

Clean Air Act Advisory Committee

Mobile Sources Technical Review Subcommittee

In-Person and Virtual Meeting

May 11, 2023

U.S. EPA National Vehicle and Fuel Emissions Laboratory (Room 601 A-D)

Welcome & DFO Opening Remarks

Due to health and safety concerns regarding the coronavirus, this MSTRS meeting was hybrid, giving people the option to attend in-person or remotely through Microsoft Teams. Jessie Mroz, the Designated Federal Officer (DFO), welcomed all members, the press, and the public to the Mobile Sources Technical Review Subcommittee (MSTRS) meeting. Ms. Mroz introduced herself and reviewed the meeting agenda. She noted that the meeting is open to the public, and there will be time later in the day for public comment.

Ms. Mroz introduced Rich Kassel, MSTRS Chair, and pointed out that it is his last term on the subcommittee. Karl Simon and Sarah Dunham both thanked Mr. Kassel for his work on the subcommittee. Mr. Kassel has been part of the MSTRS since 2016 and will be stepping down in October. Mr. Kassel welcomed everyone to the first in-person MSTRS meeting since 2019 and spoke about the importance of this subcommittee.

Agenda

10:00 – 10:20 am	DFO Opening Remarks
10:20 – 10:30 am	MSTRS Introductions
10:30 – 11:10 am	Remarks from Sarah Dunham, OTAQ Office Director
11:10 – 12:45 pm	Locomotives Presentations <ul style="list-style-type: none">- EPA- Moving Forward Network- Wabtec- Association of American Railroads
12:45 – 1:00 pm	Lunch Break
1:00 – 1:30 pm	Locomotives Discussion
1:30 – 1:35 pm	Break
1:35 – 1:45 pm	Future Charges for MSTRS
1:45 – 3:15 pm	Discussion of Charges/Next Steps
3:15 – 3:30 pm	Break
3:30 – 3:40 pm	Public Comments
3:40 – 4:00 pm	Final Remarks & Closeout

Introductions of MSTRS Members

MSTRS Chair Rich Kassel asked each member to introduce themselves, starting with in-person attendees and then moving to virtual attendees. Members shared their names and roles at their companies or organizations. A list of attendees is included in Attachment 1.

Remarks from Sarah Dunham, OTAQ Office Director

Sarah Dunham, the Director of the Office of Transportation and Air Quality (OTAQ), welcomed and thanked everyone for taking part in the MSTRS and remarked on the diversity of expertise within the membership.

Ms. Dunham started the discussion with the topic of on-road regulatory proposals. In early April, two separate regulatory actions were proposed by OTAQ to cover federal emission standards for light and medium, and heavy-duty vehicles of model years 2027 and later. Ms. Dunham noted that the bi-partisan infrastructure laws and the Inflation Reduction Act (IRA) have significantly invested and incentivized the move towards cleaner vehicles and many manufacturers have invested in cleaner and zero-emissions technologies. She also mentioned that state and local governments are leading in this area, and the EPA has taken those actions into account when shaping the current proposals.

Ms. Dunham briefly discussed the two proposals, starting with light and medium-duty vehicles. The goal for this proposal is have emission standards for vehicles sold during the 2027 to 2032 period that are as clean as possible and that significantly reduces emissions of CO₂, hydrocarbons, NO_x, and particulate matter (PM). The proposal included a phased-in approach, where more stringent standards would apply each year during the 2027 to 2032 period. Another goal was to provide a range of options within the proposals that would encourage comments and engagement with stakeholders. For light-duty vehicles, the proposed standards are projected to result in an industry-wide average target of 82 grams of CO₂ per mile, which represents a 56% reduction in predicted fleet average greenhouse gas (GHG) emissions compared to model year 2026. For medium-duty vehicles, the proposed standards are projected to result in an industry-wide average target of 275 grams of CO₂ per mile, which represents a 44% reduction in predicted fleet average GHGs compared to model year 2026. OTAQ estimates that consumers will save anywhere between \$450 to \$890 billion in fuel costs. Ms. Dunham recognizes that although the goal is to move to zero-emission vehicles, internal combustion engines will be around for a long time, and the EPA proposed more stringent standards for those vehicles as well. From the existing criteria pollutant standards, a 60% reduction in non-methane organic gases and NO_x was proposed for light-duty vehicles and a 66-76% reduction for medium-duty. For both light and medium-duty vehicles, OTAQ proposed standards that would result in a particulate matter reduction of over 95%. Ms. Dunham thanks the members that testified in the public hearing for this proposal.

The standards required in the second proposal relating to heavy-duty vehicles would regulate heavy-duty vocational vehicles such as delivery trucks, refuse haulers, public utility trucks, transit and shuttle vehicles, school buses, and tractor trailer trucks. These would be performance-based standards that would allow manufacturers to choose the set of emission control

technologies that are best suited for their vehicles. Similar to the proposed standards for light, and medium-duty vehicles, this rule would cover model years 2027-2032 and increase in stringency each year. The EPA projects there will be 1.8 billion metric tons of CO₂ reduced from this proposed rule, as well as a reduction in smog, PM, and volatile organic compounds (VOCs), all of which are critical for an improvement in public health. Like with light and medium-duty vehicles, consumers should see a significant reduction in fuel, maintenance, and repair costs. Ms. Dunham thanked everyone for testifying at the hearing for the heavy-duty rule and remarked that the next year will be busy working toward finalizing these rules.

