that the resources available from these programs are used primarily for projects that improve transportation safety and freight mobility. These programs should not be used to advance parochial agendas that are outside of their Congressionally mandated scope. Under the IJIA, states will receive more than \$50 billion per year in federal-aid highway funding. Much of that can, and should, be used to modernize and expand infrastructure, targeting congestion with a focus on improving the efficiency of key freight corridors.

Additionally, ATA cautions against federal policies that are likely to prevent or hamstring state and local agencies' efforts to expand highway capacity. This includes conditioning the expenditure of federal funds for new capacity on a showing that alternatives, such as operational strategies or investment in alternative transportation modes, are definitively ruled out. The National Environmental Policy Act (NEPA) process already requires consideration of alternatives, and layering additional requirements onto the existing process is redundant, costly, and cumbersome. We are also concerned about policies that seek to eliminate or downgrade highways in the name of equity or environmental justice without fully accounting for the impacts of these approaches on supply chain efficiency.

Furthermore, ATA is concerned about a December 16, 2021 Federal Highway Administration (FHWA) memorandum to its staff that outlined Administration policies with regard to the federal-aid highway program. The memo, in part, directed staff to "encourage" states and other federal-aid recipients to prioritize roadway maintenance and non-highway modal projects over the construction of new highway capacity. This directly contravenes policies that Congress rejected during IJIA debate. While USDOT claims the memo will not have a substantial impact on project selection, the Government Accountability Office (GAO) disagrees. In a December 15, 2022 report, GAO stated that the memo "...sets out FHWA's preferred projects for funding under the Infrastructure Investment and Jobs Act. When an agency rule has the effect of inducing changes to the internal policy or operations choices of the regulated community, that rule has a substantial impact on the rights and obligations of non-agency parties."³² Therefore, GAO concluded that the memo is subject to the Congressional Review Act. ATA supports current efforts by Members of the Committee to pass a resolution of disapproval that negates the effects of the FHWA memo.

Reduce the Cost of New, Clean Vehicles and Ensure Renewable Fuels Availability

²⁹ *Ibid.*

³⁰ *Ibid.*

³¹ *An Analysis of the Operational Costs of Trucking: 2018 Update*. American Transportation Research Institute, Oct. 2018. Estimates average truck operational cost of \$66.65 per hour.

³² *Federal Highway Administration—Policy on Using Bipartisan Infrastructure Law Resources to Build a Better America*. U.S. Government Accountability Office, December 15, 2022.

Mandates for emissions reduction and decarbonization will require the widespread deployment of new, cleaner, or alternative fuel vehicles that are significantly more expensive, and which are not yet widely available. The antiquated Federal Excise Tax (FET) on heavy-duty vehicles, created by Congress to fund America's participation in World War I, adds an additional 12 percent to the cost of every new truck. If Congress is serious about reducing emissions from trucking and the supply chain, then the first step is to remove this onerous tax and immediately make new, clean equipment more affordable. We are grateful to the bipartisan, bicameral sponsors of legislation in the 117th Congress, including Sen. Ben Cardin on this Committee, who proposed removing this burdensome cost.

ATA supports technology-neutral efforts to incentivize the deployment of new, clean trucks. Where Congress has chosen to provide targeted incentives in this area, such as the 45W tax credit for Qualified Commercial Clean Vehicles and the 30C Alternative Fuel Vehicle Refueling Property credit, ATA will work with federal agencies to formulate guidance that will enable industry to maximize the effect of the incentives on emissions reductions.

In the case of initial guidance proposed by the IRS on Qualified Commercial Clean Vehicles, ATA recommended changes to extend the credit to vehicles reaping the benefit of maturing technologies that charge vehicles through regenerative braking or solar sources. We hope that the agencies will take stakeholder feedback into account as they implement provisions of the IRA. Additionally, we urge Congress to give the market time to adjust as various tax credits and infrastructure improvements are undertaken that affect the underlying economics of trucking and the supply chain, before considering or pursuing additional measures that may drive up the operational costs of trucking.

The Carbon Oxide Sequestration credits in the IRA are another area where the agencies can enhance the legislation's environmental benefits. In December, ATA submitted comments to the IRS, asking it to recognize mobile sources as eligible facilities for the credit. This would make retrofitting trucks with mobile carbon capture and storage technology more cost-effective. IRS guidance on aggregating smaller carbon capture units is needed for companies to obtain the credit and meet the minimum carbon capture thresholds.

Looking further at the possibilities presented by sustainable liquid fuels for trucking and the transportation sector, it is important to note that the IRA created a challenge for the deployment of sustainable renewable fuels in trucking. While the current tax credits for renewable natural gas and renewable diesel are \$0.50 and \$1.00 per gallon, respectively, the credits for Sustainable Aviation Fuel (SAF) under the IRA increased up to \$1.75/gallon. The biodiesel blenders tax credit has built a robust biodiesel and renewable diesel industry domestically, which enhances our supply of fuel, limits our exposure to global petroleum markets, and improves the transportation sector's emissions footprint. From 2005-2021, the biodiesel and renewable diesel market grew from 100 million gallons to 3.2 billion gallons.³³ However, the increased credit for SAF stands to disrupt or eliminate the market for biodiesel and renewable diesel by diverting limited feedstocks. Overall carbon emissions will increase as a result, because SAF production is a less efficient process than renewable diesel production.³⁴

³³ California Air Resources Board Proposed Advanced Clean Fleets Regulation. Available online at: <https://ww2.arb.ca.gov/rulemaking/2022/acf2022>

³⁴ *Clean Truck Program (CTP) – Gate Move Analysis*. Port of Los Angeles, December 2022. Available online at: <https://kentico.portoflosangeles.org/getmedia/452bad8c-4e16-490f-bab6-155b061866bb/POLA-Monthly-Gate-Move-Analysis> (accessed January 19, 2023).

There are opportunities under the EPA's Renewable Fuels Standard (RFS) program to promote immediate carbon reductions in interstate transportation. Both renewable diesel and biodiesel are significantly more expensive than diesel if government incentives are absent or reduced. However, these alternatives have significantly lower carbon intensity – roughly 50% fewer GHG emissions -- than conventional fuel. Last week in comments filed with EPA, ATA encouraged the agency to increase the annual mandated volumes in the advanced category. Major increases in the mandate for advanced biofuels could offset some of the consequences of migration renewable diesel feedstocks to SAF. Taking action to improve access to, and the economics of, purchasing sustainable fuels as a preferred fuel source will have significant and long-term emissions reduction benefits.

The transitions to new technologies will take time, and the push for unrealistic timelines to make those changes neglects both the enormous progress in emissions-reducing technologies in trucking technology and the potential emissions reductions from removing barriers to the purchase of new, clean trucks and renewable fuels.

Considerations for Drayage and the National Safe Truck Parking Shortage

As with the need to invest highway dollars in eliminating congestion, there are additional key points in the supply chain that too often lead to inefficient use of trucks and an inefficient use of another important resource: driver hours of service. Investments in port intermodal connector infrastructure and port emissions reductions under both the IJA and IRA will provide more immediate benefits than raising the price of fuels and putting drayage operators, who play a critical role in ensuring the movement of freight between maritime and inland facilities, out of business. At the same time, investing in the construction of safe truck parking facilities will ensure that driver hours (and time spent burning diesel fuel) are spent productively moving freight rather than searching for a safe, secure and authorized location to park.

Many states with significant maritime port activity are pursuing ambitious climate goals at those facilities. ATA and our members are committed to sound environmental policies, but we emphasize that meeting the timeframes envisioned in many of these efforts will require significant advancements in both technology and infrastructure. Even if equipment with advanced environmentally friendly technologies become commercially available at the scale these climate goals require, the economics of acquiring and deploying that equipment need to be considered, and reasonable timetables set, in order to avoid destabilizing supply chains.

While the IJA and IRA contain considerable federal funding to assist ports in this process, the changes that will be required are certain to bring substantial disruption. For example, in coming weeks the FHWA plans to open grant applications for the Reduction of Truck Emissions at Port Facilities program, which will make \$160 million available for projects to reduce emissions related to idling trucks. ATA urges this Committee to use its oversight authority to balance the focus on improving port efficiency and meeting environmental targets with the economic realities facing trucking and other supply chain providers who are challenged to meet those ambitious goals.

In December of 2022, 99.87% of visits to the Port of New York/New Jersey were by diesel-powered trucks.³⁵ At the Port of Los Angeles, 93% of container moves and 95% of trucks are powered by diesel fuel with virtually all of the remaining movements powered by natural gas. At the beginning of this year, California prohibited the use of truck engines manufactured prior to 2010, which accounted for 13% of

³⁵ *PortTruckPass Comprehensive Report*. Port Authority of New York and New Jersey, December 2022.

all containers moves at the Port of Los Angeles in December.³⁶ (The figure for New York/New Jersey is even higher at 30.48%.³⁷) Thus far, the reduction in freight levels has meant that this requirement has not yet impacted the overall supply chain.

However, the California Air Resources Board is seeking to phase out older trucks and ultimately allow only zero emission trucks at the ports by 2035. This would mean all drayage trucking companies would need to replace their fleets entirely, an unrealistic expense for an ecosystem of carriers that tend to be small companies operating at low margins and whose productivity is often victim to unpredictable cargo availability and terminal access, unfair requirements to use chassis providers that force inefficient trips to and from ports, and detention at inland warehouses. ATA has expressed significant concerns regarding CARB regulations and there is no question that requirements to upgrade to newer model trucks will force considerable costs on companies working in drayage at those ports. Looking more broadly at all fleets working in intermodal freight, we need to be mindful of the challenges small businesses face during the transition to new technologies.

A larger national issue which large and small fleets share in common, and which contributes to increased emissions, inefficient utilization of equipment, and negative consequences for the wellbeing of truck drivers is the lack of safe truck parking facilities. In 2019, the FHWA found that the percentage of drivers who regularly experienced difficulty finding truck parking had skyrocketed from 75% to 98%.³⁸ Time spent looking for available truck parking costs the average driver about \$5,500 in direct lost compensation—or a 12% cut in annual pay, according to a 2016 report.³⁹ More relevant to emissions reductions, time spent seeking safe parking is time spent using equipment inefficiently. The current public and private availability of truck parking spaces nationwide is 313,000 for over three million truck drivers.

The limited number of spaces not only denies drivers facilities they need for a higher quality of life such as restrooms, showers, and meals, but is a limiting factor on placement of infrastructure to support electric and alternative fuel vehicles. Drivers deserve to be treated with dignity, and we are grateful to Committee Members for their attention to the issue. Senators Cynthia Lummis and Mark Kelly sponsored the Truck Parking Safety Improvement Act last Congress, which proposed \$755 million over four years to build out safe truck parking capacity and address this infrastructure shortcoming. We were disappointed that the IJA did not include dedicated funding for truck parking, and we look forward to working with Congress on long-term solutions.

As Congress works with stakeholders, including many fuel providers who also offer facilities to truck drivers, ATA would note that studies on the cost of providing electrical infrastructure and power to support charging at expanded parking facilities could be significant. ATRI estimates that it would take \$35.9 billion to electrify the current parking facilities, which are insufficient. The amount of electricity required by such a facility would be astounding. In their case study of the Pecos West County Rest Area in Texas, which holds 67 parking spots and hosts 369 unique truck visits in an average day, ATRI

³⁶ *Clean Truck Program (CTP) – Gate Move Analysis*. Port of Los Angeles, December 2022. Available online at: <https://kentico.portoflosangeles.org/getmedia/452bad8c-4e16-490f-bab6-155b061866bb/POLA-Monthly-Gate-Move-Analysis> (accessed January 19, 2023).

³⁷ *PortTruckPass Comprehensive Report*. Port Authority of New York and New Jersey, December 2022.

³⁸ *Jason's Law Commercial Motor Vehicle Parking Survey and Comparative Assessment Presentation*. Federal Highway Administration, U.S. Department of Transportation, December 2020.

³⁹ *Managing Critical Truck Parking Case Study: Real World Insights from Truck Parking Diaries*. American Transportation Research Institute, December 2016.

estimates that the daily electricity consumption if used as a charging station would be the equivalent to 5,000 households.

In Conclusion

Thank you for the opportunity to testify before you today on behalf of the American Trucking Associations and the 7.65 million people in trucking related jobs who power our nation's supply chains and keep the wheels of the economy turning. Trucking is focused on playing a key role to identify and advance workable solutions to the environmental challenges that we face.

I am proud to share the story of trucking's contributions to our country's ongoing effort to reduce emissions and grow a more environmentally sustainable economy. Congress has taken actions in the past two years which will ensure a more competitive economy with more resilient supply chains and safer, cleaner freight transportation. I look forward to working with Chairman Carper, Ranking Member Capito, and Members of the Committee on implementing those pieces of legislation and finding common ground on solutions that will help us meet ambitious energy and emissions goals. Thank you.

Senate Committee on Environment and Public Works
Hearing Entitled, "The Future of Low Carbon Transportation Fuels and Considerations for a
National Clean Fuels Program"
February 15, 2023
Questions for the Record for Mr. Chris Spear

Senator Kelly:

- 1. In your testimony, you discuss the importance of reducing emissions from the trucking sector, and identify congestion, idling, and a lack of truck parking as factors which contribute to excess emissions. Mr. Spear, how would federal initiatives, such as the one proposed in the Truck Parking Improvement Act, to address truck parking, or the Congestion Relief Program administered by FHWA, help to reduce emissions from the trucking sector?**

When truck drivers are forced to travel from one parking location to the next in a daily struggle to find a safe place to sleep, they waste a tremendous amount of fuel, unnecessarily putting pollutants into the air. Based on survey results, approximately 45% of truck drivers report spending at least 30 minutes a day searching for parking, while nearly one-third report that they have to drive for more than an hour on average looking for parking. Adding new parking capacity using resources provided by the Truck Parking Safety Improvement Act would significantly reduce the need for drivers to waste fuel as they search for an increasingly limited supply of parking.

The Congestion Relief Program focuses primarily on two strategies for congestion relief: highway operations and congestion pricing. Using highway operations strategies such as improved signal timing, efficient emergency response and real-time traffic information systems, are proven, effective strategies for congestion management. Congestion pricing of existing untolled lanes is unproven, with the potential for negative societal impacts including the diversion of traffic to less safe secondary roads and environmental justice concerns. Furthermore, because most trucking companies do not pass toll costs directly to their customers, pricing will not affect time of day or modal choice decisions, rendering the pricing of trucks ineffective and significantly increasing supply chain costs.

Ranking Member Capito

- 1. Has your organization supported the development and deployment of carbon capture to help reduce emissions from the transportation sector, specifically for heavy-duty vehicles? If so, are there any hurdles to deploying this technology?**

ATA recognizes that the transition to electric trucks will take many decades. Due to the long useful life of existing diesel engines, higher costs of electric vehicles, and typical fleet turnover cycles, diesel trucks will continue to be used for the foreseeable future. To ensure continued investment in low- and zero-emission vehicles and meet transportation decarbonization goals, the industry needs a realistic path that incorporates emissions control technologies for diesel-powered vehicles.

Mobile carbon capture and storage (MCCS) is a promising emissions control technology for heavy-duty vehicles, and ATA supports its development and deployment to reduce emissions. MCCS can be retrofitted onto existing trucks and has the potential to capture up to 80% of carbon emissions and 75% of nitrogen oxide (NOx) emissions. Given the significant greenhouse gas (GHG) footprint of the transport sector, emerging solutions such as MCCS require support from federal agencies.

On December 3, 2022, ATA filed comments with the Internal Revenue Service (IRS) regarding proposed

guidance under Section 45Q of the Internal Revenue Code, as amended by the Inflation Reduction Act (IRA) of 2022. ATA's comments encouraged the agency to issue guidance for 45Q credits that will make them usable for reducing greenhouse gas emissions from trucking.

Providing certainty to companies that invest in new clean technologies such as MCCS is critical. To that end, ATA has requested that the agency (1) confirm that mobile sources may be "qualified facilities" for purposes of the credit, and (2) allow pollutant capture from multiple mobile source devices to be aggregated to meet the minimum carbon capture requirements under the credits. Clarifying guidance on these two specific points will offer certainty to trucking companies investing in the deployment of MCCS devices to meet ambitious emissions reduction goals.

Senator CARPER. Thank you, Mr. Spear.

I am going to ask unanimous consent to enter into the record a letter from Consumer Reports asking EPW to pursue a Clean Fuel Standard to decarbonize the Nation's transportation sector.

[The referenced information follows:]



February 14, 2023

The Honorable Tom Carper
 Chair, Environment and Public Works
 United States Senate
 513 Hart Senate Office Building
 Washington DC 20515

The Honorable Shelley Moore Capito
 Ranking Member, Environment and Public Works
 United States Senate
 172 Russell Senate Office Building
 Washington DC 20515

Dear Chairman Carper and Ranking Member Capito,

Consumer Reports (CR) writes in advance of the hearing scheduled for February 15, 2023 entitled *The Future of Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program* to urge the Senate Environment and Public Works Committee to take the lead on developing a Clean Fuel Standard (CFS) that would aim to decarbonize the nation's transportation sector.

Transportation is the number-one source of greenhouse gas emissions in the United States, accounting for 27% of the country's total emissions output¹. One way we can reduce emissions from this sector is by using low carbon fuels for our cars, trucks, planes, delivery vans, and other vehicles. There are many options currently available, including biofuels such as biodiesel and ethanol, which can fuel the millions of internal combustion engine vehicles already on the road today, and hydrogen and electricity, which require new vehicle technology. There are also more low carbon fuel options currently under development. CR is committed to helping consumers understand their options when it comes to the availability of these technologies and ensuring the transition to low-carbon transportation fuels is equitable.

One tool that can be used to achieve broad carbon dioxide emissions reduction from transportation is a Clean Fuel Standard (CFS), which is already proving successful in multiple states. Successful CFS have taken a market-based approach to support a wide range of clean transportation fuels, reducing the fuels' carbon intensity year-to-year. By remaining technology neutral, a CFS allows the marketplace to determine which fuel sources and vehicle technologies are the most effective at reducing carbon emissions, while driving further innovation in market segments that are more difficult to decarbonize in the short term.

As this Committee evaluates the potential for a CFS policy proposal, we urge you to consider a strategy that would prioritize justice and equity by recognizing that communities impacted most by transportation greenhouse gas emissions are low income and communities of color. To

¹Sources of Greenhouse Gas Emissions, EPA 2020,
[https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#:~:text=Transportation%20\(27%25%20of%202020%20greenhouse.ships%2C%20trains%2C%20and%20planes](https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#:~:text=Transportation%20(27%25%20of%202020%20greenhouse.ships%2C%20trains%2C%20and%20planes)

achieve this goal, policies should identify opportunities to invest a significant portion of program credit revenues back into the communities that are most affected, through building CFS fueling and charging infrastructure, and providing incentives to transition these consumers to low carbon fuels and vehicles. In recognition that low-income consumers spend disproportionately more of their income on transportation fuel, policymakers should work to ensure that any CFS policy does not significantly raise the cost of transportation fuel, whether CFS or traditional transportation fuels.

A CFS provides a common-sense solution to the problem of high-carbon fuels, while bringing greater innovation and stability to the fuels market. A CFS can help alleviate high gas prices by providing more fuel options for consumers that are not tied directly to fluctuating oil prices. A CFS is fuel-neutral, technology-agnostic, and market-based. A forward-looking program like a CFS is a thoughtful approach that provides a gradual transition away from traditional gasoline and diesel, and will encourage rapidly growing investment in the technologies needed to reduce pollution across the United States. Designed properly, it will spur innovation in American technology, help ensure equitable and sustainable economic growth, and facilitate the transition to a cleaner, more just transportation sector.

Thank you for your consideration on crafting a thoughtful national clean fuels policy. CR has worked to develop a set of policy principles for an ideal CFS² (attached) and welcomes the opportunity to discuss how Congress can act on this important issue.

Sincerely,

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cc:

Senator Thomas Carper
Senator Benjamin Cardin
Senator Bernard Sanders
Senator Sheldon Whitehouse
Senator Jeff Merkley
Senator Edward Markey
Senator Debbie Stabenow
Senator Mark Kelly
Senator Alex Padilla
Senator John Fetterman

Senator Shelley Moore Capito
Senator Kevin Cramer
Senator Cynthia Lummis
Senator Markwayne Mullin
Senator Pete Ricketts
Senator John Boozman
Senator Roger Wicker
Senator Dan Sullivan
Senator Lindsey Graham

² Low Carbon Fuel Standards: Policy Principles, Consumer Reports, 2022.
<https://advocacy.consumerreports.org/research/low-carbon-fuel-standards-policy-principles/>

Senator CARPER. With that, I am going to slip out and go over to the Finance Committee and introduce Danny Werfel. I am going to yield to Senator Capito to preside in my absence. Thanks so much.

