

Federal Advisory Committee Act
Clean Air Act Advisory Committee

Mobile Sources Technical Review Subcommittee

Ritz-Carlton Pentagon City
1250 South Hayes Street
Arlington, VA 22202
April 2, 2019

Introduction, Opening Remarks

Ms. Courtney McCubbin opened the meeting at 9:00 am on April 2, 2019 and welcomed the Clean Air Act Advisory Committee MSTRS Subcommittee members. Ms. McCubbin noted that the presentations and meeting minutes from the last MSTRS meeting are online, and the minutes and presentations from this meeting will also be posted online. Ms. McCubbin then reviewed the meeting agenda (see Table 1).

Table 1. MSTRS Meeting Agenda: April 2, 2019

Time	Topic
8:30 - 9:00	Registration
9:00 – 9:15	Opening Remarks
9:15 – 10:00	OTAQ Office Director Remarks
10:00-10:30	QTAQ Regulatory Docket Update
10:30-11:00	Discussion Break
11:00-11:30	Continuing the Conversation: Data & Future Mobility Themes
11:30-12:45	Lunch
12:45-2:45	Emerging Technologies for Freight <ul style="list-style-type: none">- Jim Bruce, UPS- Ritchie Huang, Daimler Trucks North America- Andy Marsh, Plug Power- Zach Kahn, Build Your Dreams North America
2:30-2:45	Break
2:45-4:15	Data Gaps in the Non-Road Sector <ul style="list-style-type: none">- Dr. Kent Johnson, CE-CERT- George Lin, Caterpillar- Dr. Ed Mahoney, Michigan State University
4:15-4:25	Public Comment

4:25-4:30	Final Remarks & Adjourn
-----------	-------------------------

Mr. Rich Kassel, MSTRS co-chair, provided an overview of the schedule for the meeting, before taking a moment to reflect on the founding principles of the Subcommittee for new members. Mr. Kassel reiterated that group serves to provide independent advice and counsel to the EPA, and the Office of Transportation and Air Quality specifically, on pressing issues to inform decision-making in new areas of work. This meeting represents the tip of the iceberg, and Mr. Kassel encouraged the group to participate in an ongoing, deeper conversation on the topics discussed. He remarked that the Subcommittee is able to perform a deep dive into different issues on occasion that reflect the expertise present and urged Subcommittee members to think about how they could leverage their membership to be as much a part of the process of implementing fuel and vehicle policy as possible.

A list of meeting attendees is provided in the Appendix. Presentations are posted online at the MSTRS website: <https://www.epa.gov/caaac/mobile-sources-technical-review-subcommittee-mstrs-caaac>.

Office of Transportation and Air Quality (OTAQ) – Office Director Remarks

Mr. Chris Grundler welcomed the Subcommittee and thanked everyone for volunteering their time and ideas for the MSTRS meeting. He also thanked Courtney McCubbin and Rich Kassel for organizing the meeting. He noted that the purpose of this Subcommittee is to promote learning and communication among EPA and the Subcommittee members. Mr. Grundler stated that the EPA takes pride in being open and transparent with all stakeholders on issues, and he believes this process has led the United States to have the best mobile source regulations. He also believes this open regulation development process is the reason why they are broadly accepted and consistently implemented after adoption. He also noted that the EPA has a sound track record on fuel standards that receive broad support. Mr. Grundler emphasized that MSTRS meetings are how the EPA stays up-to-date on emerging issues and how they make good policy.

Mr. Grundler presented general remarks on changes and progress being made at OTAQ since the last MSTRS meeting in May 2018. He noted that since last May, the EPA announced its Cleaner Truck Initiative (CTI) and settled a major lawsuit against Chrysler. In November 2018, Mr. Grundler stated that the EPA held a large event with numerous stakeholders to announce the CTI, after state and local air agencies petitioned the EPA to reduce emissions in the trucking sector. The CTI has been launched, and the EPA is working closely with colleagues and regulators in California. He reiterated that the CTI provides an enormous opportunity to examine the suite of requirements for trucks and update them to reflect the 21st century. The EPA has prioritized looking at technology changes, data changes, learning from Europe, and taking a comprehensive approach to streamline and modernize standards. Mr. Grundler noted that this includes sensible levels of emission reductions and how technology can be leveraged – including sensors and telematics. He also stated that due to the global nature of the trucking industry,

collaborating with colleagues in Europe remains one of OTAQ's highest priorities and the office planned to meet with European Commission staff in mid-April.