Ms. Dunham then spoke briefly about other transportation sectors that require a reduction in emissions. Ms. Dunham mentioned the importance of continuously reducing airborne lead, and that aircraft using leaded fuels are currently the leading source of lead emissions in the air. Last October, OTAQ proposed an endangerment finding determination on aircraft lead, which is a science-based process. If the endangerment finding is finalized as proposed, this would trigger an obligation by both the EPA and the Federal Aviation Administration (FAA) to set regulatory standards for the chemical compositions of aircraft fuels and fuel additives.

Ms. Dunham then spent a short period of time discussing locomotives and recognized that a large portion of the day was already set aside for this conversation. OTAQ has committed to two actions in response to petitions received from California air agencies regarding harmful pollutants from locomotives. First, OTAQ has committed to undertake a notice and comment rulemaking process to reconsider existing locomotive pre-emption regulations to ensure that states, such as California, are not limited in their authority under the CAA to address their air quality issues. The EPA followed through on that commitment and proposed changes to the preemption of state regulation of new locomotives in the heavy-duty sector proposal. Second, OTAQ committed to forming a rail study team that would develop a set of options and recommendations for possible EPA regulatory actions addressing new and existing locomotives and locomotive engines. This team is now busy collecting information and engaging with stakeholders. Ms. Dunham thanked Lauren Steele for leading this team and welcomes MSTRS members who are present at the meeting specifically to hear about and discuss the rail topic.

Ms. Dunham mentioned the importance of renewable fuel standards and the three efforts that OTAQ is in the middle of relating to those standards. First is what has been called the “Set Rule,” which is the first rule that sets a foundation for renewable fuel standards. Second, OTAQ received petitions last year from eight western states requesting the removal of the one-pound-per square-inch vapor pressure waiver. The effects of this removal would be that E-10 and E-15 fuel would be able to be made and sold with the same gasoline blendstock. Third, OTAQ recently issued an emergency national waiver for E-15 fuel so that it can be sold during summer months.

Ms. Dunham wrapped up her summary with a discussion of what OTAQ is doing with the funding related to the IRA and Clean School Bus Program. OTAQ recently put out a request for information on the availability and market price performance of zero-emission trucks, zero-emission ports equipment, electric charging, and other fueling infrastructure. As for the Clean

School Bus Program, OTAQ has begun the process of taking applications for the grant program and has started to create a second rebate program.

Discussion

One member asked whether the EPA could advance its guidance on how state governments can take credit in the MOVES model for the federal money being spent on initiatives to reduce emissions. Ms. Dunham recognized that credit should be given for reduced emissions accomplished through these programs and that the EPA is still determining how this should be done.

Another member asked about how the agency is using the lifecycle information that has been provided to the EPA. Ms. Dunham responded that the EPA held a workshop last February that was meant to help the agency gain an understanding of the state of the science of lifecycle modeling for biofuels. Ms. Dunham recognized that there has been a lack of work in lifecycle analysis by the agency recently and that they are working to move forward in this field of work. Ms. Dunham stated that she is very interested in this area and that the EPA is working to improve upon its current methods of lifecycle analysis.

Another member congratulated EPA on getting the light and heavy-duty proposals out and recognized that there will be a lot of work to get the proposals to the final stage. The member asked what Ms. Dunham sees as the biggest barrier to getting those rules finalized. Ms. Dunham responded that there are not necessarily “barriers” to getting the rules finalized but that the EPA is prioritizing the many public comments that have been received regarding the rules and is working to understand and address the challenges to implementing the rules that commenters have highlighted.

One member asked what the EPA is doing to help better protect frontline communities that are exposed to traffic pollution, noting that a lot of money states have received from the IRA are being used for highway expansion, which will only increase vehicle miles traveled and related vehicle pollution. The member also mentioned that EPA PM monitors are required to be sited away from major highways, which would show hotspots if they were moved closer. Ms. Dunham recognized that there are a lot of efforts being undertaken at once that may have an effect that is counter to individual goals. She remarked that this highlights the need for efforts between different government agencies need to be coordinated.

EPA Regulatory Overview: Locomotives

Lauren Steele - U.S. EPA Office of Transportation and Air Quality

The first presentation on locomotives was given by Lauren Steele, from the Diesel Engine Compliance Center at OTAQ. Ms. Steele mentioned that locomotives are durable and high-capital equipment, so typically, the operator’s goal is to keep them working for as long as possible. While this has always been true, the fleet turnover has reduced by an order of magnitude, from about four percent per year down to 0.4 percent per year, in the last decade. With this low turnover rate, Ms. Steele emphasized the importance of getting any new regulations for locomotives “right,” and that it is important for the agency to have a proper

amount stakeholder input in the process to ensure all stakeholder positions are adequately considered.

Ms. Steele noted that this sector has less variability in the product than typical for the mobile source sector, as there are only three different types of locomotives. The three types are line haul for freight, line haul for passengers, and switching locomotives. The railroad classifications, (i.e., Class I, Class II, Class III) are defined by the Surface Transportation Board based on revenues but are not used by the EPA in its regulations. The EPA classifies businesses as large (Class I) or small (Class II/III) based on the number of employees. Ms. Steele noted that locomotives contribute significant amounts of PM_{2.5} and ozone emissions across a large section of the country. She also mentioned that uncontrolled, pre-1973 locomotives are not well characterized, and there is not much emission data for them. She further mentioned that almost half of the locomotives used by Class II and III railroads are uncontrolled, and a large percentage of the overall fleet are Tier 2 or less for the emission standards they must comply with. Currently, the locomotive engine standards apply to locomotives built since 1973, and pre-1973 locomotives trigger requirements only if they are upgraded. Five tiers of rules (Tier 0 through Tier 4) with increasing stringency apply to locomotives built since 1973, depending on the manufacture or remanufacture date. Ms. Steel then discussed the current anti-idling regulations, which require remanufactured and new engines to have a timer that shuts the engine off after 30 minutes of idling. However, the agency has learned from stakeholders that the override function of the timer is often used because most locomotives lack an alternate power source to maintain acceptable system conditions.