Senator CAPITO.

[Presiding.] Thank you, Mr. Chairman.

Mr. Spear, I talked in my opening statements about the prices of diesel and how they have been at a record high in June 2022. Can you talk about the impacts of when these prices are way up like they are, and have been for a sustained period of time, what impact that has on your industry, and how it impacts the small businesses, many of them small businesses, some quite large, across the Country?

Mr. SPEAR. It is significant, Senator. Fuel costs are our second-highest cost, just under labor. Under that, you have safety, including training. So a lot of important operational expenditures, but fuel is our second-highest cost, and that was before we went to 40-year highs on inflation, which comes as no surprise with the standard in California and Oregon. We have litigated it directly because of the cost impact that it has on our industry, particularly those that are running 20 trucks or less or owner-operators, one truck.

Senator CAPITO. Are you in the middle of that litigation right now?

Mr. SPEAR. We are, indeed.

Senator CAPITO. OK. So, would you say then, that these regulations, as I said in my opening statement, are leading to higher prices in those particular States?

Mr. SPEAR. Yes, we are dealing nationally with 40-year highs on inflation. These two States compounded that problem, which is why you see fuel costs exceeding \$7 in California, nearly \$6.50 in Oregon. That is much, much higher than the national average as you said.

But if you are a small carrier or owner-operator, you don't have the luxury of a fuel contract. You are paying retail at the pump, so you are absorbing that cost into your operational expenses. It is chipping away. You are going to see consolidation in our industry as a result, and it is going to hurt the very small businesses that this committee says it supports.

Senator CAPITO. Thank you.

Mr. Graff, I think that Appalachian hydrogen hub sounds really good to me, and thank you for what you are doing to lend your expertise. I know we are in competition with a lot of good ones, as you mentioned, but I appreciate your mentioning that.

Let me ask you a question. I think this is an important question when we are all looking at what the environmental impacts can be. You mentioned, Mr. Cooper mentioned life cycle. So, in order to get to an EV, in order to get to a hydrogen car, there is a lot that goes before you actually are at the tailpipe, I guess is how they say it, measuring it before the tailpipe.

So, a life cycle, have you done an analysis of that, of what it takes to create the hydrogens that go into these vehicles, and how the emissions, I guess I am focusing more on emissions than cost, although we know that does drive up the cost, if we have to do an-

other process before another process. What are your thoughts on that, on life cycle analysis?

Mr. GRAFF. Thanks for the question, Ranking Member Capito. Clearly, we need to look at every aspect of basically well to wheel, so to speak, in the approach for any pathway to produce energy and understand its emissions potential and how we address that.

In terms of hydrogen, we have been in the business of producing and transporting and utilizing hydrogen for over 60 years. We have the full capabilities to make sure that hydrogen itself is well-managed, it is well-contained, and its fugitive emissions, as you consider its impact on the environment, are genuinely more second order.

I think we look at safety, we look at what we can do to make sure that there is safe transport, the safe production, the safe use of hydrogen. But any fugitive emissions of hydrogen into the atmosphere has a much lower effect than other hydrocarbons or other substances that may end up in the environment.

Senator CAPITO. OK.

Mr. Cooper, on ethanol, obviously, there is an expenditure of a great deal of energy to make ethanol. How would you answer that question on life cycle, both emissions and cost?

Mr. COOPER. We fully support a well to wheels full life cycle approach when analyzing the carbon intensity of all fuel pathways. We agree that in particular, when you talk about electric vehicles, we often hear then referred to as zero-emissions vehicles. Well, that is ignoring all of the upstream emissions associated with electricity production.

But for corn ethanol specifically, the Department of Energy analyzes in great detail that full life cycle, energy use and emissions involved with farming and harvesting the corn and processing that corn into ethanol. When you add all of that together, corn ethanol has an emissions footprint that is about 50 percent lower than gasoline. So that does include all the farm inputs and all the energy used on the farm, all the way through the process to the retail gas station, about 50 percent.

Senator CAPITO. Let me ask Mr. Graff a quick question, too. Does California have personal vehicles that are hydrogen? That doesn't exist right now, does it, in any large measure?

Mr. GRAFF. Ranking Member Capito, there are currently 15,000 hydrogen fuel cell vehicles that have been sold into the California market. I mentioned earlier that we had built the first-ever liquid hydrogen production facility to provide renewable hydrogen into the State. That was specific in working with the automotive companies to facilitate the introduction of those vehicles.

Senator CAPITO. What is the cost of a hydrogen vehicle?

Mr. GRAFF. I can't speak to the exact cost today. I think that, depending on the model and the make, you are in the \$50,000 to \$60,000 range today.

Senator CAPITO. And they are quite heavy, as well, correct?

Mr. GRAFF. No, they are quite light, actually.

Senator CAPITO. They are?

Mr. GRAFF. They are much lighter than, for example, a battery-powered electric vehicle.

Senator CAPITO. Right. Well, the electric vehicles are a lot heavier than the vehicles we have.

Mr. GRAFF. Their weight would be comparable to the weight you have in other vehicles today.

Senator CAPITO. OK. Thank you.

Senator Merkley? Senator Fetterman? Senator Stabenow?

Senator STABENOW. Well, thank you very much. Good morning, and thank you to all of you for being here.

I will say on the issue of hydrogen, I know that there are joint ventures, partnerships going on right now in Michigan, and we are with the Army and so on in terms of development of hydrogen fuel cell vehicles, and they are having great success on a number of fronts.

Let me start off though, Mr. Cooper, and let me just say that, as we look at transitions, and I am all for transitions, and I want to see us get to electric vehicles. I am currently driving the Michigan-made Chevy Bolt. I think it is one of the most affordable American-made vehicles right now, in terms of electric vehicles. I love it. It is here; I love it.

But I know that the reality is that our cars are lasting longer than ever, even as we transition all the structures and things that need to happen, that the U.S. fleet is going to be comprised of hundreds of millions of internal combustion engines for years to come, so it really is important for us to understand all of this as we transition.

If we are going to meet our national climate targets, do you agree that we must secure a robust supply of low-and zero-carbon liquid fuels to complement the push toward electrification?

Mr. COOPER. Yes. Thank you for the question, Senator, and I absolutely agree that yes, we need to embrace the use of low-carbon liquid fuels. If we are serious about reducing greenhouse gas emissions as quickly as possible, we can't wait around for full electrification of the fleet. That is going to take decades, as you pointed out.

There are roughly 270 million light-duty vehicles, cars, pick-ups, SUVs, and vans. Today, 1 percent of those are electric vehicles. It is going to take decades for that transition to occur, and we should be taking steps now to further decarbonize those liquid fuels that we know are going to be, as you said, hundreds of billions of gallons of liquid fuels will be needed in the decades ahead in these vehicles.

So we think a clean fuel standard is a great way to do that and really jump start that decarbonization of our liquid fuels.

Senator STABENOW. I am assuming you do not think it is instead of a Renewable Fuel Standard, that this is about complementing.

Mr. COOPER. That is correct. A well-done Clean Fuel Standard would complement a Renewable Fuel Standard, which really creates the foundation and the bedrock for the renewable fuels industry.

Senator STABENOW. Could you speak a little bit about the recent investments that we have made, Congress has made, including those in the Inflation Reduction Act, that are going to help us be able to achieve these goals?

Mr. COOPER. Absolutely. Our industry is very excited about the Inflation Reduction Act and the suite of tax credits and grant programs in that legislation. It is a game changer for our industry.

One of the programs in particular is Section 45Z, the Clean Fuel Production Credit, which is, in essence, the tax version of a Clean Fuel Standard. It generates a tax credit for clean fuel producers based on the carbon intensity of their fuel, and the lower the carbon intensity, the more valuable the credit is up to \$1 per gallon.

Our industry is already making investments based on the availability of that tax credit in the next few years. Along with that, we had the expansion and extension of Carbon Capture and Sequestration credits, a \$500 million grant program for biofuels infrastructure. So yes, it was a wonderful investment and down payment in low-carbon renewable fuels.

Senator STABENOW. Great. I was very pleased to be able to, in the agriculture section of that bill, to have the investment in the biofuels infrastructure.

Mr. COOPER. We thank you for that.

Senator STABENOW. You have already mentioned less carbon, I am assuming, as you talk about that, it is jobs? I hear jobs, as you are talking about that as well. I think it is also important to stress that biofuel production lowers prices at the pump, and the fact that this last summer, where E15 saved drivers in some areas as much as \$1 a gallon, more at the time when we saw prices going through the roof, that was a big deal. I wonder if you might just speak more about how much renewable fuels save drivers at the pump.

Mr. COOPER. Absolutely. We did see it, especially last summer when we had record high gas prices. Ethanol was selling for about a \$1 to a \$1.25 a gallon less than gasoline at the wholesale level. So obviously, when you blend more of that lower cost product, it is going to reduce the price for the consumer. Still today, if you go to any retail gas station, the lowest cost fuel option for the consumer is going to be the fuel that has the highest content of ethanol.

We talked about California. The lowest cost fuel in the California market today is E85, it is that 85 percent ethanol blend. It is typically \$2 to \$3 a gallon less expensive than gasoline in the California market, and that is being driven by the LCFS in that marketplace.

Senator STABENOW. Thank you very much. I have other questions, but my time is up. Thank you, Madam Chair.

Senator CAPITO. Thank you.

Now, I turn to our newest Senator, Senator Ricketts. Welcome to the committee. You have 5 minutes for questions.

Senator RICKETTS. Great. Thank you very much, and thank you to all of our testifiers here today about the future of transportation fuels.

Mr. Cooper, you have a great barber there. That joke never gets old.

[Laughter.]

Senator RICKETTS. One of the things I always talk about is ethanol. I would say three things: ethanol saves consumers money at the pump, it is going to help cleanup the environment, and it is going to create jobs here in America. Ethanol must be central to

any discussion that we are going to have about the future of transportation fuels.

Senator Stabenow, thank you for mentioning the dollar savings in some places, because that is awesome. I was going to put that as one of my talking points today, too, that E10, that 10 percent blend of ethanol and 90 percent gasoline is about 98 percent of all the gasoline that is sold in this Country. E15 and the EPA's decision to allow that last summer helped with the high inflation that people were experiencing, bringing down their fuel costs.

Senator Stabenow mentioned the dollar, I think the average is about 16 cents. I just filled up my gas last time I was home. It was about 40 to 45 cents a gallon on E10, helping save that, and of course, E20, E30, E85, as you mentioned, all have future potential on that.

Also, as we have discussed about ethanol helping reduce carbon emissions, the use of ethanol blended fuels led to a reduction of nearly a billion metric tons of carbon dioxide equivalent greenhouse gas emissions between 2008 and 2020. Environmental Health and Engineering found that corn ethanol is 46 percent less carbon intensive than gasoline.

In addition, ethanol creates economic opportunities for our families, especially in Nebraska, there are over 1,000 direct jobs in Nebraska related to the ethanol industry and creates the demand for corn from our farmers. I would also note that the byproduct, the distillers grains, goes into feeding our livestock. It is just a wonderful thing, there. Ethanol has always fueled our trucks, cars, and other transportation vehicles along the American roads and highways.

So, Mr. Cooper, I want you to talk a little bit more about this Administration, as well as the State of California, has classified electric vehicles as zero emissions. Biofuels are considered low emissions. How would a National Clean Fuel Standard impact the use of biofuels and this new CFS, how would it work with the RFS, the Renewable Fuel Standard? Would it replace it, would it coexist? How would that work?

Mr. COOPER. Thank you for the question, Senator. We certainly believe that an LCFS or Clean Fuel Standard done right at the national level would complement a Renewable Fuel Standard. Again, the RFS was primarily about volume and energy independence and reducing imports. A Clean Fuel Standard is more directly about reducing emissions based on performance.

We do think the two would work together very well, complement one another. As I mentioned earlier, the RFS was really that bedrock and kind of the foundation for the renewable fuels industry. It is important to keep that foundation in place. We do think the two would work together.

In terms of how the biofuels industry would respond to a Clean Fuel Standard, we expect that it would be similar, in ways, to the response in the California marketplace and in Oregon. It has been interesting to see some of the different ways that the markets have responded to those programs in those States.

As I mentioned, the E85 market in California is off the charts. They are using more E85 in that State than any other State in the Country as an outcome of the Low Carbon Fuel Standard. They are

also one of the last two States that hasn't yet approved E15. Well, guess what? That are moving toward approval of E15 because the market is calling for it via the LCFS.

We do believe a properly designed clean fuel standard, and again, doing the life cycle analysis correctly, would drive increased use of ethanol and other renewable fuels above and beyond what it called for under the Renewable Fuel Standard.

Senator RICKETTS. I think we have talked about it a little bit here; I am concerned that any national clean fuels program could prioritize electric vehicles over liquid fuel vehicles, including clean biofuels. This will only make us more dependent on our foreign adversaries who control the majority of the worldwide production of several key components.

For example, the CCP, Chinese Communist Party, controls 60 percent of the raw lithium mines in the world, 50 percent of the lithium processing and refining, and 75 percent of the lithium and battery mega factories. How can you ensure that a new national low carbon fuel standard won't falsely prop up EVs to satisfy an agenda and do significant damage to liquid fuels, including biofuels in the process?

Mr. COOPER. Great question, and thank you, Senator. Again, if the life cycle analysis is done correctly, and the carbon intensity scores are developed in a fair and transparent way, we believe that renewable fuels are going to compete very well with electric vehicles in terms of the carbon reductions that they provide.

As the Ranking Member mentioned, internal combustion engines and conventional vehicles are far less expensive than EVs. So again, if you step out of the way and let the market respond to these carbon reduction requirements, we think it is going to drive the market toward increased use of renewable fuels, which are the lowest cost option of meeting the carbon reduction requirements.

If you stack on top of that an EV mandate or something like California is trying to do, then yes, that changes the calculation immensely. But we, again, think a truly technology-neutral standard is going to put renewable fuels in a very competitive position.

Senator RICKETTS. Great. Thank you.

Senator CAPITO. Thank you. Senator Cardin?

Senator CARDIN. Thank you, Madam Chair, and let me thank our three witnesses. I think it is very appropriate that our first hearing in this Congress is in regard to the future of low carbon transportation fuels.

Clearly, Senator Merkley and I have been engaged in some of the international meetings on the climate crisis. We have a crisis, so we need to do everything we possibly can in every aspect. The low carbon emission fuels is clearly part of that.

I am pleased that under the Bipartisan Infrastructure Bill Maryland has been able to take advantage of many of the new opportunities under the low or no emissions fuel programs. We have received three major grants in our State, \$15 million to Montgomery County, Maryland for new hydrogen production sites, and acquiring 13 hydrogen fuel cell electric buses. In Prince George's County, \$25 million for 70 zero-emissions electric buses, and in Ann Arundel County, \$1.9 million for four diesel electric hybrid buses. I say that,

because there are three different technologies, but all of them are adding to our commitment to reduce our carbon footprint.

Under the Clean School Bus program, Baltimore City is receiving \$9.4 million for 25 electric school buses. We are taking advantage of these opportunities.

Mr. Graff, you talked a little bit about the hydrogen issues. It is new technology, but it has limits. Where do you see the future of hydrogen as a source for transportation energy?

Mr. GRAFF. Senator, thanks for the question. Hydrogen itself is a very versatile molecule. If we are going to achieve our climate objectives, if the energy transition is going to occur, it will not happen without hydrogen. The estimate is that hydrogen itself, long-term, by 2050, will likely account for roughly 20 percent of the world's energy supply.

That versatility allows us to use hydrogen, produced in a variety of different pathways, to decarbonize energy intensive industry and also to decarbonize the transportation sector. The utilization of that hydrogen, we have talked a little bit about personal vehicles, but as you grow the vehicle, as you look at commercial vehicles, as you look at the class A tractors that are on the highways, if in fact, we want to get to a zero emission vehicle, in that case, we are in a place where we can utilize hydrogen paired with a fuel cell, maintain the same utility you have today, the same drivability, the same refueling time, the same use regardless of temperature, and you will be able to utilize because of the small footprint and weight of the fuel cell along with the amount of hydrogen necessary to go ahead and carry on board to power that, you will be able to maintain the payload you have today.

So it has the capability in almost every use in the transportation sector to see that evolve. The key is to build out the infrastructure, the key is to build the need for the vehicles and see this grow and evolve as we have for other sectors.

Senator CARDIN. So, we took a giant step in that direction under the Inflation Reduction Act, providing certain incentives. What more needs to be done?

Mr. GRAFF. The Inflation Reduction Act clearly provides the capability to produce hydrogen under a variety of pathways, whether utilizing renewable power or utilizing natural gas with carbon capture to produce the hydrogen at a lower cost and have the benefit of low carbon renewable hydrogen.

The key now, given the fact that the transportation sector is one of the most difficult to decarbonize, is to go ahead and further incentivize the use to build out the vehicles and fully utilize those.

As a matter of fact, I was with one of our drivers just Thursday utilizing one of the Class A tractors we are currently using to deliver goods in the State of California between our industrial sites, which utilizes hydrogen and a hydrogen fuel cell to power it. We just need to build to scale to get there.

Senator CARDIN. Thank you.

Mr. Spear, I want to get you engaged here on heavy duty trucks. I recognize that we have infrastructure challenges that are very important to the trucker and trucking industry. I recognize we have supply chain challenges that you have already mentioned in your testimony. How do we provide the necessary incentives so that

heavy duty trucks are also going to have themselves a smaller carbon footprint? What additional incentives do you think are necessary?

Mr. SPEAR. I think if you want to get the newer, safer, more environmentally friendly equipment out on the road, you have to incentivize it. You have been a leader on this. You sponsored a bill that would repeal the Federal excise tax. This is a 100-plus year old tax, World War I. It is the only one left of that era that still exists.

It tacks on 12 percent of the price of the sale of a new tractor. So that is roughly \$25,000 per tractor. Think about that. Not only is that more expensive, the impact that has on manufacturing that equipment, jobs around the Country in those manufacturing facilities, is quite significant. We believe that repealing that would have immeasurable impact on getting cleaner, more environmentally safe equipment out on the road quicker.

Senator CARDIN. Thank you for that answer. I appreciate it.

Thank you, Mr. Chairman.

Senator CARPER.

[Presiding.] Thank you, Senator Cardin. We are going to move down to Senator Merkley, and I will ask my questions a little bit later in the hearing. Senator Merkley?

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

I wanted to start, Mr. Cooper, related to your experience with low carbon fuel standards, particularly the Oregon Clean Fuels Program. As you look at Oregon's program, has it been a success?

Mr. COOPER. Yes, we think the Oregon program has been very successful.

Senator MERKLEY. Any particular insights or lessons we should take to mind, as other States consider similar?

Mr. COOPER. Yes, when we think about a low carbon fuel standard done right, we typically point to Oregon, because we think the life cycle analysis and modeling and methodology that they used for their program is more transparent, is more technology-neutral than what California is doing even. We think the Oregon program has been a great example and model for the rest of the Country to follow.

Senator MERKLEY. Thank you.

Mr. Graff, I want to turn to hydrogen, and specifically that that is made from fossil gas with carbon capture. The industry uses the term blue carbon or blue hydrogen, as you are familiar with. The first peer-reviewed study in 2021 found that using blue hydrogen, that is fossil hydrogen with carbon capture, was 20 percent more damaging in terms of greenhouse gas footprint than using fossil gas or coal directly for heating buildings, and that it was 60 percent worse than using diesel directly for heating buildings.

We have a lot of buildings heated by fossil gas and a lot that are heated by diesel. Do you agree with the studies that have shown that using fossil gas, even with carbon capture, and by the way, the assumption in this was 100 percent carbon capture, no leakage from a geological formation, doesn't make sense when it comes to trying to tackle greenhouse gas?

Mr. GRAFF. Senator, thank you for the question. I am not familiar with that exact study, and we can certainly take a look at that

and spend more time with you and your staff to talk about it. What I know is this: we have looked at the emissions reductions and the benefits of utilizing hydrogen. For example, it could be in the State of West Virginia, it could be on the Gulf Coast, to go ahead and produce large quantities, what I would call low carbon hydrogen. Sometimes, people get confused with the various colors, and I just like to call it what it is, low carbon hydrogen.