Regarding other major announcements, Mr. Grundler relayed that the Justice Department announced on behalf of the EPA and the State of California that they settled a lawsuit against Chrysler, in which over 100,000 vehicles had diesel defeat devices. The result of the lawsuit was \$300 million to settle claims of cheating emission tests and failing to disclose unlawful defeat devices and a separate \$19 million settlement with the State of California to mitigate excess emissions. Mr. Grundler noted that there will be a hearing in early May, which will provide more details on the settlement.

In terms of other priorities in front of OTAQ, Mr. Grundler stated that oversight of regulations and compliance with them remain at the top of their list. He noted that this is how OTAQ keeps their promise to the government and the public of benefits exceeding the costs when they intervene. He also noted that OTAQ has continued to adapt to the changing landscape and use new tools; it was this work that allowed them to develop the fuel standards that support cleaner air and ensure fair competition between manufacturers and competitors that are investing in new technology.

For testing in enforcement, Mr. Grundler stated that the EPA and California were too predictable, so they have begun testing in new ways and at different points in the vehicle lifecycle. This includes manufacturers receiving random test orders, testing right off the conveyor belt, testing on a normal regulatory basis, and testing at other times to ensure they work properly in real-world situations and inform decision making on regulations. Mr. Grundler relayed that the EPA is also concerned with working on the enforcement side to put an end to the practice of using defeat devices.

Around Earth Day, Mr. Grundler remarked that the EPA plans to issue a compliance report covering 2014 through 2017 that would provide the public with an easily accessible overview of the EPA's compliance tools and what the data say. In the area of compliance, he also noted that the EPA has new compliance partnerships with California, Canada, and China, where the EPA, for instance, goes upstream and ensures Chinese firms exporting to the U.S. market understand the rules and regulations. He also noted that customs at the border can directly contact the EPA, and the EPA takes compliance very seriously. The EPA's focus is not limited to domestic manufacturers, but also to European and Asian manufacturers to ensure their goods have been tested and lab verified.

Mr. Grundler commented that there have also been several significant recalls as of late due to the selective testing they have implemented in Europe and Asia. He stated that Cummins has recalled diesel engines and FCA has recalled gasoline engines. The EPA is unsure why this is occurring, but noted that it could be attributable to competition or poor organizational culture. Mr. Grundler noted that attacking the root cause of these recalls is critical and the EPA has convened an informal summit on the matter to answer outstanding questions. The next summit meeting will occur in May in the United Kingdom.

In terms of other international efforts, Mr. Grundler remarked that OTAQ is active in the G20, and the EPA leads a transportation task group. This group is currently active in sharing important fuel quality and vehicle and engine policies from the U.S. Internationally, the EPA has worked to establish aviation standards and set a particulate matter standard last year. Mr. Grundler noted that the International Maritime Organization has a global standard on sulfur taking effect, which will reduce the current standard of 35,000 parts per million to 5,000 parts per million for fuel that ocean vessels burn. He also noted that U.S. refineries are well-positioned to meet these new standards and that the standards will have huge environmental and health benefits.

For the fuels program, Mr. Grundler mentioned that OTAQ holds very important responsibilities in the renewable fuel standard (RFS), and it remains a challenging area of their portfolio that requires active management. He noted that the administration is actively working to find a solution to the RFS program. There was a hearing in Michigan in April to introduce the latest proposal, which would allow year-round sales of 15 percent ethanol and increase transparency.

For ports, Mr. Grundler stated that the Senate is interested in reauthorizing the Diesel Emissions Reduction Act (DERA) program because it benefits health and the environment in port communities greatly. For the global supply chain, he commented that SmartWay seems to be the leading program for tracking emissions.