Freight Locomotives and Rail: Issues, Impacts, Injustice, and the Need for Zero-Emission Solutions Now

Jose Acosta, Ivette Torres, Beto Lugo Martinez - Moving Forward Network

Jose Acosta, from the Little Village Environmental Justice Organization in Chicago, Illinois, started the presentation for the Moving Forward Network. Mr. Acosta stated that the mission of the Moving Forward Network is to build power with frontline and fenceline communities, transform the global freight transportation system, and advance environmental justice. Mr. Acosta then introduced the additional speakers: Ivette Torres from Peoples Collective for Environmental Justice and Beto Lugo Martinez from CleanAirNow.

Mr. Acosta explained that the main issue with locomotives is that they run on diesel fuel, and diesel emissions are extremely harmful to human health. High railyard emission concentrations are extremely dangerous, as there are many communities that are in close proximity to these railyards. One key issue is idling, which happens often in the Chicago area. Mr. Acosta then discussed the history of EPA regulations for locomotive emissions, noting that the last regulation created by the EPA for emissions from locomotives was in 2008, which is when Tier 3 and 4 emission standards were created. He also mentioned that very few locomotives are subject to Tier 4 standards.

Mr. Acosta then talked about rail in the Chicago area, as it is a very large hub for locomotives. He noted that approximately 25 percent of all freight trains and 50 percent of all intermodal

trains in the U.S. pass through metropolitan Chicago each year. Area industries that rely on the frequent shipment of goods -- manufacturing, construction, retail trade, and wholesale trade -- represent over one-quarter of all jobs in the region and add over \$158 billion per year to the regional economy, and about \$3 trillion in goods pass through Chicago each year. He remarked that it is also one of the most congested rail hubs, with trains taking as long to pass through the city as to arrive from the west coast, and more congestion leads to more pollution.

Mr. Acosta then showed a photo of an intermodal railyard located in Chicago, where there are neighborhoods surrounding the railyard. Mr. Acosta stated that Chicago is an inland port city, and it is the second busiest port city based on container volume in the U.S. and the 10th largest in the world. Intermodal railyards are also primarily located in low-income communities and communities of color. With such a high amount of rail activity in Chicago, it is important to the public health and environment of the area to address the emissions from this sector.

Ivette Torres, from Community Scientist for Peoples Collective for Environmental Justice, then proceeded to discuss railroad activity in Los Angeles and the Inland Empire area. Ms. Torres showed photos of the Colton and San Bernardino areas of California, both of which show the proximity of neighborhoods to railyards. Ms. Torres mentioned that an additional rail line is being added in San Bernadino, which will displace many homeowners on the west side, an area that is already severely impacted by the rail industry.

Next, Ms. Torres showed images of air quality monitoring data in the Inland Empire. These images showed very high PM_{2.5} measurements, and she pointed out that this was from the last study done on the effects of emissions from railyards in 2008. The communities in these areas are of low income, and folks in these areas are often diagnosed and die from cancer.

Beto Lugo Martinez, from CleanAirNow in Kansas City, presented next. Mr. Martinez showed an image of a park that is located directly next to a large railyard. Mr. Martinez explained that many children congregate here to use the playground, play soccer, etc. Mr. Martinez showed a few more images of railyards, rail lines, and the communities that are in close proximity. Mr. Martinez used those examples to support the fact that people from these communities should be at the decision-making table. Mr. Martinez then discussed the steps and the studies that his program is performing in Kansas City. Mr. Martinez pointed out that although the EPA has recognized some of its work, such as the KC Tracks study, the EPA has yet to interact with the community members that are negatively affected by air pollution. Mr. Martinez urges EPA to consider how they interact with the frontline communities and address current environmental justice issues. Mr. Martinez emphasized that zero emissions is the ultimate goal, and that it is possible.

Molly Greenberg, the campaign manager of the Moving Forward Network, finished up the presentation by discussing their call to action/ next steps:

1. The Committee should recommend that EPA adopt a Tier 5 zero-emission locomotive standard by the end of 2023. Including the development of a scrapping program to ensure that the dirtiest locomotives and switchers are taken offline.

2. Coordinate with the Federal Railroad Administration's Climate & Sustainability Division to support further zero-emission locomotive deployment, funding & development.
3. Distribute air monitors near railyards around the United States to better understand on the ground emission impacts. Data should be public and accessible.
4. Conduct emissions modeling that looks at proximity of railyards to sensitive receptors, cumulative impacts, and health impacts, accounting for race & socio-economic factors.
5. Develop a nationwide locomotive registry that includes locomotive tier, years in operation, locations, routes, and hours of operation.
6. Establish stakeholder process to continue ongoing engagement with frontline and fence line communities, such as monthly meetings. Engagement should be included throughout the planning, development, and implementation of 1-5.

Association of American Railroads

Theresa Romanosky - Association of American Railroads

Theresa Romanosky, from the Association of American Railroads (AAR), was the next presenter. Ms. Romanosky started by acknowledging that there are no simple solutions to the complicated issues regarding railroad emissions.