We are able to capture that. We are able to capture that CO₂ in those geographies. With large-scale production, like with autothermal reformers, technology that we have, we can decarbonize entire energy intensive industrial sites.

If you are going to produce hydrogen only with the need, for example, to burn it in a home, then you can certainly do this same thing in order to achieve that. However, when you are located with the local infrastructure, we can drive this in a very significant way for the industries that use it. By the way, if you utilize hydrogen in a fuel cell, it is a very, very different dynamic than a combustion engine. The benefits of that are very clear.

Senator MERKLEY. Mr. Chairman, the point I am wanting to drive here is, we often talk about with electric cars, it matters how the electricity is made. The parallel is that it makes a big difference how the hydrogen is made. The industry has given it the name, it sounds very nice, blue hydrogen. It sounds like the best of the best, but in fact, it is made from fossil gas, and this is the best version where carbon capture is complete. Even in that case, it is more damaging to the climate than is burning fossil gas directly for heating homes or than using diesel for heating homes by a 60 percent factor.

That is assuming that every bit of carbon capture is perfect, which is rarely that case that you can capture all of the carbon out of the emissions and that you can store it for eternity underground with perfect security.

So I think it is very important, the hydrogen conversation is going to be very relevant as we go forward. When it is made from electrolysis, that is, from renewable electricity being used to make it, it has a profoundly different footprint than when it is made from fracked methane gas.

I want to make sure, as we talk about hydrogen, that we realize that there are many different forms that have very different life cycle footprints. If we go down a route that actually makes things worse in terms of substituting hydrogen for heating buildings that is made from fossil gas. And then say that there is no carbon capture, then it is even worse than that. So this is the best case for fossil gas using. This is also true in terms of the production of electricity.

There is a much better case to be made that hydrogen for high-temperature applications in industry, making that hydrogen from a clean system, making it from renewable electricity. Then you have a really important application because you have hydrogen that works in settings where electricity doesn't work directly, but it is made from renewable electricity to begin with.

I just want to caution that not all hydrogen is the same, and not all hydrogen hubs would be the same. Hydrogen hubs that promote essentially making hydrogen from fossil gas have a very different

footprint than those hubs that would be depending upon a clean hydrogen. Thank you.

Senator CARPER. Thank you for your questions. Thanks for that cautionary note.

I am happy to have the opportunity, this is the first time I have been introduced to Senator Fetterman. He is from a State just north of us in Delaware. John, Delaware and Pennsylvania used to be the same State. Delaware, on June 15th, 1776, declared our independence from Great Britain, and we gave Pennsylvania their independence from Delaware. We still have a great relationship with your State.

We are delighted that you have joined us in the Senate, especially on this committee. Thanks so much. Welcome, Senator Fetterman. You are recognized.

Senator FETTERMAN. Thank you, Mr. Chairman.

Mr. Graff, I want to start with you. Many Pennsylvanians are employed in energy production industries. Transitioning to more clean energies is so important and ensuring metal class workers are not being left behind in the changing economy, is, I think, equally important. Are there any barriers, very specific kinds of special barriers, for workers in the fossil fuel sector to learn skills in renewable fuel production?

Mr. GRAFF. Senator, thank you for the question, to begin with. The evolution of hydrogen, both from a low carbon standpoint and a renewable standpoint, as I mentioned earlier, will actually create many value-added jobs in the economy. The estimate is by 2030 in the United States that the utilization of hydrogen, as projected to grow, would create about \$140 billion of additional revenue in the economy and create about 700,000 value-added jobs.

These are jobs that we are already beginning to build the work force through in many States today. We are in 50 States across the Country, and we are at a place where these jobs are readily available. The skills and the competencies and the capabilities are readily available. Where necessary, we will continue to go ahead and train the workers to be prepared to accept these jobs.

The real benefit here is that these facilities and the use of hydrogen create for a much cleaner environment, both in terms of not just in their use in the community, but also in the workplace.

Senator FETTERMAN. No additional questions.

Senator CARPER. We have been joined by Senator Lummis, who sent me the nicest note for my birthday last month. I saved it. I have it right here in my binder. I was going to read it aloud.

Senator LUMMIS. Well, I am not sure it is nice to tell people that in Latin the term "Senate" means council of old people, and then say "Happy Birthday." But that is, I think, what it said. Thank you.

Senator CARPER. We are only as old as we feel. I feel about 20, so let's go. You are recognized for as long as you want to be recognized.

Senator LUMMIS. Perfect. Thank you, Mr. Chairman.

Mr. Spear, welcome to the committee. I have concerns that creating a national Low Carbon Fuel Standard will only galvanize efforts to enact another anti-consumer regulatory scheme, such as

phasing out liquid fuels through electrification mandates or banning heavy duty diesel engines.

Do you share this concern, and are there examples of such efforts in the States that have already enacted their own low carbon fuel standards?

Mr. SPEAR. There are, thank you, Senator. As I mentioned previously, we had litigated in California and Oregon, largely because of the impact that it would have on our industry, particularly medium-sized companies with 20 trucks or fewer down to owner-operators. Those are folks that pay retail at the pump. They don't have fuel contracts.

So the impact that this has on inflating the cost of diesel in those States and then those areas is quite measurable. It is the second-largest cost strain under labor. This is a make-or-break issue in terms of keeping them out on the road moving freight. Those costs generally will be reflected in what consumers pay, your constituents.

It needs to be a gradual process that takes into account the fact that we are already facing 40-year highs in inflation. This is just an additive on top and reflected in the fuel prices, \$7 exceeding in California, nearly \$6.50 in Oregon. Those are the highest in the Country, so we definitely are going to defend our membership when that happens.

Senator LUMMIS. President Biden recently noted in his State of the Union Address that the U.S. would continue to need liquid fuels for at least the next 10 years. Is that a statement that you agree with?

Mr. SPEAR. I think it is going to be a little longer than 10, I really do. I believe we will get there, as I said in my opening remarks, I firmly believe that we will transition in time, but it has to be inclusive. The timeline has to be realistic. The targets have to be achievable for that to happen.

I think this mad rush to zero is going to be very impactful, not just in State economies, but the national economy. Something we are very mindful, I think if we pace ourselves and let the market work its will, we will get to zero.

Senator LUMMIS. I know people in Wyoming are concerned because electric vehicles are tested at sea level, which Wyoming is not, tested on flat ground, which Wyoming is not, tested at 60 to 70 degrees Fahrenheit, which Wyoming rarely is. In fact, today it is zero degrees again in Casper, Wyoming.

Those factors change the distance one can travel on a charge dramatically, and I don't think that that is well understood. Hopefully, we can bring some of those factors to light in the coming months.

Mr. Cooper, thank you for being here as well. As you know, the EPA issued what is called their "Set" rule, which, among other things, set RVO limits for the next 3 years, and proposed to create a pathway for electric vehicles' participation in the RFS.

I am concerned with how the EPA is proposing that auto OEMs generate eRINs. What is your level of concern with the eRINs proposal from EPA?

Mr. COOPER. Thank you for the question, Senator, and we share your concern with the way that EPA is proposing to allow electricity into the RFS program. We are not opposed to the inclusion

of electricity in the RFS, but it has to be done right. We share your concern that, in the case of these eRINs, the generator of those credits would be the automaker, like Tesla, and that is completely different, completely inconsistent with how RIN credit generation is done across any other fuel that is regulated under the RFS. That gives us some concern.

We are also concerned with the way that EPA would allow those automakers to benefit from what is called book-and-claim accounting, which is essentially, the automaker is going to sign a contract with a renewable electricity producer that could be thousands of miles away. When that electron enters the grid, the automaker gets to claim that carbon reduction benefit from that electron, whether it ever is used to fuel an electric vehicle or not.

So, we have some concerns with inconsistent application of that accounting practice.

Senator LUMMIS. I may have to spend a little more time with you, Mr. Cooper, to better understand that, but I appreciate your making me aware of that.

Mr. COOPER. I would be happy to.

Senator LUMMIS. Do you believe EPA's proposal aligns with congressional intent when it created the RFS nearly two decades ago?

Mr. COOPER. That is another concern we have. As we look at the statutory intent of the RFS program and our understanding of that intent, it was all about stimulating the production and use of renewable fuels, not necessarily about stimulating the production and use of certain vehicle technologies. So we think if you all in Congress had intended the program to drive certain vehicle technologies, you would have been more explicit about that.

Senator LUMMIS. Is it appropriate for EPA to combine their eRINs rulemaking with 2023 through 2025 RVOs?

Mr. COOPER. We have asked in the comments we just submitted to EPA last week that they sever that portion of the proposal, or that portion of the rulemaking, from the actual volume requirements. We think EPA should move ahead with finalizing those volume requirements. But it sounds like they need more time to really figure out this eRIN proposal and to make sure they are getting it right. We would prefer to see EPA separate those two parts of the proposal from one another.

Senator LUMMIS. Mr. Chairman, I want to thank all of our witnesses for being here today. Thank you for helping educate and inform the committee. I yield back.

Senator CARPER. I want to thank you for being here and joining us in a good learning exercise.

We are privileged that the Governor of our State is very active in the National Governor's Association. We have something in the National Governor's Association called the Center for Best Practices. They still have it, yes. It was an opportunity to for Governors to share with other Governors, other States, what was working in their respective States. I loved being part of all of that.

I believe you bring the same kind of thinking to this job as we did in those days, as well. Thank you so much for joining us today for your questions.

I want to ask unanimous consent to enter into the record the testimony of Oregon's Clean Fuels manager, whose name, believe it or not, is Wind. How about that? Cory Ann Wind.
[The referenced information follows:]



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**Testimony before the U.S. Senate Committee
 on Environment and Public Works**

**“The Environmental Protection Agency’s Renewable Fuel
 Standard Program: Challenges and Opportunities”**

Cory-Ann Wind, Oregon Clean Fuels Program Manager

Oregon Department of Environmental Quality

February 16, 2022

The Clean Fuels Program is one of Oregon’s most successful statewide policies for addressing the state’s contribution to global climate change. The program began in 2016 and thus far, the program’s success and progress can be summarized in three distinct outcomes:

First, companies that are producing biofuels are making those fuels more cleanly and delivering them in greater volumes to Oregon. The carbon intensity of the ethanol and biodiesel Oregon uses has decreased, and we’ve seen significant increases in the blending of biodiesel and renewable diesel in recent years. Renewable forms of diesel, natural gas, propane, and electricity have all entered the Oregon market since the beginning of the program and have emerged as commercially viable and cost-effective replacements of their fossil versions. Electricity will become increasingly important as new regulations and incentives for vehicles and infrastructure are implemented. All of these fuels have played an important role in reducing about 6 million tons of lifecycle greenhouse gas emissions so far and displacing over 1 billion gallons of fossil fuels.

Second, the transition from fossil fuels to biofuels and electricity is reducing tailpipe pollution and improving the public health of Oregonians. In addition to reducing greenhouse gases, low-carbon fuels also emit less carbon monoxide, nitrogen oxides, and particulate matter compared to fossil fuels. Reducing these pollutants has saved Oregonians millions of dollars in avoided health costs over the years. This is especially important for Oregon’s historically overburdened communities that are located near major transportation corridors, multimodal facilities, and distribution hubs.

And third, the program has spurred innovation and investments without impacting the price at the pump. The program has fostered a \$100-million-plus-a-year market where investments are being made

to increase the production of lower-carbon fuels, spark new innovations in technology, and invest in infrastructure to deliver these fuels across the state. These investments have allowed the transition from fossil products to cleaner fuels to happen without any significant rise in retail or wholesale fuel prices when compared to our neighboring states; even those that have not had similar fuel regulations. In fact, the program has lowered the cost of many low-carbon fuels and has created a powerful financial incentive to decarbonize the transportation sector.

The Clean Fuels Program that we have created here in Oregon takes the best parts of the federal renewable fuel standard and combines it with the best parts of a low carbon fuel standard. The renewable fuel standard creates the base demand for biofuels that are needed to begin the transition towards lower-carbon fuels and the low carbon fuel standard ensures that the lowest of the low-carbon fuels comes to Oregon. Participants can stack the value of credits from the renewable fuel standard with the credits from the low carbon fuel standard as both are needed to provide the necessary incentives to fuel providers to continue to lower their carbon intensities. The market also benefits from the long-term regulatory certainty from low carbon fuel standard programs that have targets established through 2030, and Oregon is currently in a rulemaking that will establish standards through 2035.

But we have not done this alone. Oregon has benefitted greatly from being a signatory to the Pacific Coast Collaborative. Since 2013, British Columbia, Washington, Oregon, and California have worked together to harmonize best practices for policy alignment, program design, and implementation to create the largest market for cleaner, lower-carbon fuels. And this collaboration has grown to other states that are also looking for smart strategies to reduce transportation emissions – ones that can build on strong federal support of the agriculture and biofuels industry, zero emission vehicle standards, and investments in electric vehicle charging and alternative vehicle fueling infrastructure.

Senator CARPER. Before the U.S. Senate Committee on Environment and Public Work, here is what she testified: that “Oregon’s Clean Fuels Program has spurred innovation and kept consumer costs low,” and the article that I referred to earlier actually spends some time elaborating on that. Good.

We have been joined by Senator Alex Padilla from California. Again, he comes from a State where I used to live, where I was a Naval flight officer. We always like to think of States as laboratories of democracy. California just happens to be a pretty big laboratory.

Thanks so much for joining us. I am delighted that you are in this hearing and this committee and that you could come with us and join us today. Thanks so much.

Senator PADILLA. Thank you, Mr. Chairman. I am proud to represent not only a great laboratory of democracy, but the most populous and diverse State in the Nation, the largest electric of any State in the Nation, and the fourth largest economy in the world.

With that being said, let me brag a little bit about California’s Low Carbon Fuel Standard. It is helping to advance a wide range of clean fuels while at the same time, keeping consumer costs low and fostering clean fuel investments.

California continues to grow its economy and reduce its emissions. The program’s tech-neutral approach, greater long-term predictability, and cost containment mechanisms have provided certainty and flexibility. I know prior to my opportunity to ask questions, there was a lot of California-specific comments and questions by my colleagues in the committee.

This program has been so successful that other jurisdictions are joining California, which is evident in the Pacific Coast Collaborative, a regional agreement between the States of California, Oregon, Washington, and British Columbia to strategically align policies to reduce greenhouse gas emissions and promote clean energy.

My first question is for Mr. Graff. You talk about certainty, flexibility, and technological neutrality as essential ingredients to any low carbon fuel program. Can you expand on how California’s Low Carbon Fuel Standard provides a certainty and flexibility to industry?

Mr. GRAFF. Senator, thank you for the question. There is no question that California’s LCFS program drove the introduction of zero-emission vehicles and the recognition that, in order to go ahead and fuel those vehicles, it recognized that the real point was carbon intensity and it was agnostic in terms of the pathways for the technologies to get there.

For Air Liquide, we have a long history. It is core in our culture to be sustainable in our approach. We see our commitment to our climate goals, the world’s climate goals, as well as the energy transition with hydrogen as a core component of delivering that.

For us, the ability to go ahead and leverage the ability to work with the automakers, to provide the renewable hydrogen for the nascent development of hydrogen fuel cell vehicles was paramount in our decision to invest the \$250 million liquid hydrogen plant in Nevada to meet those needs.

What is important is that in that plant, we utilize both renewable power and we use biogas, the attributes of biogas, in order to

produce that renewable hydrogen. As a result, we are leveraging many technologies in order to go ahead and meet the needs.

Senator PADILLA. If I heard you correctly, California's program was paramount in your decision, not just whether or not to make the investment, but where to invest in clean hydrogen production, is that correct?

Mr. GRAFF. It clearly enabled the introduction of the zero-emission vehicles. We needed to demonstrate what that could mean, not just for the State of California, but for the Country, and the world, we wanted to find that opportunity to demonstrate what could happen, and we wanted to locate those things logistically as close to the market as possible. It is good to minimize logistics. It also creates value-creating jobs in those communities in which you are going to use that product.

Senator PADILLA. Thank you.

Followup question for Mr. Cooper. Could you elaborate on the RFA's pledge to achieve a net-zero carbon footprint by 2050 and talk about how low carbon fuel standards, not just in California, let us add Oregon to the conversation, may have contributed to innovation in the biofuels sector?

Mr. COOPER. Absolutely, and thank you for the question, Senator.

I did mention our pledge, our members' pledge to achieve net-zero emissions by 2050 or sooner in my opening remarks. This is a pledge and a commitment that our membership is taking very seriously. They are already taking steps and making investments to reach that goal.

Today, ethanol already reduces greenhouse gas emissions by about 50 percent compared to gasoline, so we are halfway there. But with the adoption of technologies like Carbon Capture and Sequestration, with the adoption of lower carbon farming practices upstream of our facilities, replacing fossil natural gas with renewable natural gas at our facilities, all of those practices and technologies will continue to drive the carbon intensity lower for corn ethanol. We absolutely think we can get there by 2050 or sooner.

A lot of those investments are happening today, and they are being driven by the California LCFS, they are being driven by the Oregon program. Again, our member producers that serve those markets, their top priority is doing everything they can to reduce the CI, the carbon intensity, of those fuels.

So they are making investments. That was the purpose of the program. It is why we think a similar program at the national level would be a great way to rapidly reduce emissions from the transportation sector.

Senator PADILLA. Thank you both.

My time is up, Mr. Chair. Let me just end with this. Imagine that: public policy, private investment. Thank you, Mr. Chairman.

Senator CARPER. That is a good note to emphasize.

We have been joined by our new colleague from Oklahoma. Senator Mullin, we are delighted to see you today.

I just want to mention before I turn to you for your questions, this committee has a remarkable tradition for actually working together and working across the aisle to find common ground that you wouldn't really expect. I worked with John Barrasso for a num-

ber of years on something to reduce emissions of refrigerants from air conditioners and freezers and so forth that actually led to the ratification of the Kigali Treaty and phased down hydrofluoric carbons over the next 15 years. John Barrasso and I worked together on that for a long time.

Before that, Barbara Boxer was our Senior Democrat on this committee. Your predecessor, Jim Inhofe, was our Senior Republican. You could not ask for two more polar different Senators, and they somehow managed to find common ground on any number of issues, to our amazement, including transportation policy, but other stuff, as well. Jim and I were cosponsors of the Diesel Emissions Reduction Act for any number of years.

That is something we are proud of on this committee. It is a wonderful tradition. We hope that we can continue to take advantage of it with your presence. Welcome aboard. We are delighted to hear from you. Thanks for joining us.

Senator MULLIN. Thank you so much. I look forward to that; I look forward to getting to know everybody and finding those places we can work and use good common sense.

I would have loved to have been involved in the conversations with refrigerants, considering I have owned several HVAC companies, and I have a pretty strong opinion on the direction, just because from practical use, right?

I appreciate that. It is an honor to be on the committee. Sorry about sliding in here late. I am still trying to find where the committees are.

[Laughter.]

Senator CARPER. You are right on time, and the restroom is right outside the door, sir.

Senator MULLIN. I figured that one out. I was in the Armed Services Committee, and since I am on the back side of that panel, it took a while to get there.

I would like to visit a little bit with Mr. Spear. California, obviously, they proposed replacing the diesel trucks with battery electric vehicles and trucks on the road for the air source, obviously, board. What has this meant for the prices of vehicles?

Mr. SPEAR. It is putting immense pressure on the sale of new vehicles, but also used trucks, significant costs in making equipment newer, safer, more environmentally friendly equipment, less available as a result. They are just out of reach.

Senator MULLIN. As a guy who has a CDL in my back pocket, I own multiple semis, we have had fleets of vehicles out there. I have driven in California, and the traffic is pretty bad.

If you put these diesel trucks, which are already heavy and take up a lot of room, and then you make them all electric, has anybody done a study on how many more trucks that is going to add to the road? We have weight issues already, right?

We kind of have two options here. Either we increase the weight of these vehicles so that they can move, which could drastically affect safety, or we are going to have to literally put three-to-one on the road just to be able to move the same product we are moving now.

Has anybody done a study on that, and what congestion that is going to cause, and honestly, how much bigger of a carbon footprint that is going to put on California?

Mr. SPEAR. Yes, the American Transportation Research Institute has done some pretty significant recent studies on this subject and the impact that it is going to have. Looking logically at the availability of minerals to create those batteries, these are 5,000-pound batteries or more going into these trucks. The amount of lithium, graphite, cobalt, that has to go into these batteries to process that is not readily available.

We are not sourcing that here in the U.S., and it is not going to come from China. It is going to come from Congo. That needs to be decided in terms of availability of the equipment. Beyond that, the infrastructure to charge it is not in place, and then the amount of electricity needed to charge it.