Mr. Grundler concluded by saying that the U.S. is in the midst of a transformation of the transportation sector, specifically due to automated vehicles and the shared economy, which will profoundly affect the EPA. He noted that the EPA must stay connected to these changes and keep up-to-date with suppliers, manufacturers and forward-thinkers across the country. This includes answering questions, such as how you test an autonomous vehicle in the laboratory and understanding what the intersection between vehicles and fuels is. Additionally, the EPA is interested in how these changes will affect the environment.

Comments and Discussion

Dr. Rasto Brezny thanked Mr. Grundler for his overview and stated his optimism about the ongoing conversations with Europe and Euro 7. He requested that Mr. Grundler speak more about the EPA's conversations with China on China 7, since China 6 became far stricter after China received help from the EPA and California.

Mr. Grundler replied that China remains a hugely important truck market for U.S. manufacturers and others, noting that they are moving very quickly. He also stated that the EPA and China have not had as much interchange as they would like. Thus far, Chinese counterparts have been unable to attend the international compliance summits. The EPA is considering a proposal or workshop where different markets can come together and share information. The EPA is working very hard to maintain working relationships with China, despite disagreements and the ongoing trade dispute. At a minimum, Mr. Grundler stated that the EPA will look for opportunities to synergize test procedures. He believes that the regulators in China, Europe, the U.S., and California are all looking at on-board tools, because their big focus is what happens while vehicles are in use.

Dr. Kent Hoekman requested further comment on CO₂ emission standards for mobile sources, including what the EPA is doing on these standards, how they are being meshed with the National Transportation Safety Administration (NTSA), and what the future looks like. Mr. Grundler replied that EPA leadership asked OTAQ to do a detailed evaluation and analysis on what the NTSA team has done and they are currently in the middle of briefing leadership on technical viewpoints. Mr. Grundler does not know when the final rulemaking will be completed, as there is currently an extensive list of comments that the government must respond to.

Mr. Luke Tonachel commented that there are a number of compliance programs and manufacturers have had compliance challenges. He noted that the EPA's funding is going down and asked for a comment on the EPA's ability to continue to pay for compliance and enforcement work. Mr. Grundler responded by saying that the EPA continues to do the best job they can with the resources that Congress chooses to provide, noting that their workload has increased over the years, while the budget has declined.

Mr. Bill Charmley also replied that OTAQ does regulatory work but receives support from innovative staff in the standards setting division and laboratory division that can look at data in many different ways. With this high-quality data, it is easier to support compliance activities with less resources. Mr. Grundler also commented that the citizen science movement has allowed the EPA to consider how to smartly take advantage of new data sources.

Ms. Kate Blumberg thanked Mr. Grundler for the fascinating rundown and asked whether OTAQ is talking about Euro 7 for light-duty trucks. She wondered whether there was discord between the US and Europe on light-duty standards. She also asked what OTAQ was doing in the light-duty sector compliance space. Mr. Grundler responded that the EPA would be visiting Brussels in April, where they have finished negotiations on light-duty CO₂ standards. Euro 7 includes standards for both light- and heavy-duty vehicles. He noted that European compliance work is in progress and that the EU relies on member states to conduct enforcement activities. For the EPA, light-duty compliance is difficult due to tampering, but they have been paying more attention to greenhouse gas (GHG) credits and testing, and issuing a report annually. Mr. Grundler welcomes suggestions on how to improve this.

OTAQ Regulatory Docket Update

Mr. Bill Charmley, head of the regulatory development division, provided the Subcommittee with a high-level overview of OTAQ's regulatory activities. Mr. Charmley stated that OTAQ is working on three items, the first of which is developing a final rule for light-duty fuel standards, which will be issued before the end of 2019. The second item was the CTI, which Mr. Grundler discussed at length. He also remarked that the third regulatory agenda item, which is under review, is a vehicle fuel test procedure that will lay out how the EPA suggests OEMs do their testing on a single test fuel. This standard would not change the stringency of CO₂ or the CAFE standards. Mr. Charmley urged the Subcommittee to look at the regulatory and deregulatory agenda that OMB published for Fall 2018, noting a new one will be published in the coming months.