Regarding the US railroad industry, Ms. Romanosky offered that in North America, it is an interconnected, privately-owned, 180,000-mile network. There are six Class I railroads that operate over two-thirds of the nation's right-of-way and represent 95% of railroad freight revenue. She added that freight rail accounts for approximately 40% of long-distance ton-miles for freight, more than any other mode of transportation and that more than \$23 billion is privately invested annually by the railroads in their networks. She mentioned that the last decade has been the safest ever for freight railroads, and that freight railroads are the most fuel-efficient way to move freight over land. For example, on average, one train can move one ton of freight close to 500 miles on one gallon of fuel, and moving freight by train instead of truck reduces GHG emissions by up to 75% on average. In addition, one train can carry the freight of hundreds of trucks, which reduces highway congestion. She also noted that freight railroads are three to four times more fuel efficient than trucks, on average.

Ms. Romanosky listed a few locomotive fleet facts that include:

- Class I railroads owned 23,184 locomotives in 2022.
- There are currently thousands of locomotives in storage due to an increase in efficiency.
- 45% of total locomotives were built before 2000.
- An average of less than ten new locomotives were added to the US railroad fleet in the last two years.
- Class I railroads interchange locomotives.

Regarding carbon reduction, Ms. Romanosky mentioned that all six Class I railroads in North America are committed to near-term emissions reduction targets and improving efficiency. All Class I railroads have made formal commitments to carbon reduction through the Science Based

Targets Initiative (SBTi), and many have also made other public commitments to shareholders and investors. Diesel fuel usage in locomotives is a primary driver for rail emissions, with well-to-wheel emissions associated with locomotive fuel currently accounting for 95% of their total emissions footprint.

When looking at the ongoing decarbonization initiatives, Ms. Romanosky stated that there are two different tracks. The first is railyards, and the second is locomotives. Railyards, which have equipment like cranes and drayage trucks, with shorter lifespans than locomotives, are being replaced with battery-electric technology. While she acknowledged that it is a little more difficult to change switcher locomotives to zero-emissions technology, battery electric technology is being studied for these and could be a good fit. For locomotives, batteries are currently not powerful enough yet. A 5,000-gallon diesel tank that locomotives typically have would require a battery of 200 megawatt hours (MWh) to be equivalent in power, but the most powerful batteries currently being produced are only about 14 MWh in capacity. Recent decarbonization efforts have included prototype testing of various alternative fuels in locomotives and exploration of low- and zero-emission equipment in railroads. Ms. Romanosky brought up the important points that any new locomotive technologies are required to go through extensive testing before being “commercially viable” and that the infrastructure for that technology would need to be built.

To finish her presentation, Ms. Romanosky mentioned some current locomotive research initiatives. She remarked that biodiesel and renewable diesel will play an important role in Class I railroads meeting their carbon reduction goals. Some of the challenges include the limited supply and availability of alternative fuels in certain parts of the country, cost-competitiveness when compared to standard diesel, and manufacturer limits on fuel blend for engine warranties. As for biodiesel and renewable diesel use in existing locomotives, Progress Rail approved of B-20 and 100% renewable diesel in its locomotives, which may reduce carbon emissions by 20-25%. AAR’s members are partnering with Progress Rail and Wabtec to test different blends of biodiesel and renewable diesel in various engines.

Wabtec

William Carnegie - Wabtec

For the final presentation of the session, William Carnegie from Wabtec presented some general information about locomotives along with information about emission reduction technologies. When looking at heavy haul locomotives, some characteristics are that they weigh about 432,000 pounds, reach 75 miles per hour at top speed, have a 4,500-horsepower diesel engine, carry 5,000 gallons of fuel, use about 250 thousand gallons of fuel per year, and are in service for about 29 years. When compared to a typical passenger car, a line haul locomotive is about 100 times heavier, 11 times more powerful, has over 2,000 times more energy on board, and is about 2.5 times the average age of a passenger car. When looking at the difference between switcher locomotives and a typical passenger car, a switcher locomotive is about 55 times heavier, 6 times more powerful, has about 1,300 times more energy on board, and is about 3 times the average age of a passenger car. Mr. Carnegie mentioned that biofuels combined with efficiency improvements are the primary path to meeting the industry’s 2030 goals and that battery locomotives are still in the pilot stages. Mr. Carnegie also mentioned that hydrogen fuel cells are

in the demonstration or pilot phase. Long-term, Class I SBTi goals are projected to require an energy transition away from petroleum diesel.

Mr. Carnegie then discussed each alternative fuel option, including biofuels, batteries, and hydrogen fuel and the stage of development each is in. He noted that biofuels can be used in some modified locomotives now, but their use is dependent on the biofuel supply. The other options are still in the development phase, and in addition to the need for technically feasible technology, their use will be dependent on the scale of available infrastructure. Mr. Carnegie also discussed the digital space, with tools such as a Trip Optimizer, Smart HPT, FLX Optimizer, and Network Optimizer, which will help make locomotives more efficient and produce fewer emissions.

Locomotives Panel Discussion with Presenters

Mr. Kassel opened the panel discussion and explained that the goal of this part of the meeting is to have questions and comments from MSTRS members for the panelists regarding their presentation and also to help OTAQ think through potential charge(s) for future a workgroup regarding locomotive issues.