ATRI did this study, and they are showing that to charge all trucks and cars currently on the road would be 40 percent of current capacity. Think about that. Where is the power going to come from, especially in California, where there are already rolling blackouts? This is a question that we believe has to be answered before you move forward with such an aggressive timeline that is also, by the way, not just confined to California. It is going to set the national standard for the entire Country if the EPA doesn't step in.

We need a national framework. We are interState commerce. You have driven across the Country in a truck. You understand that.

Senator MULLIN. It occurs to your point, just for the reference of those that are listening, the average house has a 200-amp service that goes to every house. To charge two vehicles overnight, these aren't semis, and we are talking about infrastructure here, just to charge, the average household has two vehicles, to charge those vehicles overnight, you would be required to take a 200-amp service house to a 400 amp service house.

As someone that owned a fleet of 300-plus vehicles on the road every day, I can't imagine how much power it would cost me at night to charge all those trucks. This is something that is short-sighted when we start talking about California's proposals.

I understand what they are trying to get to, but are we thinking long-range? Are we actually paying attention to the safety, the effects on the grid? Last time I checked, they still have rolling blackouts without going all-electric. Where is that infrastructure going to come from?

Sir, as you say, we work together. This is a point that we need to have a deep discussion on, because when we start talking about renewable fuels versus fossil fuels, there seems to be somewhat of a divide, but we need to be realistic to our approach.

I am glad that you started your introduction to the committee for me in this, because I want to be part of a solution, not of a problem. The Choctaws, who have a privilege to represent the Choctaw Nation, and I am Cherokee and proud to be Cherokee, Chief Batton, he says that when we think of decisions, we think generational, not today, but we think generational. In this effect, we need to be thinking about, the effect today and generational, what our long-term goals are.

I look forward to working on the committee. Thank you for being here. With that, I yield back.

Senator CARPER. Thanks again, and welcome to our committee.

Before you arrived here, I just want to mention this again. I mentioned that I was born in West Virginia, in a coal mining town. That is where my sister and I were born. That is where I grew up until we moved to Virginia, and then off into the world.

I have always focused on job creation and job preservation as Governor, and even before that. I worked in the division of economic development. I always focused on job creation and job preservation. I continue to do that. I always look at adversity and find opportunity.

There is plenty of adversity in our Country and our planet. Where is the opportunity for doing something about it? My mom raised my sister and me in Grace Gospel Baptist Church. She dragged us there every Sunday morning, every Sunday night, every Wednesday night, and most Thursday nights. Then we would go home and watch Billy Graham on TV. She wanted to make sure we understood.

Senator MULLIN. Wait, you all had a TV?

[Laughter.]

Senator CARPER. It was a little tiny one. We had three channels.

She wanted to make sure we understood the difference between right and wrong. She really wanted to make sure we internalized the Golden Rule, treat other people the way we want to be treated. I mentioned earlier, my State of Delaware is the lowest-lying State in America. Our State is sinking. The seas around us are rising.

If Bill Cassidy and John Neely Kennedy were here today, they would tell you, in every 100 minutes in Louisiana, they lose a piece of land the size of a football field to the ocean. The folks at NOAA told us last year that sea level rise isn't just a problem today. It is going to get worse before it gets better.

That is sort of the environment in which we are operating here. We somehow have to find consensus to address these problems and concerns in a way that is fair, but also in a way that strengthens our economy rather than diminishes it.

Delaware used to be the State that built more cars, trucks, vans per capita than any State in America. We had a Chrysler plant with 4,000 employees, we had a GM plant with 4,000 employees. I worked for years to keep those plants alive. We lost them both in the Great Recession, which was just a body blow to a little State with less than a million people.

I would just say that when Chrysler decided to close their plant, I remember being there the day they literally tore down the plant and leveled it to the ground. I nearly cried. But we have on a site that used to have 4,000 employees, we have 4,000 people go to work every day in the science and technology campus that is affiliated with the University of Delaware. In adversity, lies opportunity. We just have to be smart enough to figure out how to get there. The way we do it on this committee is just being honest with each other, working with each other, thinking outside the box, looking to see what works, and trying to do more of that.

I remember going to the Detroit Auto Show. We used to go every year to the Detroit Auto Show. I remember 1 year, being there, and

they have the stands, and every auto producer has a stand. GM has a stand. Ford has a stand. Some stands are bigger than others. They have all kinds of different models and trucks and so forth, and vehicles. One year, I remember meeting a woman named Mary Barra, who is pretty famous now. She is the Chairman of GM and chairs the Business Roundtable.

It was the year that the Chevy Volt was selected as the car of the year. It is a hybrid. The Volt that year got 38 miles on a charge. The vehicle I drive now, mentioned earlier, my 2001 Chrysler Town and Country Minivan, which I sold for \$1 last year with 600,000 miles on it, but it has been replaced by an EV that gets 300 miles on a charge.

The numbers are actually getting better. Ten years ago is when the Chevrolet Volt won car of the year at the Detroit Auto Show. I remember walking around and visiting one of the stands. I don't know if it was Toyota, or who it was, but they had a vehicle, it looked like a framework with two-by-fours framed into a garage. They had a vehicle sitting in the garage, and next to it was a frame for a house.

I said to the people from the company that had that vehicle, "What is this?" They said, "This is a car that is sitting in a garage and has the ability not only to use hydrogen fuel cells, but to provide electricity to the vehicle, provide electricity for the house, cool the house in summer, warm the house in winter. This is where we are going to go in the future." Ten years later, that is a reality.

There is a lot we can do here, and a lot of ways to create jobs. I am all about jobs. I think the best thing we could do is, I used to say in my speeches, I would talk about the least of these in our society, and I would say, give a person a fish, you feed them for a day. If you teach a person to fish, they can feed themselves for a lifetime.

I used to say that was in the Bible. One day, I would say that in a speech, and there was a minister there. He said to me after my speech, "That is not in the Bible." Well, I say it should be.

[Laughter.]

Senator LUMMIS. Mr. Chairman, may I remark on your comments? One of the things during the State of the Union Address when President Biden mentioned this one-decade goal, I thought about how, without permitting reform, we don't stand a chance, because one of the largest wind energy facilities in the Country has been developed in Wyoming by Philip Anschutz. It took him over 10 years just to acquire the transmission line right of way, and there is additional permitting that needs to be done there.

Even for people who desire to move to electric vehicles that can power houses out of the garage if there is no electricity available, it is because of the permitting burdens that come with building transmission lines, it is just an unachievable goal. I think that, even for people who aspire to President Biden's goal, that that should become a priority. Thank you.

Senator CARPER. I agree. President Biden, we ended up voting on permitting reform, as you will recall, at the end of last year. We ended up not passing it on the 47th vote. The President worked very hard to try to get it adopted.

I expect the Administration will come back and say, let's try it again, give it another try. He likes to say, as you may recall in his State of the Union Address, he kept going back to the phrase, let us finish the job we have begun.

It is all well and good that we have a lot of promising ways to create electricity without worsening our carbon situation here in this Country, but if we create all this clean energy over here in our Country, and over here we have a lot of people who need that energy, we have to figure out how to get it there.

Your point is well taken. I think this is an area where we can find consensus and should work hard to do that. I know Senator Capito has offered legislation on this front. I am hopeful that we can all be part of getting to that consensus. Thank you.

I have a couple more questions. Do either of you want to ask another question, is there anything else? OK.

This is a question for Mr. Graff and Mr. Cooper. As a recovering Governor, I often look to States for policies that work. I have mentioned this before.

Today, there are States that have implemented or are in the process of considering technology-neutral low carbon fuel standards that provide greater flexibility and certainty than the Renewable Fuel Standard. For example, as we heard last year from, again, Ms. Cory Ann Wind, that is a great name, Oregon's Clean Fuels Program manager, Oregon has successfully advanced cleaner fuel usage, kept consumer costs low, and helped to foster local job creation.

Oregon is tracking consumer fuel costs as a requirement of the program, and Oregon has lower fuel prices than surrounding States, such as Idaho, which does not have a clean fuels program.

A question, if I can, for Mr. Graff, and also, Mr. Cooper, for you. What are the most important principle of lessons learned from State programs that should guide development of a national Clean Fuels Program, and how are these State programs protecting the interests of consumers? Mr. Graff, would you go first?

Mr. GRAFF. Mr. Chairman, thanks for the question. As I said in my opening remarks, I think that any program in itself, first of all, needs to have clear certainty. That is to say, if, in fact, we are going to make major investments as a Country or as a business into the infrastructure, into the production capability, to provide for renewable fuels, for low carbon fuels, we need to have certainty as to the future. When we invest, we invest for the long-term. These facilities will be in operation for 15, 20, 40, 50 years.

The second thing is flexibility, that is the ability to choose the right solution for that ecosystem. If you have abundant wind power, solar power, hydropower, for example, you can produce hydrogen with electrolysis using water. If you have an abundant supply of natural gas and the capability to store carbon in sub-surface geological structures like you do in West Virginia or on the Gulf Coast, then you can utilize hydrogen with carbon capture in order to produce that hydrogen.

By the way, the byproduct natural gas liquids you produce are critical and necessary to the local economy to preserve the jobs and grow the jobs in the chemical industry. That is critical in terms of the versatility and the flexibility of what you need to have.

Then the final piece is around technology. We don't want to pick or choose specifically what technology to apply in a rule or a law. We want to give the companies, we want to give the ability to go ahead and pick and choose what makes the most sense, whether it is renewable power, whether it is biogas, whether it is hydrogen with carbon capture, whatever the case may be, and to build that at the appropriate scale to meet the needs of the local economy.

Senator CARPER. Good, thank you. Geoff?

Mr. COOPER. Thank you, Senator. I think my list would be pretty similar to what we heard from Mr. Graff.

Senator CARPER. Repetition is a good thing. Feel free to repeat.

Mr. COOPER. I won't repeat, but I will say setting clear and predictable carbon intensity reduction requirements is very important, and then sticking to them, not backtracking or changing them retroactively.

Second, life cycle analysis is critically important under a program like this. Those carbon intensity values for each fuel pathway, that really is the engine that drives the program. Having a consistent, transparent, science-based life cycle methodology is critical to the whole thing. Again, that is why we think the Department of Energy's GREET model is a great example for that type of methodology.

Senator CARPER. OK, thanks. I am going to pick on Mr. Graff again for a minute here. It is a question dealing with energy security. The recent price spikes in petroleum, particularly following Russia's invasion of Ukraine, all those prices at the pump, as I have seen witnessed as recently as this morning in my neighborhood, they demonstrate that global markets continue to drive fuel prices. The volatile global oil market creates economic uncertainty, puts pressure on American families and businesses that no amount of domestic drilling can prevent.

I believe the solution to high oil prices and dependence on foreign oil is to reduce demand for oil and transition away from oil over time while giving consumers more choices to fuel our cars, our trucks, and our vans. Fortunately, clean hydrogen is an example of a low carbon fuel that can be produced domestically from renewable fuel resources like wind, like solar, like biomass.

My question is, how can the use of hydrogen in low carbon transportation fuels help strengthen our national energy security? I am going to repeat that. How can the use of hydrogen and low carbon transportation fuels help to strengthen our national energy security?

Mr. GRAFF. Thanks for the question, Mr. Chairman. As you pointed out, the world's energy needs only continue to grow. The inherent risks of various energy supplies continue to evolve. I think we should see everything we have today as additive, with the idea that hydrogen and its long-term growth and potential will help fill both a necessary void and provide the growth in low carbon and renewable sources of energy that we need for the future.

The application, again, of hydrogen, and the use of hydrogen, again, is very versatile because it provides the capability in an industrial setting to decarbonize and provide the needs for energy intensive industry. We are already beginning to demonstrate that with some of our projects we are building around the world, but it also provides the flexibility and the capability to decarbonize the

transportation sector and provide the additional fueling needs we need for that infrastructure.

We already had a conversation about personal vehicles, the introduction of those vehicles, and how it is used. As you scale those vehicles into commercial vehicles or a Class A tractor trailer, the utilization of hydrogen is a primary and a core vector that will allow us to decarbonize heavy transportation, and in its use, it has basically this—

Senator CARPER. Did you say carbonize heavy, or decarbonize?

Mr. GRAFF. Decarbonize.

Senator CARPER. Thank you.

Mr. GRAFF. As we look to go ahead and think about its utilization, which is similar to everything we have today. If you utilize hydrogen in any of these vehicles, regardless of their size, you have the same range of drivability. You have the same utilization. That is to say, in refueling, it is the same experience you have today. You don't have to wait hours to recharge. It is the same experience you have today. If you were to still have your minivan, and you had to fill it with fuel, it would be the same experience in refueling a hydrogen fuel cell vehicle.

Senator CARPER. Don't let my wife hear you say that.

[Laughter.]

Mr. GRAFF. The inherent drivability, regardless of temperature, is paramount. It doesn't matter where you are. We had a conversation on this earlier. Temperature is not an issue for a hydrogen fuel cell vehicle and its performance.

At the end of the day, the inherent weight and the size of the array necessary for just the fuel cells and a full charge of hydrogen is comparable to what we have today. It doesn't require additional weight; it doesn't require additional size from an array standpoint, so you can maintain the same type of payload you have today.

I think all this is additive, substitutive, and we are able to go ahead and demonstrate its versatility in almost every sector, including if you wanted to back up power and back up the grid.

Senator CARPER. OK. Just a quick followup, if I could, Mr. Graff. I mentioned earlier, you may recall, Consumer Reports say they support the Clean Fuel Standard because it can, this is their quote from Consumer Reports, "help alleviate high gas prices by providing more fuel options for consumers that are not tied directly to fluctuating oil prices."

Mr. Graff, do you agree with Consumer Reports on this point? Could a technology-neutral clean fuel standard actually lead to lower costs for consumers?

Mr. GRAFF. I think any time you have a market-based, flexible program that allows you to utilize any technology, as long as it meets the requirements, will create the lowest cost solution to the consumer. At the end of the day, the consumer wants power to be or fuel to be available. It wants it to be as low cost as possible, and clearly, they want it to be cleaner.

I think that the affordability, the availability, and the ability to go ahead and provide cleaner fuels is paramount as we think about where we are going to go and the world around us.

Senator CARPER. Good, thanks.

I have a question for the entire panel. Before I do, I want to just take a couple minutes and give Chris Spear a chance to comment, especially, if you would, Chris, on the potential for hydrogen with respect to large vehicles, trucks, vans, and semis, buses.

My hope is that there is a future there that would involve hydrogen, the cleaner the better. But are we barking up the wrong tree, or is there something to this?

Mr. SPEAR. No, not at all. I think we have a tremendous amount of innovation that is occurring within our industry, and a lot of that is domestic innovation. Our trucks are largely manufactured here in the United States, even foreign flight carriers, so it is a very exciting space.

I appreciate Michael's comments across the board. We too, are tech neutral. Our industry will gravitate to different types of energy sources, fuel sources, that fit their business model.

I mentioned drayage. Starting in the ports where the equipment is confined, electrifying there makes a lot of sense. Don't do it too fast. A lot of that equipment is old, and a lot of the people servicing those boxes are 20 trucks or less operations. So if you go too quickly, the cost of an electric truck or even now hydrogen trucks as they come online are much, much higher in price.

You have to let parity work its course. That is why I keep coming back to the timeline. My comments about California and Oregon are not rhetorical. They are factual. If you have a timeline and a target that is that aggressive, and in an economy that size, fourth largest economy in the world, we service that.

If you want us to keep servicing that and providing those goods to consumers, your constituents, you have to build in time to do it. Those wins that we have had with the EPA took 40 years to get 98.5 percent of the tailpipe emissions out, and we are committed to the remaining 1.5 percent. Moving to electric, moving to hydrogen, these are emerging technologies that will take time, but they are very exciting.

Senator Lummis was talking about Wyoming. I am from Wyoming, Geoff is from Wyoming. It is a very different climate. It is going to have different conditions, different applications. Hydrogen has tremendous potential for longer haul, not affected by cold or heat. It is a very, very exciting technology for us, beyond electric.

We will get there, as I said in my opening remarks. It is just going to take a little bit more time than some States are providing.

Senator CARPER. OK, thank you for that.

The last question is for the entire panel. I want to start off with Geoff Cooper. Geoff, here is the question. First, I do appreciate the perspectives that all of you, this entire panel, have shared with us today. I hope that the dialog can help further inform thoughtful action to support the development of national clean fuels policy that will reduce emissions from our transportation sector and help further grow our economy at the same time.

That said, I also recognize the challenges in developing a new program that satisfies everyone will need compromise and collaboration as we go along that road.

My question is, would you take a moment and share with us where you believe there is common ground amongst you as a panel? I am always looking for common ground. Where would the

common ground lie here on this panel? I think I have heard it, but I want you to sort of close with that thought in mind. Go ahead.

Mr. COOPER. Thank you, Mr. Chairman, and again, thank you for the opportunity to testify today. I think this has been a wonderful conversation and very enlightening.

I do think I have heard lots of common ground amongst the three of us today around the need to continue innovating and continue looking at and investing in technologies that reduce carbon emissions, that reduce dependence on petroleum and imports in particular, and that continue to stimulate investment and innovation and new technologies.

I think that is one area where we are all in agreement. I think a clean fuel standard, again, if properly structured, would do that.

Senator CARPER. Good, thank you. Mr. Spear?

Mr. SPEAR. Yes, Mr. Chairman. You and I have had conversations on this, other members of this committee and staff.

We are all in on this. We start with yes. I think we have demonstrated that over the last 40 years with the EPA. We need to collaborate, public and private, setting standards that are achievable, so the timelines and the targets do matter.

What I hear that is common amongst this panel is tech neutrality and market driven. To do that, you have to be inclusive. You have to be transparent. Our industry serves 72.5 percent of the domestic freight in this Country, so there is really nothing that we eat, drink, or wear that did not, at some point, touch a truck and 3.8 million drivers out there making it happen.

It is a very proud industry. It is a hard-working industry. It is one that we need to keep around as an economy. Going at the right pace and hitting the right targets, we will get there. I am convinced of that, and working with our partners at this table, we are committed to doing that, and we will help this committee achieve those goals.

Senator CARPER. Great, thank you so much.

Mr. Graff, closing thought, please.

Mr. GRAFF. Thank you, Mr. Chairman, and thanks to the rest of the panel for their thoughts today, as well.

I fully agree with the other panelists. I think there is very common agreement, first of all, on the need for clarity, for certainty, for flexibility, and for the ability to innovate on various technologies in order to meet the end use consumer's needs and in order to meet the Country's needs.

I think all of us here and in the organizations or companies we represent are clearly committed to the long-term prominence of the U.S., whether that is in innovation, which has been core to the U.S. since its founding, and the benefits that brings, whether it is to go ahead and recognize that the U.S. is clearly, from an energy standpoint, the world leader of production, and from the standpoint of the future, the willingness to innovate to demonstrate we are not only the energy leader today, but we will be the clean energy leader in the world in the future, as well.

But most importantly, to make sure that in everything we do, whether that is meeting the economic needs of the Country, meeting the economic needs of the various representatives here and the businesses we represent, is to give back to the community, to make

sure we keep our own employees, but more importantly, communities in mind to what we do, and that we are able to go ahead and give back in those communities, we are able to create jobs in those communities and clearly maintain those jobs and grow the value-added jobs that we can create in the world around us.

If we continue to manage all that in balance, if we continue to go ahead and drive that in the right way, we will continue to propel the U.S. as we all know it.

Senator CARPER. Great thoughts. Thank you. We are indebted to each of you; thank you for spending this time and sharing your ideas with us and helping to further cultivate an atmosphere to find consensus on an incredibly important issue.

I am going to make a couple of unanimous consent requests before we let you escape. I would ask unanimous consent to enter into the record announcements from Volvo, from Tesla, and from Nikola about their plans to roll out electric big rigs with 355-mile range. Let me say that again. I want to make sure I got that right. They plan, these three manufacturers, to roll out electric large rigs with 355-mile range, which is quite a bit.

Volvo is looking to have half of their truck sales to electric by 2030, proving electric heavy-duty vehicle technology is advancing quickly.

I would ask unanimous consent to enter into the record announcements from those companies.

[The referenced information follows:]



Volvo leads the booming market for electric trucks

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Volvo leads the booming market for electric trucks

2023-02-23

Last year, the number of heavy electric trucks on the roads in Europe and the United States grew faster than ever before. Volvo Trucks have now sold more than 4 300 electric trucks globally in more than 38 countries. In Europe, Volvo Trucks is the market leader with a 32% share of the market for heavy electric trucks, and in North America, nearly half of all heavy electric trucks registered in 2022 were Volvo trucks.