There are two other regulatory items for on-highway and off-highway action that Mr. Charmley outlined. The first being a technical amendment action, which fixes two errors in the 2012 rule. The two errors are related to calculations for credits. The EPA hopes to finalize this within the coming months. Mr. Charmley remarked that OTAQ will soon propose amendments related to the marine diesel engine emission standards that correct errors present in the 2008 rule. Additionally, the EPA is examining changing U.S. regulations to ensure that they can enforce the International Maritime Organization's 2020 sulfur standard.

On the fuel side, Mr. Charmley stated that OTAQ must adjust the volumes under the RFS program for 2020. He clarified that if the EPA waives the volumes for some of the requirements, they must do a rulemaking to reset the remainder of the program, which they are working on. Another regulatory item he discussed was the EPA's agreement to streamline and modernize fuel regulations. Mr. Charmley noted they had begun this process, but it has experienced significant delays due to the actions on the RFS, and they are hoping to issue a rule in Fall 2019. The last item he discussed was a proposal that was issued in 2016 for the Renewables Enhancement and Growth Support (REGS) rule. The rule has not yet been finalized, but it is still something available to the EPA that they could return to. Mr. Charmley stated that OTAQ also has long-term actions without a specific target date, including a proposal on gliders and an endangerment finding on lead emissions.

In terms of studies, OTAQ is currently conducting two major studies. In an appropriations bill, Mr. Charmley relayed that Congress requested a coastal marine mode shift study. OTAQ began this in February and is working towards issuing a report to Congress by the end of 2020. The second study is related to the air quality impacts of the RFS. Mr. Charmley reiterated that the RFS program has taken significant rulemaking work and its implementation has been heavily challenged.

Mr. Charmley stated that other topics that are not on the fall regulatory agenda, but will be discussed within OTAQ, include highway heavy-duty trucks, highway trailers, the United Nation's International Civil Aviation Organization (ICAO) PM standards, and an outstanding petition for locomotive standards. As part of the CTI, OTAQ may examine non-road standards for land-based products and look at technology used on-road and see if it is applicable to off-road.

Comments and Discussion

Mr. Jim Kliesch thanked Mr. Charmley and asked two questions. The first question he asked was on the GHG program technical amendments and whether Mr. Charmley envisioned the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule being done in tandem with the amendments. Mr. Charmley responded that there is no plan to do those in tandem. Mr. Kliesch then asked where the agency stood on a 2017 solicitation for input on regulatory reform. Mr. Charmley responded that their office presented the list of what they are currently working on and he cannot speak to regulatory reform. OTAQ has chosen to focus on streamlining the fuels program.

Mr. Chris Nevers remarked that in terms of regulatory reform, it would be helpful if the EPA concentrated on manpower reduction issues and that this idea could potentially be rolled out in

other regulations. He noted it would help both sides with manpower concerns, so that EPA is not approving AC17 test requests on a piecemeal basis.

Mr. Robert Anderson introduced the topic of regulation modernization and fuel regulations for gasoline and diesel. He noted that Ford has collaborated with the EPA on this since 2011 and they are anxious to see a regulation come to fruition. In terms of the RFS reset, Mr. Anderson asked how a proposal for 2020 volume standards and a reset rule will be coordinated. Mr. Grundler responded that they will be separate from one another, and the exact scope is under discussion. Mr. Charmley added that they would be very carefully coordinated.

Continuing the Conversation: Data and Future Mobility Themes

Rich Kassel, Tri-State Transportation Campaign

Mr. Rich Kassel of Tri-State thanked EPA staff for sharing updates on what OTAQ is currently accomplishing. He shifted the conversation to discussing next steps for the Subcommittee. Mr. Kassel reiterated that the Subcommittee's role is to provide OTAQ with advice, council, and recommendations that help guide future policies. In order to do this, he suggested revisiting conversations from this meeting and recent previous meetings.