One member began the discussion by mentioning the railyard she lives near and asked about the trajectory for transitioning to zero emissions, noting that her community is willing to live with a 99% reduction in emissions rather than zero emissions. William Carnegie opined that for switchers, they would likely go to Tier 4, and those could get further reductions in PM emissions with alternative fuels. For the transition to zero emissions, he remarked that it will be very dependent on the infrastructure capability of the location and that technology will vary depending on location. Theresa Romanosky added that the permitting requirements for something like a power substation could take up to seven years, so there is a lot of uncertainty about how long the transition to zero emissions will take. She also mentioned that with the cost and long life of locomotives, it is very difficult for the rail industry to consider retiring units that can still be used for their intended purpose, but they are more open to remanufacturing them to improve efficiency and emissions. Molly Greenberg added that it is also a question of prioritization, and that this is not something that is easy to prioritize due to multiple challenges and loopholes, but that it is critical to do that prioritization and shift to zero emissions because the status quo is negatively impacting communities. Beto Lugo Martinez mentioned that there is a loophole in federal regulations that allows locomotives to operate under the same emissions that they produced when they were first made. He suggested that the railroads could be required to make a deposit of funding to an account every year, the amount of which would depend on the emissions from their locomotives, and that they could then use those funds to buy zero-emissions technology or infrastructure. This could be paired with a requirement to retire the oldest locomotives. Mr. Martinez requested that the EPA consider locomotives as a priority because the EPA has the power to enforce new emission regulations and move the industry towards zero emissions.

Mr. Kassel suggested that due to a lack of time and lots of interest in the discussion of locomotives, there could be a follow-up discussion at a later time.

One MSTRS member continued the conversation by bringing up the topic of mode shift from truck to rail and asked what the corollary graph would look like for PM_{2.5} and NO_x emissions. Ms. Romanosky responded by saying that she does not have corollary graphs but that it would depend a lot on the location and whether there are rail lines available there. Mr. Carnegie also mentioned that it would be an interesting and fairly simple calculation to do when looking at truck and rail, but that it would be important to agree upon the boundary conditions, such as assuming a certain amount of freight and a certain amount of emission reduction in both locomotives and trucks when calculating the change in emissions from those mode shifts.

Next, a MSTRS member thanked the Moving Forward Network for being present at the MSTRS meeting and acknowledged how difficult it can be for many frontline communities to have activists speaking on their behalf. Regarding emissions and how states are going to meet the NAAQS, the member stated that setting new emission standards is not going to suffice in reducing emissions from locomotives considering their long lives. There needs to be a focus on how to shift the older locomotive out of the fleet. Ms. Greenberg responded by acknowledging that when locomotives are at a point where they need to be refurbished, there should be an emphasis on getting emissions reductions and shifting to zero emissions technologies. She also stated that there are some ways mode shifts can be applied but that there are many situations where it will never be a viable solution. Ms. Greenberg emphasized that a wholistic approach is needed to truly improve air quality. Ivette Torres added that many locomotive builders are also pushing for zero-emission technology.

Another MSTRS member suggested that Tier 4 locomotives will give more reduction in PM_{2.5} than zero-emissions technology because the HEPA filters used in the Tier 4 engines have been shown through EPA test procedures to reduce the amount PM in the ambient air – i.e., the air going into the engine is dirtier than the air that comes out. This means the net effect is that Tier 4 technology would produce more emission benefits than zero emissions technology. Ms. Greenberg was interested in hearing more information on these studies.

One MSTRS member asked about the constraints in the distribution of renewable diesel regarding the ability to put it into a pipeline. One member stated that this is out of EPA's jurisdiction but that removing the regulatory constraints on the distribution of renewable diesel in the pipeline would help it become more widely used. Ms. Romanosky added that there is a feedstock constraint of renewable diesel and that many people are working to increase that supply. A second question was asked regarding the number of Tier 0 locomotives still in operation today. Ms. Greenberg stated that 77 percent of Class I railroad locomotives are still using Tier 2 or older technology.

One member asked whether the use of hybrids would be a good option to help in the transition to zero emissions. Mr. Martinez stated that he had not seen the use of hybrids, and he added that using biofuels would still have a large negative effect on the health of frontline communities, as the processing/manufacturing plants are often located in those same communities. Ms. Greenberg added that any transition with locomotives takes a long time due to their working lifespans, so it is better to focus on zero emissions and only have one transition. Another member said that the goal of zero emissions is great, but in the near term, there should be more incentivization for

emission controls and retrofitting older locomotives to move towards Tier 4. Mr. Carnegie stated that switcher locomotives will affect community health the most, and there is technology available to upgrade those locomotives to Tier 4. Ms. Romanosky added that railroads are currently working towards that for switchers.

A MSTRS member mentioned that there is a lot of looseness around GHG vs. criteria pollutant benefits of rail in the discussion at the meeting and that focusing the discussion with some near-term modeling could be very beneficial.

Mr. Kassel stated that a wide array of topics was brought up in this discussion and acknowledged the importance of this committee in flagging these issues. He thanked the presenters for bringing this information forward.

Future Charges for MSTRS: National Blueprint for Transportation Decarbonization & Future Mobility Report Overlay Presentation

Karl Simon, U.S. EPA Office of Transportation and Air Quality

Karl Simon, from the U.S. EPA Office of Transportation and Air Quality, provided a bit of context for the following discussion. Mr. Simon stated that the MSTRS Future of Mobility Report came out in 2021 and the National Decarbonization Blueprint that came out a year later share a lot of commonalities. Themes from both include a need for increased focus on EJ areas, increased collaboration, fuel neutrality, public education, and addressing the legacy fleet. From now until 2030, the goal is to get the rules in place and build infrastructure. From 2030 to 2040, the work will be in scaling, so that by 2040 it is clear what needs to be done to reach 2050 goals. The last decade, 2040 to 2050, will be the big transition to clean technologies.