2/23/23, 9:43 AM

Volvo Trucks have sold 4,000 electric trucks globally.



Volvo Trucks has sold more than 4300 electric trucks in more than 38 countries around the world.

In 2022 the market for heavy (≥ 16 tonnes) electric trucks in Europe, grew by 200% to 1,041 trucks, and Volvo Trucks holds the highest share of this market.

"We are determined to lead the electric truck transformation and our market leading position in 2022, not only in Europe, but also in North America and other markets, is proof that we are doing just that. Although, the market for electric trucks is still small, but the trend is clear: many of our customers are now starting their own shift to electric. We intend to be the catalyst for this transition and aim for 50% of our global sales of new trucks to be electric in 2030," says Roger Alm, President of Volvo Trucks.

Since Volvo Trucks started production of fully electric trucks in 2019, the company has sold more than 4 300 electric trucks in more than 38 countries around the world. Volvo currently offers the industry's broadest product line-up with six products in series production, catering to a very wide variety of transports in and between cities.

"We now have a product portfolio that can cover most types of transportation for all kinds of customers. Looking at the goods flow patterns, it's possible to electrify nearly half of all transports with our line-up of electric trucks," comments Roger Alm. "We see it as our mission to support our customers in making that happen.

Note that:

All references to "Europe" mean the European Union including Norway and Switzerland.

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<https://www.volvotrucks.com/en-en/news-stories/press-releases/2023/feb/volvo-leads-the-booming-market-for-electric-trucks.html>

2/23/23, 9:43 AM

Volvo Trucks have sold 4,000 electric trucks globally.

- The Volvo market share and overall growth data referenced for heavy (≥ 16 tonnes) electric trucks Europe includes content supplied by IHS Markit.
- North America means USA and Canada. The Volvo Trucks market share position for North America is based on intelligence supplied by Volvo Trucks North America.
- The statement; "it's possible to electrify nearly half of all transports"; refers to Eurostat statistics "Road Freight Transport by distance" showing that close to half of all goods transported on road in Europe travelled a distance of less than 300 km.

[LINK](#) to high resolution images



For further information, please contact:

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 Email: jan.strandhede@volvo.com

Volvo Trucks supplies complete transport solutions for discerning professional customers with its full range of medium- and heavy-duty trucks. Customer support is provided via a global network of dealers with 2,300 service points in about 130 countries. Volvo trucks are assembled in 12 countries across the globe. In 2022 approximately 145,000 Volvo trucks were delivered worldwide. Volvo Trucks is part of the Volvo Group, one of the world's leading manufacturers of trucks, buses, construction equipment and marine and industrial engines. The group also provides complete

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Tesla delivers its first electric Semi trucks promising 500 miles of range

By Peter Valdes-Dapena, CNN Business

Published 10:05 PM EST, Thu December 1, 2022


AudioLive TV



A view of the Tesla Semi electric truck during its live-streamed unveiling in Nevada, U.S. December 1, 2022, in this still image taken from video.

(CNN Business) — Tesla made the first deliveries of its Semi truck to customers Thursday evening, five years after the heavy-duty hauler was first unveiled. The event included two truck cabs decked out in the livery of Pepsi and Frito-Lay, PepsiCo's snack foods subsidiary.

The Tesla Semi was first shown as a prototype in 2017. At the time, Tesla CEO Elon Musk said production would begin in <https://www.cnn.com/2022/12/01/business/tesla-semi-pepsi/index.html>

3/1/23, 2:07 PM

Tesla delivers its first electric Semi trucks promising 500 miles of range | CNN Business

2019. But Musk didn't say during Thursday night's presentation at Tesla's factory in Sparks, Nevada, how many trucks were actually being delivered to PepsiCo, or how many were being produced, or at what rate.

The fully electric semi truck features an unusual design in which the driver sits in the center of the cab rather than on one side. Tesla has boasted of the truck's performance — saying it accelerates much more quickly, even with a full load, than traditional diesel-powered semi trucks. A video during the presentation showed, according to Tesla, a fully loaded Tesla Semi accelerating up a steep grade and passing other trucks.

Since it has no multi-gear transmission, as diesel trucks do, it's also much easier to drive than other semi trucks, Musk said. The truck can drive 500 miles on a single charge, according to Tesla. It has three electric motors, one of which drives the truck most of the time while the other two are used mostly for acceleration and hard pulling. The truck can pull up to 82,000 pounds, Tesla claims.

Musk and Dan Priestley, Tesla's senior manager for truck engineering, also boasted of new "megawatt" ultra-fast chargers that will be used to quickly refill the truck's batteries, but they did not say how long it would take to recharge the truck. These chargers will be made available for the use of Cybertruck drivers when Tesla's pickup truck goes on sale, Musk said.

Regenerative braking — the way electric vehicles use their motors to slow down and recharge their batteries using the vehicle's own motion — will also be a safety benefit, Priestley said, because drivers won't have to downshift going down long hills and may not need to use the truck's actual brakes at all.

Tesla's Autopilot system, touted in the original presentation five years ago as a benefit for long haul truck drivers, wasn't mentioned during the presentation, however.

Replacing gasoline and diesel-powered trucks with those that are electric could greatly improve human health and even save tens of thousands of lives, according to a recent report by the American Lung Association. Musk also talked about those benefits during the presentation plus the benefit of noise reduction for people living near highways.

But making things a bit awkward between Tesla and PepsiCo, Musk recently tweeted about his appreciation for Coca-Cola products. Coke is Pepsi's most prominent competitor. Musk, who now runs Twitter as well as Tesla, published a photo of his bedside table showing, among other things, four open cans of Diet Coke. On Monday, he tweeted in response to someone else's post about Diet Coke products, writing "Don't love the name, but the drink itself is amazing & brings me joy."

When asked in the days before the presentation for its reaction to Musk's public displays of affection for Diet Coke, PepsiCo did not answer.

Steven Williams, CEO of PepsiCo Foods North America, and Kirk Tanner, CEO of PepsiCo Beverages North America, appeared toward the end of the presentation and thanked Musk for allowing them to participate in the Semi truck program.

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<https://www.cnn.com/2022/12/01/business/tesla-semi-pepsi/index.html>

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Nikola Delivers First Nikola Tre Battery-Electric Trucks

December 17, 2021 • Jordan Wiklund (/authors/10154133/jordan-wiklund) •



The electric startup Nikola Corporation is poised to enter the American battery-electric vehicle (BEV) fleet market with an order of 100 Nikola Tre trucks (<https://nikolamotor.com/tre-bev>) for TTSI's zero-emissions fleet.

Nikola delivered the first BEV pilot trucks on Dec. 17 to Total Transportation Services Inc. (TTSI), which operates in the port and port areas of Los Angeles and Long Beach and has long had a commitment to reducing emissions.

As President Biden recently committed to an electric future for federal government fleets (<https://www.reuters.com/world/us/biden-pledges-end-gas-powered-federal-vehicle-purchases-by-2035-2021-12-08/>), several representatives from California were on hand to help take delivery as part of the induction ceremony, including Congresswoman Nanette Diaz Barragán (California's 44th district), state senator Steven Bradford, as well as several leaders from the House of Representatives. California Gov. Gavin Newsom sent a representative from the Office of Business and Economic Development, and several organizations were also present, including representatives from the Port of Los Angeles, South Coast Air Quality Management District, Coalition for Clean Air, and Calstart.

Nikola Touts Battery-Electric, Fuel-Cell Truck Progress
(<https://www.enr.com/news/2022/12/17/nikola-touts-battery-electric-fuel-cell-truck-progress>)

Guests were able to learn about and experience the Nikola Tre firsthand.

"Nikola committed to make its first Tre BEV deliveries in Q4 2021 and it is a big honor to celebrate this milestone with our partner, TTSI, and dignitaries who are committed to advancing zero-emission transportation solutions to reduce truck emissions in port operations," said Nikola CEO Mark Russell. "TTSI has significant sustainability goals, and we are pleased to help them achieve their vision with our zero-emission trucks."

As previously reported, TTSI's LOI is for 100 zero-emission trucks and that process begins with a four-vehicle pilot of two BEVs and two FCEVs. Once initial vehicle trials and subject to obtaining some government funding, 30 more BEVs are slated for delivery in 2022, with

70 FCEVs to follow in 2023.



The Nikola Tre is designed for local last-mile delivery and can go up to 350 miles per charge.

Nikola

The Nikola Tre is designed for local deliveries up to 350 miles, a higher EPA projection than many new and upcoming EVs. The Nikola Tre FCEV truck is meant for longer distances, stretching the range to 500 miles. The FCEV from Nikola is expected to help bolster the American regional market where additional hauling capacity and/or quick fueling is required by fleet operators.

"This day represents a major step in our continual quest to achieve a zero-emission fleet, which is why TTSI highly values its partnership with Nikola. Production, performance, and maintenance will be the key to our future success, and we are confident Nikola will excel on all three fronts," said Vic LaRosa, president of TTSI.

Smog and particulate matter are real problems for California's busy ports. According to TTSI, 13,000-14,000 trucks call at the Los Angeles/Long Beach port every month, blasting roughly 2,600 tons of smog-causing nitrogen-oxide emissions. TTSI said in a release that the company is thrilled to be at the vanguard of fighting climate change in southern California and partnering with an American company to reduce emissions and help forge a more sustainable (and breathable) future.



The more robust Nikola Tre PCEV can make 500 miles and is more of a regional transporter.

Nikola

Nikola also plans for European ports. In September 2021, Nikola and Iveco (https://nikolamotor.com/press_releases/iveco-and-nikola-sign-mou-with-hamburg-port-authority-for-zero-emission-class-8-battery-electric-trucks-132) signed a deal with the Hamburg Port Authority in Germany to deliver up to 25 Nikola Tre BEVs to that port throughout 2022.

"Reaching a zero-emission transportation future requires bold leadership and collaboration from federal, state, and local partners, along with major investments from the private sector," Congresswoman Nanette Diaz Barragán said. "This is crucial for the health of people living in the communities near the ports in my district, who suffer higher rates of cancer, asthma, and other respiratory diseases due to all the toxic diesel emissions coming from the equipment and trucks at the ports. I appreciate the commitment TTSI and Nikola have made at the Port of Los Angeles to a cleaner, safer future."

Further Reading: Pennsylvania Flatbed Carrier to Lease 100 Nikola Tre PHEVs
(<https://www.greenfleetmagazine.com/10153974/pennsylvania-atbed-carrier-to->

Senator CARPER. I would also like to ask unanimous consent for the record to submit various articles, reports, and other documents that help demonstrate the benefits of a Federal program to help provide certainty, predictability, and flexibility for all stakeholders while lowering costs for consumer, spurring clean fuel technology innovation and helping to meet our climate emissions reductions goals.

[The referenced information follows:]



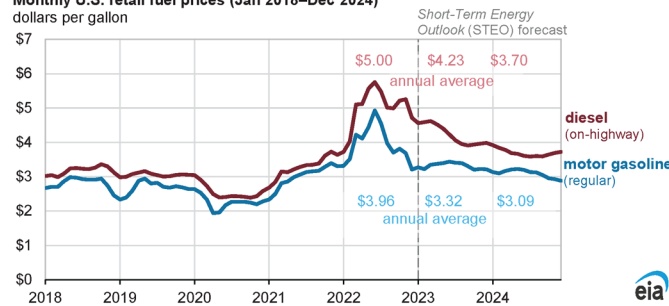
Today in Energy

January 12, 2023

EIA expects U.S. gasoline and diesel retail prices to decline in 2023 and 2024

We are working on some exciting changes to our short-term analyses, so we are no longer publishing the *Today in Energy* article on Fridays. We will have additional updates in the coming months.

Monthly U.S. retail fuel prices (Jan 2018–Dec 2024)
dollars per gallon



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)*

We forecast retail gasoline and diesel prices will decline in 2023 and 2024, according to our latest *Short-Term Energy Outlook (STEO)*, after reaching multiyear highs in the first half of 2022. We forecast that retail prices for regular-grade gasoline will average \$3.32 per gallon (gal) in 2023 and continue to decrease to average \$3.09/gal in 2024, down from \$3.96/gal in 2022. We expect on-highway diesel prices to decrease to average \$4.23/gal in 2023 before decreasing further to \$3.70/gal in 2024. These forecast price decreases are based on our expectation of lower demand growth for diesel and motor gasoline with continued high production of those products.

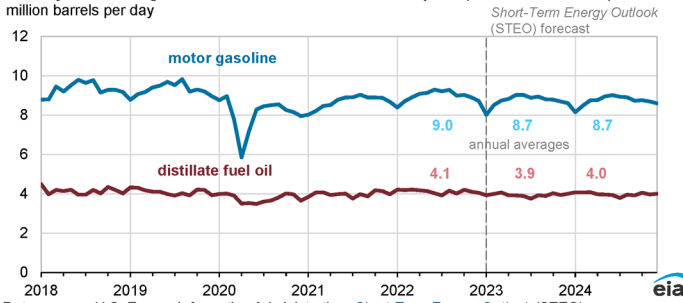
In 2023, we expect that limited growth in global demand for gasoline combined with increased gasoline production will cause gasoline inventories to rise in the United States. We estimate that annual average U.S. gasoline consumption increased by 0.3 million barrels per day (b/d) in 2022. We forecast a decrease in gasoline consumption in 2023 of 0.3 million b/d compared with 2022, and we expect gasoline consumption will remain similar to 2023 in 2024. Additional refinery capacity that came online in late 2022, combined with additional capacity expansions expected to come online in 2023, will also contribute to rising supplies of both gasoline and diesel fuel internationally, further contributing to lower prices globally in 2023 and 2024. We also estimate that U.S. refiners will continue to produce gasoline, even as prices decrease, to meet higher global demand for diesel fuel.

We expect annual U.S. consumption of gasoline will remain less than in 2019 (9.3 million b/d) through the end of 2024. However, we estimate that people drove more in the United States during 2022 than during 2019, before the pandemic. We forecast this trend of increased travel will continue in the United States during 2023 and 2024, but increased *vehicle fleet fuel economy* will offset the increase in *fleet vehicle miles traveled*. Vehicle fleet fuel economy is the number of fleet vehicle miles traveled, including hybrid or hybrid-electric vehicles, divided by all gasoline consumption, also reported in miles per gallon.

2/13/23, 8:04 AM

U.S. Energy Information Administration - EIA - Independent Statistics and Analysis

Monthly U.S. motor gasoline and distillate fuel oil consumption (Jan 2018–Dec 2024)
million barrels per day



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)*

U.S. consumption of distillate fuel oil increased from 4.0 million b/d in 2021 to 4.1 million b/d in 2022. Distillate fuel oil is primarily used in the United States as diesel road fuel, but it is also used for agriculture, space heating, and industrial uses. For both gasoline and distillate, U.S. consumption in 2022 was concentrated in the first part of the year, before high prices began driving consumption down for most of the second half of 2022.

We expect U.S. demand for distillate to remain below 2022 demand through the end of our forecast in 2024. Although we forecast global demand for distillate fuel oil will remain strong, distillate demand remains a factor with significant uncertainty in our forecasts for distillate inventories and prices, especially in Europe where sanctions on Russia have disrupted historical supply patterns for the fuel. Similar to gasoline, we expect increased global refinery capacity will help lower diesel prices through 2023.

Additional information on our forecasts for petroleum consumption, production, inventories, and prices is available in our *Short-Term Energy Outlook*.

Principal contributor: Kevin Hack

BEYOND THE DATA

A blog by the nation's official climate record keepers.

DISCLAIMER

Beyond the Data is written and edited by Derek Arndt, Jake Crouch, Jessica Blunden (NOAA NCEI), and Rebecca Lindsey (contractor to NOAA CPO). Posts reflect the views of the bloggers or guest contributors themselves, not necessarily those of Climate.gov, NOAA, or NCEI.

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2022 U.S. billion-dollar weather and climate disasters in historical context

BY ADAM B. SMITH
PUBLISHED JANUARY 10, 2023
COMMENTS (#COMMENTS)

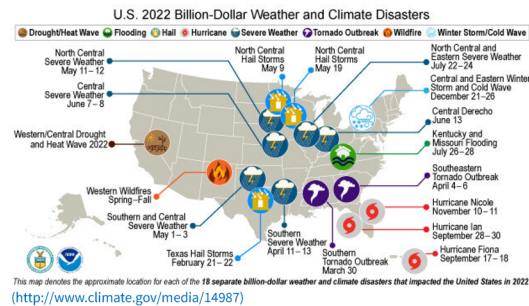
The NOAA National Centers for Environmental Information (NCEI) has released the final update to its 2022 Billion-dollar disaster report (www.ncei.noaa.gov/access/billions (<http://www.ncei.noaa.gov/access/billions>)), confirming another intense year of costly disasters and extremes throughout much of the country. 2022 tied 2017 and 2011 for the third highest number of billion-dollar disasters. 2022 was also third highest in total costs (behind 2017 and 2005), with a price tag of at least \$165.0 billion. This total annual cost may rise by several billion when we've fully accounted for the costs of the December 21-26 Central and Eastern winter storm/cold wave.

A note about images: The images in this post are screenshots from the Billion-dollar Disaster web analysis and mapping tool, which is best viewed on a desktop computer monitor. For best viewing, click to see full-size versions of these images, or visit the NCEI web tool directly.

2022 Highlights

In 2022, the U.S. experienced 18 separate weather and climate disasters costing at least 1 billion dollars. That number puts 2022 into a three-way tie with 2017 and 2011 for the third-highest number of billion-dollar disasters in a calendar year, behind the 22 events in 2020 and the 20 events in 2021. It was another year with a high diversity of destructive disasters:

- 1 winter storm/cold wave event (across the central and eastern U.S.).
- 1 wildfire event (wildfires across the western U.S. including Alaska).
- 1 drought and heat wave event (across the western and central U.S.).
- 1 flooding event (in Missouri and Kentucky).
- 2 tornado outbreaks (across the southern and southeastern U.S.).
- 3 tropical cyclones (Fiona, Ian and Nicole).
- 9 severe weather/hail events (across many parts of the country, including a derecho in the central U.S.).



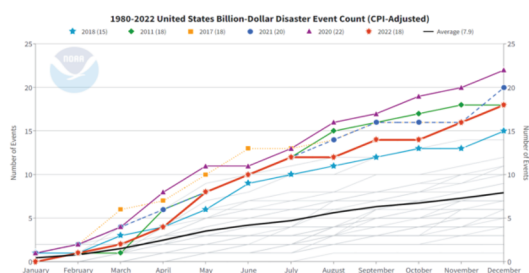
In 2022, the United States experienced 18 separate weather or climate disasters that each resulted in at least \$1 billion in damages. NOAA map by NCEI.

2022 was also deadly, in that the 18 events of 2022 caused at least 474 direct or indirect fatalities—the 8th most disaster-related fatalities for the contiguous U.S. since 1980.

Damages from the 2022 disasters totaled \$165.1 billion. (All cost estimates are adjusted based on the Consumer Price Index, 2022). The costliest 2022 events were Hurricane Ian (\$112.9 billion) and the Western and Central Drought / Heat Wave (\$22.1 billion). Adding the 2022 events to the record that began in 1980, the U.S. has sustained **341 weather and climate disasters** with the overall damage costs reaching or exceeding \$1 billion. The cumulative cost for these 341 events exceeds **\$2.475 trillion**.

2022 costs in historical context

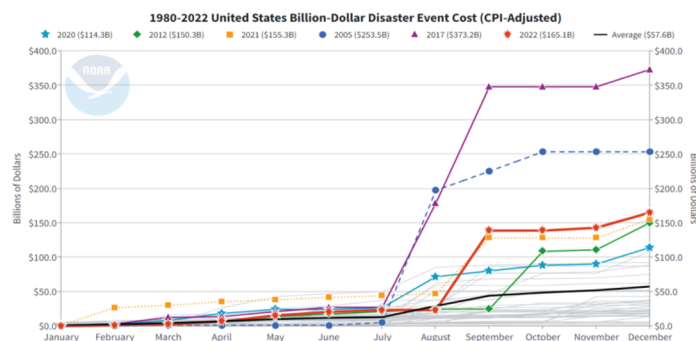
Like many years in the past decade, 2022 was another active year during which we had a high frequency, a high cost, and large diversity of extreme events that affect people's lives and livelihoods—concerning because it hints that the extremely high activity of recent years is becoming the new normal. 2022 (red line) marks the eighth consecutive year (2015-2022) in which 10 or more separate billion-dollar disaster events have impacted the U.S. The 1980–2022 annual average (black line) is 7.9 events (CPI-adjusted); the annual average for the most recent 5 years (2018–2022) is 17.8 events (CPI-adjusted).