Mr. Kassel noted that the Subcommittee began discussing future mobility in May 2018. This included discussions on what data is necessary to inform policy decisions for a future worth heading towards. The sub-topics that came out of this discussion include examining electrification, autonomous vehicles, shared vehicles, etc. for data gaps in both the non-road side and the highway side. The Subcommittee identified a range of various points for further discussion. The meeting last May included a data panel, where the Subcommittee examined questions around big data and vehicles, such as how to use big data in a way that it informs good policymaking. It also included a panel on future mobility, which raised questions regarding how to accept a mid-century goal of a particular level of emissions, such as 'how do we get there?' and 'what are changes that need to happen in terms of vehicle fuels, technology, and data gathering?' These panels opened the door for future conversations on how to provide guidance that is actionable for the agency. Mr. Kassel referenced the opening of his speech, calling the Subcommittee to act on issues of great importance outside of these bi-annual meetings.

Mr. Kassel summarized the conversations from this meeting and previous meetings, saying that Subcommittee members were tasked with contributing to three areas of guidance for the EPA: (1) electrification and what that means (i.e. pace, vehicle side, charging side, duty cycles, certification, or all elements for inclusion in a deep dive), (2) freight and goods movement (i.e. Amazon, how retail works, implications at the local level, and autonomous vehicles in inner-city freight), and (3) refining the data discussion towards being more goal oriented (i.e. how do we create the next generation of compliance and enforcement; how do we bridge data gaps in in-use emissions).

To conclude his remarks, Mr. Kassel noted that the Subcommittee values committee member thoughts on any one or more of these three areas and asks members to continue to have

conversations about where the Subcommittee can go with these topics. He then invited reactions from meeting attendees.

Comments and Discussion

Mr. Michael Replogle asked that the Subcommittee consider how data gaps in emissions relate to the transportation sector as a whole and vehicle traffic safety. He asked the group how environmental goals could be advanced while simultaneously advancing road traffic safety goals. He cited evidence that New York City reduced road traffic deaths by 28 percent over the last 4 years improving speed management, reducing speed limits, increasing enforcement, and redesigning roads and intersections. Mr. Replogle noted that the City believes this also contributed to energy reductions in transportation and positive mode shifts from driving to walking, cycling and public transportation.

In regard to the for-hire vehicle industry, Mr. Replogle noted that the City has by rule compelled high volume mobility providers and taxis to provide data on trips and empty time between trips, and that this is proving valuable to understanding and regulating traffic congestion and improving safety. The City's new regulatory approaches to safety and traffic congestion have implications for energy use and air quality related to vehicle usage. He believes the EPA needs to look beyond standard emission regulatory approaches and consider using data reporting requirement in new ways and connecting emissions with road safety. Europe's new traffic safety standards, including intelligent speed assistance, braking assist, etc. are projected to cut road crashes by 30 percent and to reduce emissions by 10 percent. He remarked that states such as California should pave the way in adopting similar standards, with other states and federal regulators following suit in the future, with the goal of reducing road traffic deaths, GHG emissions, and other pollutants.

Mr. Kent Johnson shared his enthusiasm for large data and in-use data. He also noted that with CARB adopting Real Emissions Assessment Logging (REAL) in 2018, the concept of looking at in-use vehicle data has become a reality. He remarked that institutions such as UC Riverside have been instrumental in developing this regulation, but industry has not been adequately involved. He reiterated that industry involvement is crucial for data collection, especially when using equipment such as on-board sensing to collect in-use emissions data. Mr. Johnson asked Mr. Grundler what sort of dialogue could occur between industry and the EPA to create greater access to data sharing and what sort of incentives there would be for each party to participate. Mr. Grundler responded that there are no barriers to data sharing between industry and the Agency. He noted that the EPA did engage in this with CTI.

Mr. Kassel asked the group to consider one more question. He asked for opinions on whether the three topics he suggested during his remarks are the three correct baskets of work for the Subcommittee to focus on. He invited Subcommittee members to raise new topics that might be important to consider.