Discussion of Charges/Next Steps, Workgroup Team Leads, Supplemental Group Meetings

Rich Kassel, MSTRS Chair, led a discussion on four themes for which OTAQ is currently considering requesting further input from the MSTRS. The goal is to determine which of these four issues MSTRS members have more interest in, so that one or more workgroups can be formed. Mr. Kassel also mentioned that the flagged issues from this discussion would be what OTAQ considers while moving forward with in contemplating these issues and developing workgroup charges.

Discussion Topics for MSTRS Spring Meeting:

1. Testing requirements and provisions for fuel economy labeling associated with advanced technology vehicles (such as electric vehicles and fuel cell vehicles) and vehicle performance data, as characterized on the label, fueleconomy.gov, and other consumer-facing websites.

MSTRS comments/ideas/thoughts/recommendations:

- The consumer should have visible information through the label to understand the efficiency of the vehicle. There needs to be visible information about the

safety of the vehicle, not just to its passengers, but also considering the effects that vehicle has on others in a crash.

- This topic should be approached from a perspective that green energy is a precious, limited resource, and we need to consider the ability of green energy to offset emissions in each application.
- Auxiliary systems in vehicles need to be considered in terms of the overall energy use of the vehicle compared with the primary use of the vehicle.
- The number of labels required to be on cars is increasing, but there should be an incentivization to come up with a new electronic version of labels.
- When looking at new labeling, there needs to be a form of measurement that is accessible to consumers, such as the common understanding of miles per gallon, but that includes the full lifecycle of the vehicle or equipment.
- Simple, up-front, physical labels are good if we're trying to impact buying decisions. Safety scores and lifecycle information would be good to present.
- For medium and heavy-duty vehicles, information about how efficient the vehicle is when performing its main function, such as hauling equipment, would be good information to have and share.
- Energy Star is a great example of a label style.
- For consumers, it would be helpful to show ranges of mileage based on different use scenarios, like driving in cold weather.
- For light-duty vehicles, it would be helpful to have a score for upstream suppliers that would encompass their production emissions, such as the GHG emissions from battery production. We should consider putting this information on labels.
- For heavy-duty vehicles, labels are not as important, but maybe that information could be incorporated into SmartWay, with something like "SmartWay Electric" that could also include the infrastructure components.
- The entire process should be modernized, with thought given to whether physical labels are needed and whether QR codes could be used or would be helpful.
- Average consumers may not be so interested in upstream emissions or the labels on cars, but giving them information they can use, such as the ranges in miles per charge, might be better.
- Thought should be given to how EV infrastructure is labeled. Also, consumers will care most about how much the vehicle costs, how much the fuel or electricity will cost, and how long it takes to charge. This would apply equally to light, medium, and heavy-duty vehicles.
- The label should be kept simple and focused on the topics consumers want to know, such as how far the EV will go, and how heavy a load can be towed with the vehicle. This is the type of information is useful to consumers and helps them make meaningful comparisons between products.

- Physical labels may be a bit old fashioned, as most people are looking at vehicle information online before going to buy a car. They will likely only see the information on the dealer's or manufacturer's website before they make a decision.
 - Considering the vehicle-to-grid or vehicle-to-home capabilities is an important topic.
 - Considering whether the vehicle draws on scarce resources in the supply chain, like lithium and cobalt, is also an important consideration.
2. Addressing legacy emissions from existing and future internal combustion engines (ICE) vehicles and equipment.

MSTRS comments/ideas/thoughts/recommendations:

- One suggestion is to stop scrapping 2010-compliant heavy-duty vehicles and ensure those newer vehicles go to the next user, but pre-2010 vehicles should be retired.
- Low carbon fuels should be taken advantage of. Biofuels and other fuel improvements decrease criteria pollutants as well.
- EPA should consider how to incentivize collaboration to make faster progress toward the goals in some of these areas.
- It would be helpful for the EPA to develop definitions regarding zero emissions for states to use in their in-use programs so that everyone is on the same page.
- Zero-emission zones need to be adopted more often. The existing statutory authority of DOT and EPA should be used to help manage the additional traffic on the existing roadway system.
- There should be much more retirement of old and dirty vehicles.
- There are limited low-carbon fuels, and they should be used in the sector where they would provide the most benefit or where other options are limited.
- The latest technologies, such as using telematics to monitor ICEs, should be used, as outlined in the Future of Mobility report.
- The EPA is limited on in-use rules, so look to the states to implement some of those elements through state implementation plans (SIPs).
- There is a need to think about how to incorporate strategies to reduce vehicle miles traveled (VMT).
- It is important to consider equity and who is being harmed by the legacy vehicle emissions. Some owners of the oldest and dirtiest vehicles located in EJ areas are not going to be in the market for a new vehicle, but that is where the biggest differential in emissions and greatest impacts would be found.
- There could be some synergies between federal and state programs. California has the Clean Truck Check program (a heavy-duty inspection program), and states and other jurisdictions could benefit from guidance in how to get SIP credit from programs like these.