(<http://www.climate.gov/media/14989>)

Month-by-month accumulation of billion-dollar disasters for each year on record. The colored lines represent the top 6 years for most billion-dollar disasters. All other years are colored light gray. NOAA image by NCEI.

Over the last seven years (2016-2022), 122 separate billion-dollar disasters have killed at least 5,000 people and cost >\$1 trillion in damage. In addition, the \$100 billion cost figure has been eclipsed in 5 of the last six years (2017-2022 with 2019 being the exception). One of the drivers of this cost is that the U.S. has been impacted by landfalling Category 4 or 5 hurricanes in five of the last six years, including Hurricanes Harvey, Irma, Maria, Michael, Laura, Ida, and Ian.



Month-by-month accumulation of estimated costs of each year's billion-dollar disasters, with colored lines showing 2022 (red) and the previous top-5 costliest years. Other years are light gray. 2022 finished the year in third place for annual costs. NOAA NCEI graphic.

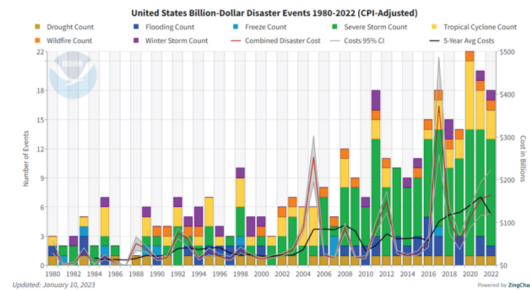
In broader context, the total cost of U.S. billion-dollar disasters over the last 5 years (2018-2022) is **\$595.5 billion**, with a 5-year annual cost average of **\$119.1 billion**, the latter of which is nearly triple the 43-year inflation adjusted annual average cost. The U.S. billion-dollar disaster damage costs over the last 10-years (2013-2022) were also historically large: at least **\$1.1 trillion** from 152 separate billion-dollar events.

It is important to keep in mind that these estimates do not reflect the total cost of U.S. weather and climate disasters, only those associated with events more than \$1 billion in damages. That means they are a conservative estimate of how much extreme weather costs the United States each year. However, these billion-dollar events do account for most of the damage from all recorded U.S. weather and climate events (NCEI; Munich Re), and they are becoming an increasingly larger percentage of the total damage costs from weather-related events at all scales and loss levels.

The U.S. losses from billion-dollar disasters over the last seven years (2015-2022) are more than \$1 trillion and have further skewed the total distribution of extreme weather costs. From 1980-2000, about **75%** of all disaster-related costs were due to billion-dollar disasters, and by 2010, the percentage had risen to about **80%**. By 2022, it has risen to **~85% of all disaster-related costs**, or \$2.475 trillion out of \$2.850 trillion.

Increasing trend of high-cost disasters: exposure, vulnerability, and climate change

The number and cost of weather and climate disasters are increasing in the United States due to a combination of increased [exposure](https://content.naic.org/consumer_glossary.htm#E) (i.e., more assets at risk), [vulnerability](https://www.naic.org/documents/cipr_study_1704_flood_risk.pdf) (i.e., how much damage a hazard of given intensity—wind speed, or flood depth, for example—causes at a location), and the fact that climate change is increasing the frequency of some types of extremes that lead to billion-dollar disasters (NCA 2018, Chapter 2 <https://nca2018.globalchange.gov/chapter/2/>).



Updated: January 16, 2023 <http://www.climate.gov/media/14990>

The history of billion-dollar disasters in the United States each year from 1980 to 2022, showing event type (colors), frequency (left-hand vertical axis), and cost (right-hand vertical axis.) The number and cost of weather and climate disasters is rising due to a combination of population growth and development along with the influence of human-caused climate change on some type of extreme events that lead to billion-dollar disasters. NOAA NCEI.

In other words, the increase in population and material wealth over the last several decades are an important cause for the rising costs. These trends are further complicated by the fact that much of the growth has taken place in vulnerable areas like coasts, the wildland-urban interface, and river floodplains. Vulnerability is especially high where building codes are insufficient for reducing damage from extreme events. This is part of the reason that the 2010s decade is far costlier than the 2000s, 1990s, or 1980s (all inflation adjusted to 2022 dollars).

| Time Period | Billion-Dollar Disasters | Events/Year | Cost | Percent of Total Cost | Cost/Year | Deaths | Deaths/Year |
|--------------------------|--------------------------|-------------|-------------------------|-----------------------|-----------------------|--------|-------------|
| 1980s (1980-1989) | 31 | 3.1 | \$204.9B | 8.3% | \$20.5B | 2,970 | 297 |
| 1990s (1990-1999) | 55 | 5.5 | \$313.6B | 12.7% | \$31.4B | 3,062 | 306 |
| 2000s (2000-2009) | 67 | 6.7 | \$566.8B | 23.7% | \$56.7B | 3,102 | 310 |
| 2010s (2010-2019) | 129 | 12.9 | \$936.3B | 37.8% | \$93.6B | 5,227 | 523 |
| Last 5 Years (2018-2022) | 89 | 17.8 | \$595.5B ¹ | 24.0% ² | \$119.1B ¹ | 1,751 | 350 |
| Last 3 Years (2020-2022) | 60 | 20.0 | \$434.6B ² | 17.6% ² | \$144.9B ² | 1,460 | 487 |
| Last Year (2022) | 18 | 18.0 | \$165.0B ² | 6.7% ² | \$165.0B ² | 474 | 474 |
| All Years (1980-2022) | 341 | 7.9 | \$2,476.2B ³ | 100.0% ³ | \$57.6B ³ | 15,821 | 368 |

(<http://www.climate.gov/media/14991>)

Screenshot of a table of summary statistics of billion-dollar disasters by decade and by latest 1-, 3-, and 5-year periods. NCEI Billion-dollar disaster [web interface](https://www.ncei.noaa.gov/access/billions/summary-stats). (<https://www.ncei.noaa.gov/access/billions/summary-stats>)

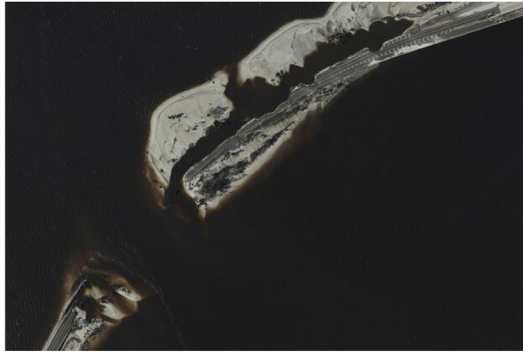
However, climate change is also supercharging the [increasing frequency](https://www.climate.gov/news-features/event-tracker/global-warming-increased-risk-intensity-louisianas-extreme-rain-event) and intensity of certain types of extreme weather that lead to billion-dollar disasters—most notably the rise in vulnerability to drought, lengthening wildfire seasons in the Western states, and the potential for extremely heavy rainfall becoming more common in the eastern states. Sea level rise is worsening hurricane [storm surge flooding](https://www.climate.gov/news-features/features/superstorm-sandy-and-sea-level-rise). (Read more about changes in climate and weather extremes in the U.S. National Climate Assessment.) (<https://nca2018.globalchange.gov/chapter/2/>) Given all these compounding hazard risks, there is an increased need to focus on where we build, how we build, and investing in infrastructure updates that are designed for a 21st-century climate.

Notable U.S. billion-dollar disasters of 2022

Among the many weather and climate-related disasters to affect the U.S. in 2022, the following caused the most damaging impacts and broke numerous records.

Hurricane Ian (September 2022): \$112.9 billion, 152 deaths

Ian made landfall near Cayo Costa, Florida, as a Category 4 hurricane with sustained winds of 150 mph. Significant parts of coastal communities, including those along the barrier islands of Captiva, Sanibel, Pine and Fort Myers Beach, were swept away by the high winds and storm surge. Ian slowly crossed Florida causing significant inland flooding across central and eastern portions of the state from widespread rainfall totals of 10-20 inches. The counties of Volusia, Orange, Seminole and Brevard reported more than 20 inches of rainfall.



(<http://www.climate.gov/media/14998>)

One of multiple washouts on the Sanibel Causeway near Fort Myers, Florida, following the passage of Hurricane Ian in 2022. [Image](https://storms.ngs.noaa.gov/storms/ian/index.html#19/26.47956/-82.02615) (<https://storms.ngs.noaa.gov/storms/ian/index.html#19/26.47956/-82.02615>) captured September 29; provided by NOAA Remote Sensing Division.

Ian re-emerged over the Atlantic as a tropical storm, re-intensified into a Category 1 hurricane on September 30, and made landfall near Georgetown, SC, with sustained winds of 85 mph causing more coastal flood damage and destroying several large piers near Myrtle Beach, South Carolina. Since 1980, five hurricanes have produced \$20+ billion in damage in Florida—Andrew (1992), Charley (2004), Wilma (2005), Irma (2017), and Michael (2018). Hurricanes Andrew and Irma produced the highest damage totals in Florida (approximately \$50 billion for each storm). Hurricane Ian's impact is the first to exceed \$100 billion in insured and uninsured losses in Florida.

Western and Central Drought / Heat Wave (2022): \$22.2 billion, 136 deaths



(<http://www.climate.gov/media/15002>)

Lake Mead on August 17, 2022. Photo by Christopher Clark, Bureau of Reclamation. Used under [Creative Commons license](https://creativecommons.org/licenses/by-sa/2.0/). (<https://creativecommons.org/licenses/by-sa/2.0/>)

Severe drought conditions impacted the Western and Southern Plains states. Large reservoirs across the West including Lake Mead, Lake Powell, Lake Oroville, and Shasta Lake, among others, continue to be depleted. Lake Mead, the Nation's largest reservoir, is nearing dead pool status and is at the lowest level since it was filled in the 1930s. The Great Salt Lake is also near record-low levels. The impacts of the drought are affecting crops and feed costs for livestock. Extreme heat also developed for many days across Western and Central states causing more than one hundred heat-related fatalities across Arizona, Nevada, California, Oregon and Texas. This is one of the more costly droughts on record, with a diverse array of direct impacts across different regions and industries.

1980–2022 costs and fatalities by disaster type

The distribution of damage from U.S. billion-dollar disaster events from 1980 to 2022 is dominated by tropical cyclone losses. Tropical cyclones have caused the most damage (\$1,333.6 billion) and have the highest average event cost (\$22.2 billion per event). Drought (\$327.7 billion), severe storms (\$383.7 billion), and inland flooding (\$177.9 billion) have also caused considerable damage based on the list of billion-dollar events.

Severe storms have caused the highest number of billion-dollar disaster events (163), but they have the lowest average event cost (\$2.4 billion). Tropical cyclones and flooding represent the second and third most frequent event types (60 and 37), respectively. Tropical cyclones are responsible for the highest number of deaths (6,890), followed by drought/heatwave events (4,275) and severe storms (1,982).

Billion-dollar events to affect the United States from 1980 to 2022 (CPI-Adjusted)

| Disaster Type | Events | Events/Year | Percent Frequency | Total Costs | Percent of Total Costs | Cost/Event | Cost/Year | Deaths | Deaths/Year |
|------------------|--------|-------------|-------------------|-------------------------|------------------------|---------------------|----------------------|--------------------|-----------------|
| Drought | 30 | 0.7 | 8.8% | \$327.7B | 13.2% | \$10.9B | \$7.6B | 4,275 ¹ | 99 ² |
| Flooding | 37 | 0.9 | 10.9% | \$177.9B | 7.2% | \$4.8B | \$4.1B | 676 | 16 |
| Freeze | 9 | 0.2 | 2.6% | \$35.3B | 1.4% | \$3.9B | \$0.8B | 162 | 4 |
| Severe Storm | 163 | 3.8 | 47.8% | \$383.7B | 15.5% | \$2.4B | \$6.9B | 1,982 | 46 |
| Tropical Cyclone | 60 | 1.4 | 17.6% | \$1,333.6B | 53.9% | \$22.2B | \$31.0B | 6,890 | 160 |
| Wildfire | 21 | 0.5 | 6.2% | \$133.1B | 5.4% | \$6.3B | \$3.1B | 435 | 10 |
| Winter Storm | 21 | 0.5 | 6.2% | \$84.9B ³ | 3.4% | \$4.2B ³ | \$2.0B ³ | 1,401 | 33 |
| All Disasters | 341 | 7.8 | 100.0% | \$2,476.2B ³ | 100.0% | \$7.3B ³ | \$57.6B ³ | 15,821 | 368 |

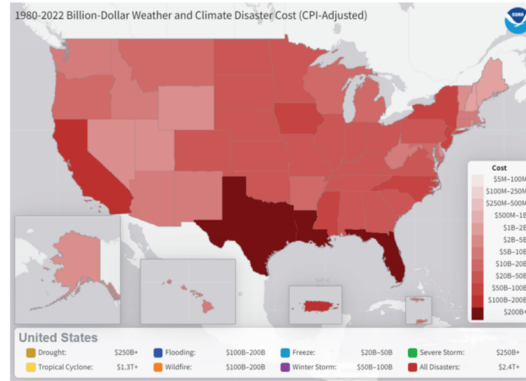
¹Deaths associated with drought are the result of heat waves. (Not all droughts are accompanied by extreme heat waves.)
²Flooding events (river basin or urban flooding from excessive rainfall) are separate from inland flood damage caused by tropical cyclone events.
<http://www.climate.gov/media/14992>

This table shows the breakdown, by hazard type, of the 341 billion-dollar weather and climate disasters assessed since 1980. Screenshot from the NOAA NCEI Billion-dollar Disasters webpage. (<https://www.ncei.noaa.gov/access/billions>)

Climatology of billion-dollar disasters

Disasters by region

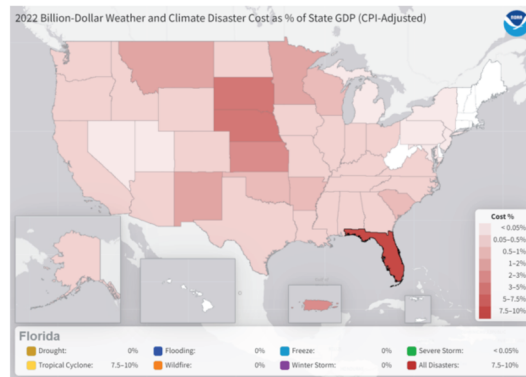
The South, Central and Southeast regions of the United States, including the Caribbean U.S. territories, have suffered the highest cumulative damage costs, reflecting the severity and widespread vulnerability of those regions to a variety of weather and climate events. In addition to the highest number of billion-dollar disasters experienced, [Texas also leads the U.S. in total cumulative costs \(~\\$380 billion\)](#) from billion-dollar disasters since 1980. [Florida is the second-leading state](#) in total costs since 1980 (~\$370 billion), largely the result of destructive hurricane impacts.



(<http://www.climate.gov/media/14993>)

This map depicts the total estimated cost borne by each state from billion-dollar weather and climate events from 1980-2022. Screenshot from NOAA NCEI Billion-dollar Disasters [web mapping tool](#).

Louisiana's total costs are now the 3rd highest (~\$290 billion) from billion-dollar disasters (after being surpassed by Florida this year due to the impacts from Hurricane Ian). This year Florida experienced landfalling Hurricanes Ian and Nicole in the span of only four weeks. There were numerous cities and towns that were beginning the disaster recovery process after Ian, only to experience more damage from Nicole.

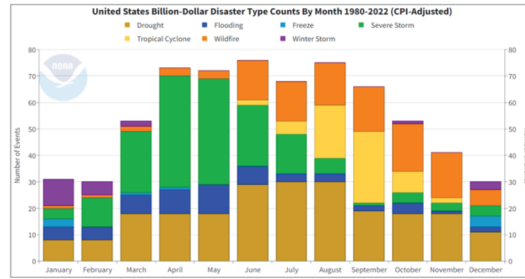


(<http://www.climate.gov/media/14994>)

Screenshot of a map the US showing billion-dollar disasters costs for each state during 2022 as a percentage of each state's 2022 gross domestic product (GDP). NOAA NCEI image from the Billion-dollar Disaster [web mapping tool](#). (<https://www.ncei.noaa.gov/access/billions/mapping>)

Another way to examine damage is to compare each state's annual disaster losses relative to their Gross Domestic Product (GDP), which represents economic output. The damage costs from Hurricane Ian across Florida were impactful during 2022 reflecting 7.5-10.0% of Florida's 2022 economic output (GDP). Several other states across the nation also sustained relatively large hazard impacts from other extremes including drought / heat and severe storms including hail, derechos and tornadoes.

Billion-dollar disasters by month



(<http://www.climate.gov/media/14995>)

The monthly climatology of U.S. billion-dollar weather and climate disasters from 1980 to 2022, showing which months have the greater frequency of disasters (height of bar) and which types of events (colors) are most likely to occur in a given month. NOAA NCEI image.

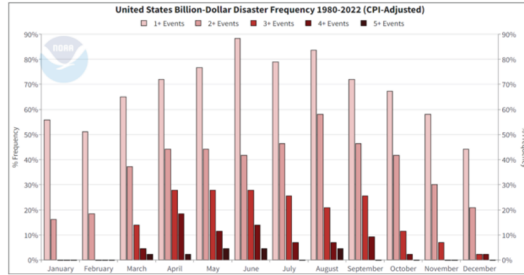
The 43-year climatology of U.S. billion-dollar disasters offers a view of risk from extreme events, which are often seasonal in nature. For example, during the spring months (March-May) severe storms (green blocks), including tornadoes, hail, and high winds, often occur in many Central and Southeast states, but they taper off in the second half of the year. During the spring months there is also greater potential for major river flooding (i.e., deep blue events in chart above). U.S. springtime flooding from snowmelt and/or heavy rainfall is a persistent hazard that affects many towns and agriculture regions within the Missouri and Mississippi River basins, among others.

During the fall season, Gulf and Atlantic coast states must be vigilant about hurricane season particularly during August and September (i.e., yellow events in chart above). Hurricanes are the most destructive and costly of these events totaling damage losses exceeding \$1 trillion since 1980. For example, in 2016-2018, the U.S. was impacted by 6 separate billion-dollar hurricanes (i.e., Matthew, Harvey, Irma, Maria, Florence, Michael) with 3,318 fatalities and an inflation-adjusted loss total of \$390.8 billion. As a comparison, the U.S. also experienced a series of active hurricane seasons from 2003-2005 where 9 separate billion-dollar hurricanes (including Katrina, Rita, and Wilma in 2005) made landfall, with 2,225 fatalities and an inflation-adjusted loss total of \$343.2 billion.

Also, the peak of the Western U.S. wildfire season occurs during the fall months of September, October and November (i.e., orange events in chart above). California, Oregon, Washington, Idaho, Montana and Colorado often experience enhanced wildfire risk and related poor air quality for weeks to months. Western wildfire risk is also becoming more hazardous, as 17 of the 20 largest California wildfires by acreage and 18 of the 20 most destructive wildfires by number of buildings destroyed have occurred since the year 2000. In four of the last six years (2017, 2018, 2020 and 2021), California has experienced historically large and costly wildfires with losses well exceeding \$65.0 billion. Overall, the 2022 Western wildfire season was less severe and destructive than in recent years.

In total, each region of the U.S. faces a unique combination of recurring hazards, as billion-dollar disaster events have affected every state since 1980. The chart above highlights how the frequency of billion-dollar disasters differs across both time and space. The combined historical risk of U.S. severe storms and river flooding events places the spring and summer seasons in the high-risk category for simultaneous extreme weather and climate events. Hurricane, wildfire and drought impacts dominate the Fall season.

The winter months are also active with the potential for powerful winter storms and cold wave events, much like what two-thirds of the U.S. experienced from December 21-26, which killed at least 87 people and caused billions of dollars in damage.