Ms. Elaine O'Grady commented that she is thinking about electrification more broadly and wondering whether the EPA has the statutory authority it needs to address the three revolutions previously discussed. Mr. Grundler responded that the Clean Air Act is an enormously effective

tool that provides the EPA with a lot of discretion. He believes the EPA has the authority to address electrification. He remarked that when the EPA was considering the future and how electrification would impact the transportation sector, they conducted a “what-if” analysis. He concluded that the EPA is not as future-looking currently, but that it is not due to a lack of discretionary authority.

Dr. Kent Hoekman asserted that he would like the Subcommittee to consider autonomous transportation as a separate, stand-alone topic, noting that autonomous transportation has the ability to impact emissions, safety and social wellbeing.

Mr. Matt Miyasato stated that California is very focused on the impact that these topics have on disadvantaged communities and disproportionately affect environmental justice communities.

Mr. Rashid Shaikh added that there is a critical health dimension to transportation emissions, noting that the term “zero emissions vehicle” does not accurately reflect the energy source that must be used to power the vehicle. As emissions are expected to increase in the foreseeable future, Mr. Shaikh urged the Subcommittee to consider local and regional health impacts from these technologies and the associated congestion and emissions in urban areas.

Mr. Matt Barth made a pitch for an integrated analysis to look at the various dimensions present, such as energy, emissions, safety, and mobility. Because many stakeholders and agencies do not communicate, an integrated analysis could create a better holistic understanding of potential issues and outcomes

Ms. Simone Sagovac noted that working together and thinking through potential issues to prevent them before they occur is a goal. For instance, high-emissions sources, like truck depots, could be located away from populated areas. She also recommended looking at driver performance to reduce emissions.

Mr. Rich Kassel provided the group with a summary of California’s Assembly Bill 617 Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants.

Mr. Matt Miyasato commented that AB617 required CARB to institute the Community Air Protection Program with the help of air districts to identify communities that are disproportionately affected by air pollution and to monitor, reduce, and mitigate air pollutants with the help of steering committees. This bill was passed without a sustained funding plan.

Mr. Steven Cliff added that they expect resources to increase this year for this initiative based on the Governor’s proposal, so there will be additional staff and resources for communities. He noted that environmental justice communities are an exciting new area to work in, but there are still communities that have been left behind, even when regional progress is being made. The emissions in these communities are not so much tied to mobile sources, but simple shifts, such as changing trucking routes and land use, could improve air quality. He finished by saying that these shifts are certainly considerations to be taken into account when looking at the broader freight regulatory work.

Mr. Grundler agreed that California provided an interesting case study and that follow-up on the implementation of that bill could include examining vegetative and other barriers along roadways to reduce exposure to some pollutants as the fleet becomes cleaner.

Mr. Michael Iden commented that autonomous vehicles can travel where normal cars can, but all of the emphasis is on the technology of the vehicle, and there is little emphasis on infrastructure. He noted that there have been no efforts at the local or state level in Illinois to examine infrastructure needs, and he suggested Ontario as a case study for a place that has taken a broad look at autonomous vehicles and potential impacts beyond emissions and safety.

Ms. Kate Blumberg stated that the EPA cannot do what California can do in terms of incentivizing light-duty zero-emission vehicles, but she believes that thinking about incentivization for zero-emission heavy-duty vehicles is critical; especially vehicles that play a role in local emissions.

Mr. Grundler noted that the Clean Air Act provides the EPA with discretion to make decisions. One of these decisions has been to include the largest EPA incentives ever to increase electric trucks and reduce NO_x emissions in Phase II of the GHG and fuel economy regulations. He also noted that Ms. Blumberg's comment would be reflected in the conversation surrounding the CTI.