- The EPA could issue revised PM monitoring siting guidance to ensure monitors are located in the best areas to address communities who are most affected by emissions.
 - OTAQ should be encouraged to work with EPA’s Office of Air Quality Planning Standards regarding the PM NAAQS standards. The current standards are on annual basis rather than a 24-hour basis and changing it to a 24-hour standard would be more protective of health and would accelerate the changes need to reduce emissions, such as the replacement of older vehicles with newer technology vehicles.
 - Brake and tire wear emissions should be considered.
 - There are 2035-2040 commitments that have been made by state and local governments for emissions reductions, but the time value of early action should also be considered, especially regarding PM emissions.
3. Expanding the SmartWay program to other sectors beyond those currently covered. This could include nonroad equipment as well as other parts of the goods movement sector.

MSTRS comments/ideas/thoughts/recommendations:

- Consider a program for off-road equipment and possibly create a fleet recognition program for those.
- SmartWay could be expanded to include off-road equipment and also could be expanded or revised to apply in other countries.
- There should be incentives for EV infrastructure so that more EVs will be purchased and used.
- It should be a corporate responsibility to be transparent about manufacturing throughout the lifecycle, so people know where and how everything is being made and the resulting emissions.
- A way for companies to be certified by and labeled as SmartWay for using clean equipment should be explored. This could apply to many sectors, such as agriculture or construction.
- A voluntary or recognition program would be helpful for landscaping companies.
- A label or certification program could help cities and others to award extra credit to clean companies during the contract bidding process.
- For a label or certification program, it would be important that the labeling or certification process be based on quantitative measurements and that the whole company would not be awarded the label if only a small part was certified. This would prevent companies from being able to “green wash” themselves this way.
- Transportation efficiencies should be considered, such as congestion reduction.
- There could be a way to link a label or certification to “extra points” in the process for grants or other funding.

4. Using lifecycle analysis (LCA) modeling as a tool to periodically review the progress of transportation decarbonization, including fuels, vehicle manufacturing and operation, and battery recycling.

MSTRS comments/ideas/thoughts/recommendations:

- There could be a connection between LCA and labeling, such as the percentage of “green steel” in a vehicle.
- There could be a QR code that shows the carbon intensity of a product, such as the product along with the carbon intensity of the grid used in the area.
- For biofuels, the uncertainty in their use hinders adoption by industry. Maybe there could be some discussion or consensus around biofuels and how it would impact companies that decide to use biofuels or not.
- Some federal and state programs require LCA for biofuels but keeping it up to date is difficult.
- LCA needs to use current data as science and technology evolves.
- For LCA, there should be a prioritization of where the effort is spent. It may be most helpful to focus on the individual pieces of the production process that matter most to emissions rather than trying to develop a perfect analysis.
- Whether or not to do LCA is not much of a question and should be used in a corporate responsibility pledge. The real question is what strategies are available for mitigation if LCA shows a problem.
- In LCA, there needs to be caution in the use of a single renewable energy rate for an area, because it will depend on when the item charged and whether renewable assets (such as wind) are online at that time.
- Costs need to be considered as well in LCA.
- Using a robust LCA model is key and updating it with new concepts and information is important.
- There could be more collaboration in data used for LCA modeling between different government agencies, such as for farming emissions.
- With increasing EVs, infrastructure will become an increasing part of the transport sector’s carbon emissions, and that infrastructure needs to be part of LCA rather than just the vehicle and fuel.
- A point to consider for LCA is what the baseline is - where you are starting and what you are comparing that to.

After a quick break, Mr. Kassel had an informal vote of who and how many people would want to be part of workgroup(s) for locomotives and the four other topics discussed above.

Votes (estimated based on raised hands):

Topic #1 – 9

Topic #2 – 13

Topic #3 – 4

Topic #4 – 8

Locomotives – 14

Mr. Kassel mentioned that the first and fourth topics could be combined for one workgroup. Mr. Simon remarked that the vote was illustrative and that OTAQ will be developing a charge for one or more workgroups based on today's discussion.

Public Comment

Moving Forward Network asked EPA to include their stakeholders in future MSTRS meetings. No other public comments were made during this session. Some remarks related to the discussion topics from the public were made via the chat function of Microsoft Teams throughout the meeting, and these are included in Attachment 2. (Chat comments from MSTRS members are captured in the meeting summary above.)

Closing remarks

Ms. Mroz and Mr. Kassel thanked everyone for their participation. Ms. Mroz noted that the EPA is planning for the next meeting to take place in person as well, and she will send members a Doodle poll soon to request information about dates for the fall meeting. She then adjourned the meeting.

Attachment 1

MSTRS Members Attendee List	
Mary Arnold	Civics United for Railroad Environmental Solutions, Inc.
Matt Barth*	Institute of Electrical and Electronics Engineers
Michael Berube*	U.S. Department of Energy
Chris Bliley	Growth Energy
John Boesel	CALSTART
Lori Pampell Clark	North Central Texas Council of Governments
Michael Cleveland	Association of American Railroads
Dave Cooke	Union of Concerned Scientists
Steven Douglas	Alliance for Automotive Innovation
Raquel Garcia	Southwest Detroit Environmental Vision
Michael Geller	Manufacturers of Emission Controls Association
Megan Green	Mecklenburg County Government
Rich Kassel	Tri-State Transportation Campaign
Aaron Katzenstein*	South Coast Air Quality Management District
George Lin	Caterpillar
Ellen Mantus	Health Effects Institute
Rachel Muncrief	International Council on Clean Transportation
Elaine O'Grady*	Northeast States for Coordinated Air Use Management
Clay Pope	Capitol Access Partners
Tara Ramani	Texas A&M Transportation Institute
Michael Replogle	Institute for Transportation and Development Policy
Joanne Rotondi	Hogan Lovells
Matthew Rudnick	General Motors
Lubna Shoaib*	East-West Gateway Council of Governments
Dan Short (for Diep Vu)	Marathon Petroleum Company
Matthew Spears*	Cummins Inc.
Erik White	National Association of Clean Air Agencies
Cynthia Williams	Ford Motor Company
Kate Zyla*	Georgetown Climate Center
Other Attendees	
Frank Acevedo*	
Jose Acosta*	
Cari Anderson*	
Heather Arias*	
Gabriela Baeza-Castaneda*	
Megan Beardsley*	
Morgan Bogdanski-Craanen*	
James Bruce*	
Byron Bunker	
James Bunce*	
William Carnegie	
Bill Charmley	