(<http://www.climate.gov/media/14996>)

This graph shows the percent frequency of a given month having at least one billion-dollar disaster (light pink bars), 2 or more events (medium pink bars), 3 or more (red), 4 or more (darker red), or 5 or more (darkest red). Billion-dollar weather and climate disasters occur in all months, but the spring and summer (March–Aug) are the time when multiple, concurrent disasters are likely. A second maximum occurs in the Fall driving by tropical cyclones. Screenshot from the NCEI Billion-dollar Disasters webpage. (<https://www.ncei.noaa.gov/access/billions>)

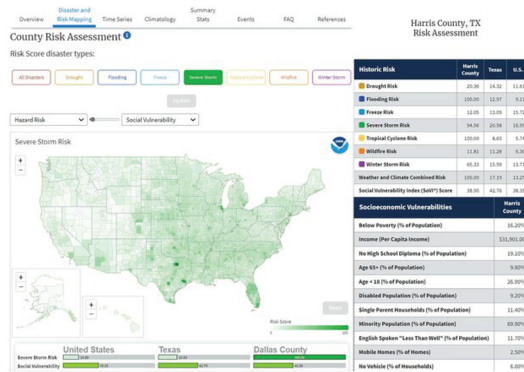
The increase in disasters create 'compound extremes' (e.g., billion-dollar disaster events that occur at the same time or in sequence), which are also an increasing problem for recovery. As noted in *National Climate Assessment (2017)* (https://science2017.globalchange.gov/report_section/executive-summary/es7/) "the physical and socioeconomic impacts of compound extreme events (such as simultaneous heat and drought, wildfires associated with hot and dry conditions, or flooding associated with high precipitation on top of snow or waterlogged ground) can be greater than the sum of the parts."

For example, in 2021 California experienced drought-enhanced wildfire seasons that produced wildfires and mountain-side burn scars, followed by atmospheric rivers of heavy rainfall that enhanced landslides and flooding. Other examples include southern Louisiana being impacted by multiple hurricanes and Spring flooding events in 2020 and 2021. In 2022, Florida was impacted by Hurricanes Ian and Nicole in the span of several weeks.

Over the last six years (2017-2022), there were just 18 days on average between billion-dollar disasters compared to 82 days in the 1980s. Shorter time intervals between disasters often mean less time and resources available to respond, recover and prepare for future events. This increased frequency of events produces cascading impacts that are particularly challenging for vulnerable socioeconomic populations.

Mapping County Level Hazard Risk, Vulnerability, and Projected Future Impacts

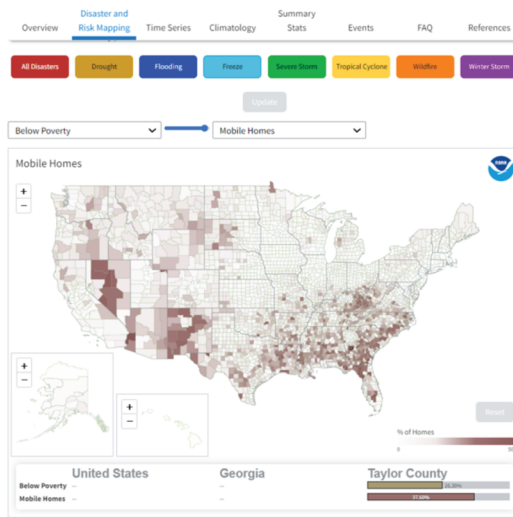
To better reflect multi-hazard and socioeconomic risk – the Billion-dollar disaster site has continued to develop its mapping tools at both the county and Census tract-level. This provides neighborhood-scale information on natural disaster and socioeconomic vulnerability and resilience to hazards across the United States.



<http://www.climate.gov/media/14997>

NOAA's county-level risk mapping tool allows users to view risk scores based on historical and projected occurrence of billion-dollar disasters, and how those scores overlap with social vulnerability based on population age, income, and other factors. Screenshots from NOAA NCEI Billion-dollar [disaster mapping tool](https://www.ncei.noaa.gov/access/billions/mapping). (<https://www.ncei.noaa.gov/access/billions/mapping>)

This interactive NOAA mapping tool provides detailed information on a location's susceptibility to weather and climate hazards that can lead to billion-dollar disasters—such as wildfires, floods, drought and heat waves, tornado outbreaks, and hurricanes. The tool expands upon FEMA's National Risk Index and the Census American Community Survey to provide a view of a location's risk for, and vulnerability to, single or multiple combinations of weather and climate hazards for every county and county-equivalent in all 50 states and the District of Columbia.



<http://www.climate.gov/media/14999>

The most recent update to NOAA's Billion-dollar Disasters mapping app allows users to find local-scale data on overlapping hazards and socioeconomic vulnerabilities. Screenshot from NCEI's [hazard mapping tool](https://www.ncei.noaa.gov/access/billions/mapping). (<https://www.ncei.noaa.gov/access/billions/mapping>)

This is a new focus on multi-hazard risk mapping at local scales, highlighting areas of socioeconomic vulnerability where communities may be most impacted are less served. As we have seen in recent years, many parts of the country are prone to hazards and their impacts such as the Western megadrought and longer, more intense wildfire seasons to the strong hurricanes that have frequently impacted Florida and Louisiana in recent years. FEMA and NOAA tools along with many new tools from across the Federal agencies help us better examine the exposure, vulnerability and resilience to many different hazards so that we can better plan and prepare for the future: <https://www.ncei.noaa.gov/access/billions/mapping> (<https://www.ncei.noaa.gov/access/billions/mapping>)

Comments

[Add new comment](#)

Your name



The Honorable Tom Carper
 Chair, Environment and Public Works
 United States Senate
 513 Hart Senate Office Building
 Washington DC 20515

The Honorable Shelley Moore Capito
 Ranking Member, Environment and Public Works
 United States Senate
 172 Russell Senate Office Building
 Washington DC 20515

Dear Chairman Carper and Ranking Member Capito,

The undersigned organizations write to respectfully encourage immediate action by Congress to begin the process that will lead to a national clean fuels policy to accelerate the decarbonization of the transportation sector, advance American energy independence, and facilitate domestic energy production. As the Committee holds this hearing, *The Future of Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program*, it is our hope there will be recognition that a national Clean Fuels Standard (CFS) can help to achieve the transportation sector's contributions towards the 2050 net zero goals. Our coalition, the DriveClean Initiative, has advanced principles upon which a CFS could be drafted.

We believe a national CFS is a critical complement to ongoing efforts by the Administration and Congress to reduce greenhouse gas emissions and air pollution from the transportation sector by 2050. A CFS is a common-sense solution to build upon the current federal approach to transportation fuels policy, a solution that is already proving successful in states like California, Oregon, and Washington as well as Canada.

A CFS is a market-based, technology-neutral policy that supports a portfolio of clean transportation fuels. It ensures that transportation fuels are continually less carbon intensive from year-to-year. As we have seen in California, by not picking winners and losers, a CFS allows the marketplace to determine which fuel sources are the most effective at reducing carbon emissions. Given recent research showing the need for climate action this decade to avoid the worst consequences of climate change and the imperative to reduce the disproportionate public health burdens borne by many frontline communities for decades, we believe that action in the 118th Congress is urgently needed to attain this goal.

A strong national clean fuels policy, built on foundational frameworks put forward by many states including New Mexico, Minnesota, Illinois, New York, Oregon, California, and Washington, would send clear near-term and long-term market signals that will incentivize all low-carbon fuels and vehicle technologies, and that will disincentivize high-carbon fuels.

These programs all provide a common-sense solution to the problem of high-carbon fuels. They provide a technology-neutral, fuel-agnostic, market-based mechanism that accelerates investment in low-carbon fuels, infrastructure, and vehicles. This approach does not prohibit any particular fuel or technology. Instead, it allows the marketplace to determine which fuel sources are the most effective at reducing carbon emissions in each application and geography.

A forward-looking program, like a CFS, will encourage rapidly growing investment in the technologies needed to simultaneously reduce criteria and carbon pollution in all communities



across America. Designed properly, it will spur innovation in American technology, advance energy independence, create jobs across the nation, help ensure equitable and sustainable economic growth, as well as smooth the transition to a cleaner, more just transportation sector. Such a technology-neutral, fuel-agnostic policy allows a broad coalition of stakeholders, like ours, to support all clean fuels, ranging from: renewable fuels to electrification to hydrogen – and many other new technologies well into the future.

The DriveClean Initiative represents a wide array of stakeholders deeply invested in reducing emissions from transportation fuels. We include automakers, farmers, environmental groups, utilities, science-based organizations, renewable fuel producers, technology companies, electric vehicle charging companies, truck and bus manufacturers, emissions controls makers, non-profit clean energy organizations, and more.

We encourage a strong national clean fuels policy that will send long-term signals and promote rapid investment in the technologies expected to reduce criteria and carbon pollution in all communities across America. Designing such a program will require a thoughtful process; to provide guidance from a wide range of stakeholders, we have attached the above-referenced list of CFS design principles for Congress to consider. A national policy would provide greater stability and market certainty, which would ensure that vehicle makers, fuel providers, and other stakeholders all work towards common goals, and would maximize job creation and economic development in every state and region. The long-term market certainty for domestic fuels created by a national CFS will additionally provide increased stability from international price shocks and address our urgent need for energy independence.

Thank you for considering our views as you examine the full range of strategies that will be necessary to meet our future economic, climate, and other important goals. We welcome the opportunity to participate in an open dialogue to further discuss how Congress can act on this important issue.

Copied to:

| | |
|----------------------------|---------------------------|
| Senator Benjamin L. Cardin | Senator Kevin Cramer |
| Senator Bernard Sanders | Senator Cynthia M. Lummis |
| Senator Sheldon Whitehouse | Senator Markwayne Mullin |
| Senator Jeff Merkley | Senator Pete Ricketts |
| Senator Edward J. Markey | Senator John Boozman |
| Senator Debbie Stabenow | Senator Roger F. Wicker |
| Senator Mark Kelly | Senator Dan Sullivan |
| Senator Alex Padilla | Senator Lindsey Graham |
| Senator John Fetterman | |

Sincerely,





February 15, 2023

The Honorable Thomas Carper
Chairman
Environment and Public Works Committee
U.S. Senate
Washington, DC 20510

The Honorable Shelley Moore Capito
Ranking Member
Environment and Public Works Committee
U.S. Senate
Washington, DC 20510

Dear Chairman Carper and Ranking Member Capito:

We appreciate that the Environment and Public Works Committee will convene a hearing this week on “Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program.”¹ The retail fuel industry is an indispensable part of lowering the carbon footprint of transportation fuel in the United States. Collectively, our members represent approximately 90 percent of retail sales of motor fuel in the United States.² On behalf of this diverse and forward-thinking industry, we are eager to work with the Committee to help improve the environmental characteristics of transportation energy in the United States.

As the Committee examines various clean fuel policies and incentives, we urge you to consider the following policy principles that have been developed by our associations and guide our view of these issues. The most expeditious and economical way to achieve environmental advancements in transportation energy technology is through market-oriented, consumer-focused policies that encourage our membership to offer more alternatives. Fuel retailers have demonstrated in recent years that they are prepared to invest in any transportation energy technology that their customers desire. With the right alignment of policy incentives, the private sector is best equipped to facilitate a faster, more widespread, and cost-effective transition to alternatives – including electricity – in the coming years.

As discussed further below, policies that adhere to the following principles will create new jobs, accelerate the deployment of advanced alternative fuel infrastructure and vehicles, benefit consumers through a competitive and robust marketplace and drive massive economic investment and improvements in air quality:

- Science should be the foundation for transportation climate policies.
- Establish performance goals without mandating specific technologies to allow for the benefits of innovation and technology development.

¹ See Senate Environment and Public Works Committee Public Hearing, “The Future of Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program,” (Feb. 15, 2023) *available at* <https://www.epw.senate.gov/public/index.cfm/hearings?ID=E1E24A1B-6A3C-4B0F-8794-15D1AA5AB7D9>

² NACS is an international trade association representing the convenience store industry with more than 1,300 retail and 1,600 supplier companies as members, the majority of whom are based in the United States. NATSO currently represents approximately 5,000 travel plazas and truckstops nationwide, comprising both national chains and small, independent locations. SIGMA represents a diverse membership of approximately 260 independent chain retailers and marketers of motor fuel.

- Develop competitive market incentives to ensure a level playing field and provide long-term consumer benefits.
- Harness existing infrastructure to help commercialize new technology, maximize diverse investments, and achieve near-term and long-term emission reduction goals.
- Set consistent, uniform national policy so that (i) the market has certainty to help it invest, and (ii) state policies do not create inconsistent or counterproductive measures.
- Ensure fair treatment so that all households are not forced to subsidize alternative energy users.

Science should be the foundation for transportation climate policies.

Any effort to improve transportation energy's emissions characteristics requires an accurate accounting of the lifecycle carbon intensity associated with particular fuels and technologies. This analysis should include everything from acquisition of natural resources, engine and battery manufacturing, tailpipe emissions, and vehicle end-of-life consequences. It should also be regularly updated so that policy is nimble enough to adjust to efforts to innovate and improve the environmental characteristics of different alternatives. Additionally, every sector of the economy should assume a burden of reducing carbon emissions that is proportionate to its share of nationwide emissions.

Policy should set performance goals without mandating specific technologies to allow for the benefits of innovation and technology development.

While it may be tempting to prematurely pick winners and losers from an energy technology standpoint, sound policy must be grounded in science and recognize that the state of technology can change rapidly. Incentives to invest in alternative fuel technologies should be tied to those technologies' lifecycle environmental attributes rather than the underlying technology itself.

No one solution will decarbonize transportation energy. Policies should incentivize multiple technologies. What policymakers think is the best solution today may be surpassed by subsequent ingenuity and innovation. Sound policy should not stifle innovation by mandating specific fuel solutions. Instead, policy should set performance goals and let the market – guided by consumers – innovate to find the best way to meet those goals.

Retailers' experience is valuable in this respect because they bring a technology-agnostic perspective with an underlying attention and loyalty to consumer preferences and low prices.

Develop competitive market incentives to ensure a level playing field and provide long-term consumer benefits.

Fuel retailers today are best positioned to provide alternative sources of transportation energy because they have a keen understanding of consumer preferences and tendencies. Refueling stations are strategically located throughout the country where refueling demand is greatest, competing with one another on price, speed, and quality of service. Those sites include disability accessible restrooms and parking lots, food and beverage options, vehicle service and repair centers, and even showers and other amenities for professional drivers. Consumers demand all of this, regardless of the type of fuel their vehicle consumes.

Existing alternative fuel incentives – such as the Renewable Fuel Standard and biofuel blending and alternative fuel infrastructure tax credits – have allowed retailers to offer less expensive, lower carbon fuels to their customers, while also supporting investments in renewable fuel production. Regardless of how one may feel about ethanol and biodiesel, the *incentives* Congress established have been successful given the amount of petroleum-based fuel that has been displaced by these renewable fuels since 2005.

These benefits can be replicated for new technologies if policymakers adopt the same market-oriented and consumer-focused perspective. Policy mechanisms worth considering include:

- Ensuring credit regimes and/or tax incentives make alternative fuel less expensive for the end user, thereby providing a stable economic case for upstream investment.
- Permitting all EV charging station owners to generate a profit by selling electricity to EV owners without being subject to regulation as a utility. This allowance is essential if fuel retailers are to have any incentive to invest in EV charging technology.
- Adopting uniform retail pricing measurements (*e.g.*, dollars per kilowatt-hour) and requirements for consumer-friendly price disclosures.

Conversely, policies that at first blush appear to be quick and easy solutions tend to have the unintended consequence of undermining retailers' incentives to invest capital in alternative fuels. This inevitably hinders the growth and expansion of alternative transportation energy. Examples of these counterproductive policies include:

- *An electricity marketplace that needs modernization to adapt to transportation needs* – Utilities charge commercial users of electricity “demand” charges on their monthly bills based on the largest amount of power they pull at a particular time. EV fast charging stations require a large amount of power to be dispensed quickly and result in large demand charges that cannot be passed onto individual drivers. But utilities don't have to pay demand charges themselves. A prohibition on such practices and other ways in which utilities favor their own EV charging stations on pricing is the only way to provide a level playing field and ensure competitive pricing for individual consumers.
- *Forcing ratepayers to underwrite electric utilities' investment in EV chargers or to subsidize the cost of electricity that charges electric vehicles* – Where this occurs, the utilities are operating in a guaranteed rate of return environment without putting a single dollar at risk. Retailers cannot compete with electric utilities in this environment. While there is good reason for ratepayers underwriting the cost of the grid and other upgrades, there is no public policy rationale why utilities should be given a leg up over private actors who wish to enter the market for chargers that consumers use to power their vehicles. Utilities' ongoing pursuit of this uncompetitive arrangement is the single greatest deterrent to fuel retailers investing in EV charging infrastructure.
- *Prohibiting fuel retailers from selling electricity to individual consumers* – Certain states prohibit the sale of electricity (*i.e.*, fuel) to individual consumers except by price-regulated utilities. This discourages additional deployment of such infrastructure. EV charging station owners must be permitted to generate a profit by selling electricity to EV drivers if they are to have any incentive to invest in the technology.
- *Allowing EV charging infrastructure at Interstate rest areas* – Not only would this discourage off-highway fuel retailers from investing in charging infrastructure, but it will

signal to prospective EV drivers that they will need to refuel at often desolate, poorly maintained state-run rest areas rather than the off-highway travel centers, convenience and fuel retailers with all of the amenities that drivers have come to expect.

Harness existing infrastructure to help commercialize new technology, maximize diverse investments, and achieve near-term and long-term emission reduction goals.

It is exponentially less expensive to leverage existing infrastructure than create entirely new supply chains and infrastructure. To the extent environmental objectives can be achieved by harnessing existing infrastructure – including removing hurdles to bringing alternative fuels to market – customers will more seamlessly gravitate to new types of fuels and vehicles. American companies have spent more than sixty years building out a refueling infrastructure system that optimizes logistics and maximizes customer benefits. Deployment of new technology that complements this infrastructure will (all else being equal) be less expensive and thus more likely to generate consumer loyalty.

In just the past decade, there has been extraordinary growth in consumption of biofuels such as ethanol and biodiesel, as well as other low carbon fuels such as renewable natural gas, compressed natural gas, renewable diesel, and biobutanol. These are all liquid fuels that are mostly compatible with existing infrastructure that was originally developed for hydrocarbons. With all of these fuels, industry has responded to policy signals by allocating capital toward bringing the fuels to market. Retailers then sell the fuels to consumers for less money than the fuels that were being displaced. This has created enormous environmental benefits in a relatively short period of time. We can build upon current policies to leverage existing infrastructure and achieve meaningful environmental benefits as we work toward reaching our longer-term aspirations.

Set consistent, uniform national policy so that (i) the market has certainty to help it invest and (ii) state policies do not create inconsistent or counterproductive incentives.

Federal policy should be designed to lower the cost of alternatives fuels to make those sources of transportation energy more competitive with petroleum-based fuels. This is the only way to ensure that consumers will gravitate toward low carbon technologies. Although some state incentive programs adopt this approach, others have vacillated between different approaches in a way that does not allow private market participants to plan long-term investments in alternatives. Such inconsistent policies are ultimately self-defeating, and that approach should be avoided.

Ensure fair treatment so that all households are not forced to subsidize alternative energy users.

Fundamental tenets of fairness dictate that users of transportation energy, including alternative energy sources, pay for that energy and related infrastructure. Unfortunately, this is not occurring today in two ways:

First, when utilities rate-base their EV infrastructure investments, it raises the monthly utility bills for all of a particular rate class, even though the benefits are confined to a small group of users. It is patently unfair and inequitable for policymakers to force most households to subsidize the refueling costs for EV drivers. Vehicle owners should pay the costs of powering their own vehicles in order to create a market system that will keep energy prices down and avoid regressive charges.

Second, it is imperative that highway infrastructure funding comes from all highway users, and not just those that rely on a particular technology. Any user fee to generate increased revenue for highways must capture all vehicles that use the roads.

* * * *

In the current policymaking landscape, it is tempting to paint a picture of how we want the world to look in ten, twenty, or thirty years without focusing on the steps needed to get from here to there in a way that establishes a sustainable market that will benefit consumers and the environment. Our associations believe that national, consumer-focused, and market-oriented climate policy is achievable. We are eager to work with the Committee as you consider a national clean fuels program and other ways to incorporate low carbon fuels into the transportation energy supply.