Mr. Kassel concluded by saying that the Subcommittee may consider how to most quickly accelerate the shift from a dirtier, legacy fleet to the cleanest possible new fleet in a diversity of communities. He stated that there may be opportunities to create programs addressing the legacy fleet, especially in the heavy-duty sector. He stated that the Subcommittee and the EPA can account for both health impacts and emerging technologies. Mr. Kassel suggested that as a way to move forward, these suggestions should be passed on to the Agency and Subcommittee members to gauge interest and begin work on some of these ideas. He thanked everyone who participated and provided helpful ideas, hoping to consider this the beginning of a longer conversation on data and future mobility.

Panel Presentations – Emerging Technologies for Freight

Mr. Dennis Johnson, the moderator for this Emerging Technologies for Freight panel session, introduced the presenters and the topics to be discussed in this panel.

Presentation – Powering Operations of the Future

Mr. Johnson introduced Mr. Jim Bruce of the United Parcel Service (UPS).

Mr. Bruce presented an overview of what UPS considers emerging technologies, how UPS will utilize these technologies, and what the barriers will be. He began by defining freight as regular freight, parcels, e-commerce, and coyote. He noted that there are three drivers forcing UPS to rethink their business: (1) urban congestion; (2) local clean air and minimizing criteria pollutants; and (3) climate. He stated that commercial diesel and aircraft are driving growth in U.S. transportation-related GHG emissions. He noted that there has been an emphasis on electrification, but argued that UPS uses many trucks that rely on compressed natural gas (CNG) or biodiesel and have a lower carbon footprint than fully electric vehicles. Aligned with this, Mr. Bruce stated that there are no fully electric trucks that can be deployed at scale for UPS. UPS has

worked on electrifying its fleet through pre-ordering Tesla’s electric heavy-duty trucks. Mr. Bruce indicated that these trucks will be deployed to be tested in order to ensure they can withstand 20 years of service. He relayed that the UPS head of engineering says electrification will be transformational due to the reliability issue of existing diesel trucks, especially in terms of post-2020 emission control system failures.

Mr. Bruce stated that UPS has shown they can deploy electric trucks at scale, because they have deployed natural gas trucks at scale as part of their climate change strategy. However, he cautioned that it takes 10 to 20 years to roll over the fleet and that UPS intends to use compressed natural gas trucks throughout the transition period. In terms of EPA initiatives, Mr. Bruce stated that there is a need for low carbon fuels and the EPA can play a role in this by stabilizing the Renewable Identification Numbers (RINs) program.

He then discussed the uncertainties associated with electrification for UPS, including the durability of trucks, how they can be charged, whether it is possible to produce high capacity fast chargers, and how to charge during peak power demand. UPS has engaged in opportunities to put solar arrays on their buildings to not only generate building power, but also provide power for battery charging. Looking towards the future, Mr. Bruce stated that UPS is looking to engage with new technologies as the company transforms to meet changing demand.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – Daimler Advanced Technologies

Mr. Johnson introduced Mr. Ritchie Huang of Daimler Trucks North America.

Mr. Huang began by discussing Daimler’s commitment to leading the charge on automation, electrification, and connectivity. He noted that they announced several months ago that they are cancelling their platooning program, because they felt their customers did not have a need for it, and they were not seeing the fuel efficiency numbers they had hoped for. Additionally, they saw safety risks with platooning, including a feeling that crash avoidance could not be guaranteed.

In terms of automation, Mr. Huang stated that Daimler was the first company to put an automated truck on the road in 2015. He explained that it provided a concept to develop new technology so Daimler could understand efficiency and safety in a real-world setting. These safety lessons were translated to their 2017 model. They expect to release an automated level 2 truck this summer. These automated features would include: active brake assist, intelligent high beam control, traffic sign display, side guard assist, automatic wipers/headlamps, and active lane assist.

Pursuit of level 4 automation was announced but Mr. Huang cautioned that there are many considerations in building highly automated trucks. Daimler faces challenges as a manufacturer, including trucks that are safe and reliable, navigating various weather conditions, seamless integration into customer process, and how all scenarios could play out, including the unknown. Mr. Huang stated that Daimler looks forward to having more conversations with the EPA, DOT, and their customers as automation continues to develop.