David Choi*
Allison Dominguez*
Morgan Ellis*
Keesha Esqueda*
Reza Farzaneh*
Ezra Finkin*
Cecilia Garibay
Janice Godfrey*
Layla Gonzalez*
Molly Greenberg
Doug Greenhaus*
Gil Grodzinsky*
David Haugen
Erik Herzog*
Eli Hinerfeld
Aaron Hula*
Justin Hwang*
Tim French*
Sterling Imfeld*
Michael Johnson*
Brian Kelly
Heather Kryczka*
Maria Lennox*
Sonya Lewis-Cheatham*
Reema Loutan*
Andrea Maguire*
Beto Lugo Martinez
Britney McCoy*
Rajani Modiyani*
Michael Moltzen*
Jessie Mroz
Sharon Murphy*
Carrie Paige*
Stuart Parker*
Matthew Payne*
Russel Pietrowiak*
Natalie Popovich*
Jean Marie Revelt*
Sarah Roberts
Bill Robertson
Theresa Romanosky
Allen Schaeffer*
Greg Schroeder*
Melissa Shurlan*
Karl Simon

Amy Smith*
Peter Smith*
Molly Spillman*
Lauren Steele
Lesley Stobert
Alan Stout*
Michelle Sullivan*
Abby Swain*
Ivette Torres
Brian Urbaszewski*
Lucita Valiere*

* Attended virtually

Attachment 2

Chat Comments

[5/11 11:13 AM] Berube, Michael

DOE has really appreciated the close partnership with EPA as we review the best state of the science on LCA as Sarah said.

[5/11 11:36 AM] Brian Urbaszewski

same - will presentation be shared after?

[5/11 12:10 PM] Atenas

We cannot wait! Community are the experts!

[5/11 12:25 PM] Johnsen, Michael (FRA)

A better comparison would be the amount of electricity the diesel engine produces per gallon and then compare to the battery storage limits.

[5/11 1:11 PM] Swaine, Abby

For the speaker from Kansas City: there are some specifics from the CP/KCS merger proceedings that would be of interest, in case you haven't seen them already. At <https://www.stb.gov/proceedings-actions/dockets-and-service-lists/>, look for Docket No. FD 36500, and find the STB's March 15 2023 Decision (item 51549), which includes a dissenting opinion, and discussion of the environmental review process and outcome. Links to different sections of the January 2023 Final EIS itself (item 51566) are here: <https://www.stb.gov/news-communications/latest-news/pr-23-02/> To see EPA Regions 5/6/7 comments on the draft and final EIS, search EPA's EIS database <https://cdxapps.epa.gov/cdx-enepa-ll/public/action/eis/search>, selecting Surface Transportation Board on the Agency dropdown menu, and specifying a data range of Oct 1 2022 to May 1 2023.

[5/11 1:18 PM] Johnsen, Michael (FRA)

You can retrofit older locomotives and that saves on the costs...

[5/11 1:20 PM] Natalie Popovich-DOE/LBL (she/her) (Guest)

That would be great! Please do set up a follow-up call.

[5/11 1:43 PM] Swaine, Abby

Of potential interest: [2020 National Emissions Inventory Locomotive Methodology](#) (2023 NEI is pending)

[5/11 2:24 PM] Swaine, Abby

[Brake and Tire Wear Emissions from Onroad Vehicles in MOVES3 \(PDF\)](#) (48 pp, 1 MB, November 2020, EPA-420-R-20-014) <https://www.epa.gov/moves/moves-onroad-technical-reports>

[5/11 2:33 PM] Swaine, Abby

Beyond vehicles and fuels... <https://www.epa.gov/transportation-air-pollution-and-climate-change/what-you-can-do-reduce-pollution-vehicles-and>

[5/11 2:44 PM] Swaine, Abby

<https://www.aceee.org/blog-post/2022/06/9000-pound-electric-hummer-shows-we-cant-ignore-efficiency-evs>

[5/11 2:54 PM] Swaine, Abby

The new [ISO standard 14083](#), *Quantification and reporting of greenhouse gas emissions arising from transport chain operations*, is now available for global adoption.

The concept for this standard draws from the [EPA SmartWay Transport Partnership](#)... <https://www.epa.gov/vcs/using-international-standards-assess-greenhouse-gases-transportation>

[5/11 3:03 PM] Swaine, Abby

Per the comment about emulating NACFE: SmartWay Affiliates in Action (NACFE) <https://www.epa.gov/smartway/smartway-affiliates-action-nacfe> and <https://www.epa.gov/smartway/smartway-heavy-duty-truck-electrification-resources>