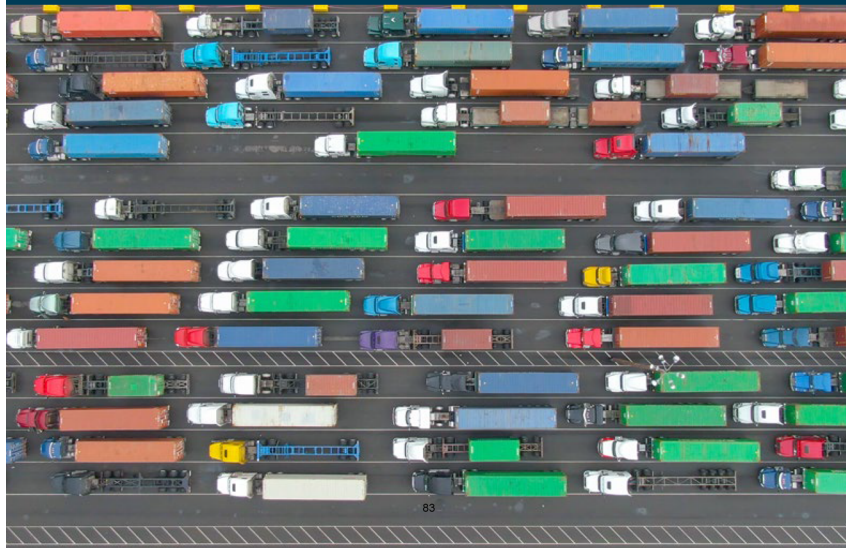
Sincerely,

National Association of Convenience Stores (NACS)
NATSO, Representing America's Travel Plazas and Truckstops
SIGMA: America's Leading Fuel Marketers



Closing the Transportation Emissions Gap with Clean Fuels

JANUARY 15, 2021





NEW YORK | CALIFORNIA | HONG KONG | PARIS

Closing the Transportation Emissions Gap with Clean Fuels

JANUARY 15, 2021

By Emily Wimberger, Trevor Houser, and John Larsen

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About this Report

This nonpartisan, independent research was with support from Breakthrough Energy. The results presented in this report reflect the views of the authors and not necessarily those of the supporting organization.

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Executive Summary

Federal and state policies adopted over the past two decades have done a great deal to bend the curve of greenhouse gas (GHG) emissions from the US transportation sector. However with 1.6 billion tons of CO₂-equivalent projected to come from the transportation sector in 2030, we are still a long way from being on track to net-zero emissions by 2050, or from reducing transportation-related pollutants like NO_x, particulate matter, and ozone, which disproportionately impact communities of color and low-income communities.

To achieve economy-wide net-zero emissions, we find that, in the transportation sector, a portfolio of strategies is the lowest cost and most likely to succeed. While efficiency improvements and vehicle electrification can cut transport emissions by up to two-thirds by 2050, low-GHG liquid fuels are needed to fill the

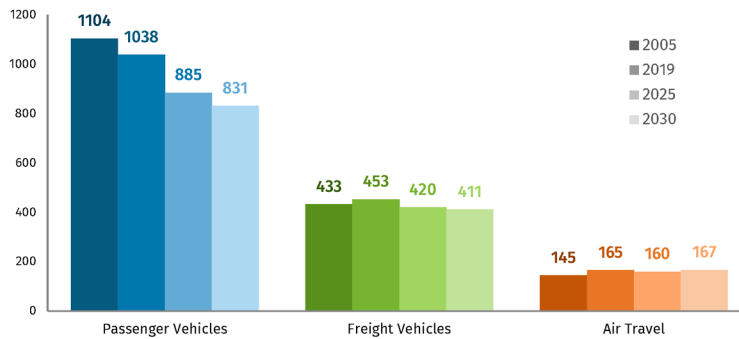
remaining gap and achieve net-zero emissions in the transportation sector by mid-century.

Transportation will continue to be one of the largest sources of US emissions

Transportation is the largest source of GHG emissions in the US, accounting for 33% of the economy-wide total in 2019. While transport emissions declined 6% between 2005 and 2019, the majority of reductions have come from the passenger vehicle fleet (light-duty vehicles). Between 2005 and 2019, emissions from freight vehicles rose 5%, and aviation emissions rose by 14%.

Looking forward, under current policy, passenger vehicle emissions are projected to be 20% lower in 2030 than they were in 2019, largely due to increased electrification. However, the same progress is not projected for freight transportation and air travel. Freight emissions are projected to decline by 9%, while aviation emissions are expected to increase by about 1% in 2030 (ES Figure 1).

ES FIGURE 1
US transportation emissions by mode, 2005-2030
 Million metric tons (MMT) of CO₂-equivalent (CO₂e)



Source: Rhodium Group. Projections are from Rhodium Group's Taking Stock 2020, V-shaped economic recovery scenario.

Electric vehicles alone will not get the US to net-zero by 2050

Under a scenario of modest electrification of light-duty vehicles (LDVs), we project that over 700 million metric tons of emissions will remain in 2050, from fuels that need to be decarbonized or displaced through mobility strategies that reduce vehicle usage (low electrification in ES Figure 3). Under this scenario, electric vehicle sales come in at the lower end of aggressive projections, reaching 35% of LDV sales in 2030 and 77% in 2040. Even with increased LDV electrification (ES Figure 2), where more than half of all LDV sales nationally are electric by 2030 and nearly 90% by 2035, 525 million tons of GHG emissions, 34% of emissions still remain in the transportation sector in 2050. The remaining emission reductions will need to come from fuel decarbonization and mobility solutions. Increasing mobility will reduce vehicle miles traveled but cannot decarbonize the remaining emissions from the

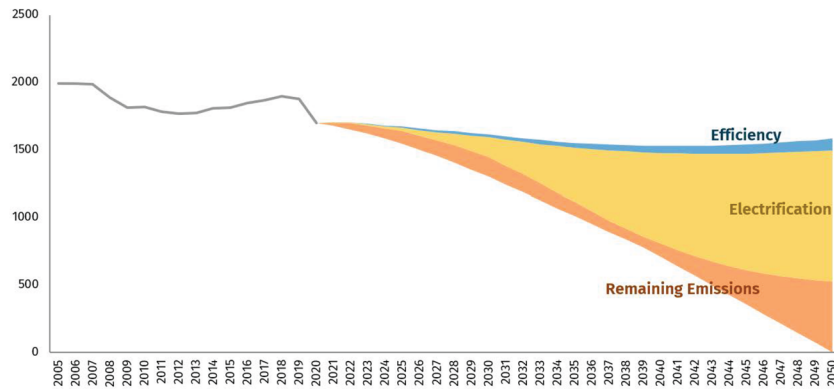
transportation sector. Clean fuels will be needed to close the transportation emissions gap.

A portfolio of clean fuels is needed to close the transportation emissions gap

Achieving net-zero emissions in the transportation sector in 2050 will require not just electrification but other strategies as well, including aggressive federal action to deploy a portfolio of clean fuels. We find in our modeling that a combination of advanced biofuels, electrofuels, and carbon-neutral fossil fuels (defined in ES Table 1) can successfully close the transportation emissions gap and get the sector to net-zero emissions by 2050.

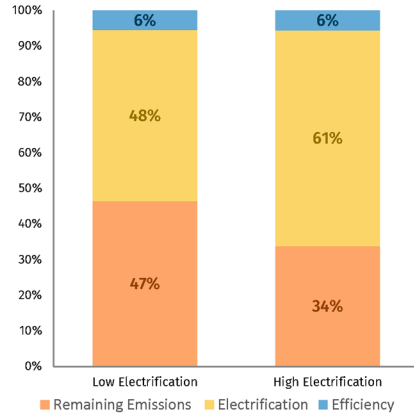
The optimal portfolio of clean fuels will depend on technology cost, feedstock availability and will vary regionally based on local air quality issues, availability of high-quality wind and solar resources and characteristics of the local agricultural economy.

ES FIGURE 2
US transportation emissions with decarbonization strategies under a high electrification scenario
 Million metric tons CO₂e



Source: Rhodium Group and EER

ES FIGURE 3
Transportation emissions fuel gap in 2050 under varying levels of electric penetration
 Percentage in million metric tons CO_{2e}



Source: Rhodium Group and EER

ES TABLE 1
Clean fuel categories

| | |
|-----------------------------|---|
| Biofuels | Conventional and advanced fuels made from biomass feedstock |
| Electrofuels | Drop-in liquid replacement fuels made from electricity, carbon, and hydrogen |
| Carbon-neutral fossil fuels | Petroleum fuels whose emissions are offset with negative emissions technology |

Federal policies to drive clean fuel deployment

Achieving net-zero emissions in 2050 will require aggressive federal action to reduce transportation demand, electrify vehicles, and develop and deploy clean fuels. A portfolio of policies can drive emissions reductions across transportation modes and amplify

reductions from policies enacted at the state and local level. The federal government plays a large role in determining the US fuel mix. Research funding, fiscal incentives, market-based policies, and GHG and air quality targets all shape the portfolio of fuel consumed across the country. Rather than relying on existing policies, the federal government can take action to accelerate the deployment and market penetration of the clean fuels needed to achieve net-zero emissions by 2050.

Federal transportation policy should support research and development of clean fuels through funding and investments in transformational fuel technology. Moreover, the federal government can accelerate deployment and development of clean fuels through fiscal incentives aimed at fuel manufacturers and fuel consumers to incentive the production and consumption of clean fuels. Federal procurement policies can also increase market penetration as bulk purchases can increase economies of scale. Ultimately, deep market penetration of clean fuels, required to achieve net-zero emissions by 2050, will require durable price signals and robust federal policies.

This report begins with projections of transportation emissions under current policy, to identify the emission reductions that will be needed to achieve net-zero emissions by 2050. Next, we identify the portfolio of strategies that can achieve net-zero transportation emissions, including a wide range of clean fuels to complement electrification, efficiency, and increased mobility. The report then shifts to the economic and environmental merits of a wide range of clean fuels and the federal policy tools that can drive development and market penetration of clean fuels to achieve net-zero transportation emissions by 2050.

The Honorable Tom Carper
 Chair, Environment and Public Works
 United States Senate
 513 Hart Senate Office Building
 Washington DC 20515

The Honorable Shelley Moore Capito
 Ranking Member, Environment and Public Works
 United States Senate
 172 Russell Senate Office Building
 Washington DC 20515

Dear Chairman Carper and Ranking Member Capito,

The undersigned organizations write to respectfully encourage immediate action by Congress to begin the process that will lead to greater decarbonization of the transportation fuel sector. As the Committee holds this hearing, *The Environmental Protection Agency's Renewable Fuel Standard Program: Challenges and Opportunities*, it is our hope there will be recognition that a national clean fuels policy can help to achieve the goals set forward to decarbonize the transportation sector. We support a national goal of net-zero greenhouse gas emissions economy-wide not later than 2050.

We believe a strong national clean fuels policy is a critical complement to ongoing efforts by the Administration and Congress to reduce greenhouse gas emissions and air pollution from the transportation sector by 2050. Given recent research showing the need for climate action this decade to avoid the worst consequences of climate change and the imperative to reduce the disproportionate public health burdens that have been borne by many frontline communities for decades, we believe that action in the 117th Congress is urgently needed to attain this goal.

The good news is that there is a common-sense solution to build upon the current federal approach to transportation fuels policy. A solution that is already proving successful in states like California and Oregon, it is called a "clean fuel standard (CFS)." A CFS is a market-based policy that supports a portfolio of clean transportation fuels. It ensures that transportation fuels are continually less carbon intensive from year-to-year. As we have seen in California, by not picking winners and losers, a CFS allows the marketplace to determine which fuel sources are the most effective at reducing carbon emissions.

A strong national clean fuels policy, built on a foundation put forward by the Midwest Clean Fuels standard framework, the California LCFS, the Oregon CFS, the CFS being implemented in Washington, along with policies under consideration in many other states, would send clear near-term and long-term market signals that will incentivize all low-carbon fuels and vehicle technologies, and that will disincentivize high-carbon fuels.

These programs all provide a common-sense solution to the problem of high-carbon fuels. They provide a fuel-neutral, technology-agnostic, market-based mechanism that accelerates investment in low-carbon fuels, infrastructure, and vehicles. This approach does not prohibit any particular fuel or technology. Instead, it allows the marketplace to determine which fuel sources are the most effective at reducing carbon emissions in each location.

A forward-looking program, like a CFS, will encourage rapidly growing investment in the technologies needed to simultaneously reduce criteria and carbon pollution in all communities across America. Designed properly, it will spur innovation in American technology, create jobs across the nation, help ensure equitable and sustainable economic growth, as well as smooth the transition to a cleaner, more just transportation sector. Such a fuel-neutral, technology-agnostic policy allows a broad coalition of stakeholders, like ours, to support all clean fuels, ranging from: renewable fuels to electrification to hydrogen – and many other new technologies well into the future.

Our organizations represent a wide array of stakeholders deeply invested in reducing emissions from transportation fuels. We represent automakers, farmers, environmental groups, utilities, science-based organizations, renewable fuel producers, technology companies, electric vehicle charging companies, truck and bus manufacturers, emissions controls makers, non-profit clean energy organizations, and more.

We encourage a strong national clean fuels policy that will send long-term signals and promote rapid investment in the technologies expected to reduce criteria and carbon pollution in all communities across America. Designing such a program will require a thoughtful process; to provide guidance from a wide range of stakeholders, we have attached a list of CFS design principles for Congress to consider. A national policy would provide greater stability and market certainty, which would ensure that vehicle makers, fuel providers, and other stakeholders all work towards common goals, and would maximize job creation and economic development in every state and region.

Thank you for considering our views as you consider the full range of strategies that will be necessary to meet our future economic, climate, and other important goals. We welcome the opportunity to participate in an open dialogue to further discuss how Congress can act on this important issue.

CC:

- | | |
|----------------------------|----------------------------|
| Senator Alex Padilla | Senator John Boozman |
| Senator Benjamin L. Cardin | Senator Joni Ernst |
| Senator Bernard Sanders | Senator Kevin Cramer |
| Senator Cynthia Lummis | Senator Lindsey Graham |
| Senator Dan Sullivan | Senator Mark Kelly |
| Senator Debbie Stabenow | Senator Richard Shelby |
| Senator Edward Markey | Senator Roger F. Wicker |
| Senator James M. Inhofe | Senator Sheldon Whitehouse |
| Senator Jeff Merkley | Senator Tammy Duckworth |

Sincerely,



Alder Fuels





Statement of Principles

The transportation sector and the national economy cannot achieve net-zero emissions by 2050 without addressing transportation fuels. A broad-based coalition of interests could help create demand for and support a national clean fuels policy, consistent with the following principles:

1. Transportation fuels must be decarbonized in sufficient time to achieve national net-zero emissions in the transportation sector not later than 2050.
2. Fuels decarbonization policy should be coordinated and not conflict with other greenhouse gas and pollution reduction policies and goals. Such policies should work together in an efficient and synergistic way.
3. A life-cycle emissions performance-based approach that is technology and feedstock neutral is essential to achieve fuels decarbonization and promote innovation and investment across all potential clean fuel types including electricity, hydrogen, biofuels and others.
4. Achieving the decarbonization goal and maximizing consumers' benefits can be most effectively accomplished by steadily growing market opportunities for low-carbon fuels with transparency, scale, and fair competition. Any such markets or programs must include safeguards and incentives to protect and enhance environmental integrity, including biodiversity, and to promote job creation and equitable and sustainable economic growth.
5. Any legislative or regulatory program should start not later than 2023 and provide clear long-term market signals for investors, market participants, technology innovators, and feedstock suppliers. Such policy or program should be implemented efficiently and transparently, and directed with unambiguous language and intent.
6. States or regions may implement clean fuels programs that are designed to steadily decarbonize transportation fuels. States or regions may increase the stringency of their program's decarbonization requirements if they have the technical capacity to manage the program.
7. The federal government and the states can and should make a constructive and sustained effort to a) ensure the best possible science is being used to support the value of fuels decarbonization, including with respect to life cycle analysis and applicable verification and reporting, and, b) expand the research, development and deployment of low and zero carbon fuels technologies and practices, including demonstration projects and technical assistance.

Senator CARPER. True confession, I was born in West Virginia in a coal mining town. I grew up in Danville and Roanoke. All my life as a kid, I loved cars. I loved cars, trucks, and vans as a little boy and as a teenager, and even as a big boy today. It has been a passion of mine.

I am an Ohio State Graduate. I love Ohio State, but I love Detroit. I am a huge Tigers fan. I was on the phone earlier this week with Chris Ilitch, the owner of the Tigers, talking about our team and pitchers and catchers reporting, so this is something that is just part of my DNA.

The other thing that is part of my DNA is trying to find consensus and common ground, trying to make sure that the people that are being born today are going to have a planet to grow up on and a planet to grow old on. As they grow up and grow old, they will have jobs that will enable them to support themselves and their families.

I mentioned earlier, I used to love to go to the Detroit Auto Show. They have always had it in January. Some of you may have been there. It was always cold. They moved the Detroit Auto Show now to June or July, and now we have the Auto Show here in the winter. I am happy they invited me to come by and speak at the D.C. auto show last month.

I was struck, as I walked around, I looked at the vehicles that were being offered at the auto show and thinking about, 10 years ago, when I was starting to first think about maybe buying an electric vehicle, being at the Detroit Auto Show, we had the Chevrolet Volt. It was a hybrid. It got about 38 miles on a charge.

But I walked around the year after that, and after that, and after that, and there just wasn't much coming along in terms of electric vehicles and hybrid vehicles. Boy, there is now. I was stunned when I walked around the huge showroom for the D.C. Auto Show. There were so many. It was not just little cars; it was SUVs, it was minivans, like my old Chrysler minivan, all kinds of vehicles that are being offered these days. It was exciting to see, and a lot of them are being built right here in America.

This is a glass half full deal. This is a glass half full deal. It is not going to be easy to get from here where we need to go, but it is imperative that we do that.

I will close with a quick story about Albert Einstein that I occasionally share in this committee, so hopefully you will not have heard it. I take the train to work; I take the train to go home most days. I love the train, I love Amtrak. I used to be on the Amtrak Board. Bill Clinton put me on the Amtrak Board and gave me a chance to help fashion and form the future of passenger rail in our Country a little bit.

This weekend, my wife and I had gone up to New York City to celebrate the birthday of one of our sons. On our way back, we stopped at a train stop where Albert Einstein used to get on and off the train. He used to teach at Princeton. As we stopped in Princeton, at the train station, I was reminded of an Albert Einstein story about the day he got on the train to go someplace, and sometimes he would go to New York City, he would go to Washington, wherever he would go.

One day, he got on the train and got to a seat and started looking for his train ticket. He looked in his pants, he looked in his coat, he looked in his briefcase, he couldn't find it.

The conductor comes along and sees that Albert Einstein is in some duress. He said, Dr. Einstein, we know who you are. You don't have to worry about it. Just forget about your ticket. That is OK.

The conductor turned around to walk out of the car to leave, and he turned around just before he went into the other car. Albert Einstein was down on his hands and knees looking for his ticket. The conductor rushes back to Albert Einstein, and he says, Dr. Einstein, you don't have to do this. We know who you are. You ride the train all the time. We know who you are.

Dr. Einstein looked up and said, I know who I am, too, I just don't know where I am going. I just don't know where I am going.

I have a pretty good idea, I think we all have a pretty good idea, where we are going. There is a smart way to get there, and there is a less smart way to get there. The smart way to get there is to figure out how to work together to get to where we all need to go.

One of the ways we will do that is by learning from those, it could be some States or jurisdiction, whether they have taken a wrong approach, and we will learn from their mistakes, and there will be others where they are on to something, something good, and we want to learn from both. We want to learn from both. Your testimony today will help get us on the right path, I think. We appreciate it very, very much.

In closing, I want to again thank our witnesses for your time and for your testimony today. Clean fuels help safeguard our Nation's energy security, boost economic opportunity for our farmers, and reduce greenhouse gas emissions. It has been over 15 years since Congress passed significant revisions to the Renewable Fuel Standard. Since then, American ingenuity and innovation, clean vehicle and clean fuel technology has advanced further than I think a lot of us would have imagined. With that in mind, I think it is time to revisit our national fuels policy.

I know this is not an easy issue to tackle. My dad used to say, you probably remember things your parents said to you. One of the things my dad used to say to us was, the hardest things to do are sometimes the things that are the most worth doing. This is not an easy one, but it is an important one, if we want to reach our energy security and our climate goals.

As I said earlier, my hope is that today's conversation will help be the start of more conversations between my colleagues and us and our other stakeholders, and what a national fuels program could look like, should look like.

Before I adjourn, some housekeeping. Senators will be allowed to submit written questions for the record through the close of business on Wednesday, March 1st. We will compile those questions; we will send them to each of you. We would ask you try to reply to us by midnight, March 1st. No, I am just kidding. We will ask you to reply to us by Wednesday, March 15th.

With that, without further ado, this hearing is adjourned. Thank you all.

[Whereupon, at 12:02 p.m., the hearing was adjourned.]

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