In terms of electrification, Mr. Huang stated that Daimler is heavily developing passenger cars and trucks. He noted that there are questions about the viability of electrification, but the company sees a future in it as long as they work with customers to identify the value. Currently,

Daimler has four vehicles that they are launching in their electric trucks line and the range tops out around 250 miles. Mr. Huang stated that challenges to commercial electric vehicles include their relative expense compared to diesel trucks and charging infrastructure availability. He concluded by saying that Daimler will work closely with customers to create a mobility ecosystem that goes beyond just the truck, but also includes regulations and incentives. He stated that Daimler hopes to further engage with the EPA in a discussion about disincentivizing diesel.

For connectivity, Mr. Huang stated that connectivity can enhance utilization, efficiency, and safety. He elaborated by saying there are three components Daimler is examining today: (1) a virtual technician feature, (2) connecting fuel performance analytics, and (3) connecting safety event reporting.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – The Future of Hydrogen

Mr. Johnson introduced Mr. Andy Marsh of Plug Power.

Mr. Marsh started by discussing the origins of Plug Power and how his company originally put fuel cells into forklifts. He noted that fuel cells take about 30 percent of power off the grid by using hydrogen and that fuel cells work best in asset intensive settings where units run for 24 hours per day. He stated that, to date, Plug Power has shipped over 25,000 fuel cells and that the company uses more than 15 tons of hydrogen daily. He continued by saying that Plug Power was the first company to create a commercial market for hydrogen fuel cell technology with the support of the federal government.

Mr. Marsh asserted that fuel cells remain a key enabler for electric vehicles. While batteries may be the best choice for passenger cars, fuel cells can get twice the range of batteries and can be fully charged in minutes. In China, for example, there has been a push towards fuel cell vehicles, because they are familiar with the limitations of battery-powered electric vehicles.

Mr. Marsh identified the advantages of batteries and fuel cells for different activities, stating that a fuel cell in a FedEx delivery van traveling long distances (over 140 miles per day) makes sense, and this is being done at a larger scale in Germany where there are fueling stations available. Additionally, trucks that are powered by fuel cells can have more weight put on them because of the energy density of fuel cells. Alternatively, inner city delivery is better suited to a battery-powered electric vehicle.

In terms of how the hydrogen industry will develop to meet the growing demand for fuel cells, Mr. Marsh referenced the Hydrogen Vision for 2050 report by the Hydrogen Council, which calls for hydrogen to account for 19 percent of total energy demand, become a \$4 trillion industry, contribute a 7 Gt reduction in CO₂ emissions, and create 45 million jobs. Mr. Marsh stated that there is a global effort towards making hydrogen part of the long-term solution to cutting GHG emissions. Furthermore, the transportation sector is already moving towards electrification, and fuel cells are part of that transformation.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – Emerging Technology for Freight (BYD)

Mr. Johnson introduced Mr. Zach Khan of Build Your Dreams North America

Mr. Kahn began by stating that BYD is a pioneer in creating a new energy ecosystem – from power generation to storage to electrified transportation. He noted that the company has a global reach with manufacturing plants worldwide, including in the U.S. In the last four years, BYD has sold the most vehicles with plugs around the world, with a majority of these sales occurring in China. Mr. Kahn said that Shenzhen, China, where the company was founded, is fully electric in terms of buses and taxis. He also noted that the company has deployed electric refuse trucks in the U.S. and sees growth potential there.

On the off-road side, Mr. Kahn stated that BYD is working in ports, mining equipment, warehouses, and airports. He reiterated that BYD is a highly integrated company, where they make all the components, and this year they are starting to see a lot of big deployments of products, for example Goodwill in San Francisco bought 10 trucks to move goods around and one refuse truck.

Looking towards the future, BYD hopes to create electrified options for shipping goods to stores and front doors, utilizing their line of delivery trucks. They are also coming out with a class 6 refrigerated truck soon and working with a company in Canada on an all-electric refrigeration unit with a solar array on top. Existing trucks can be replaced with this type of vehicle and improve human health. For 2019, most U.S. deployments of BYD trucks will occur in California.

Comments and discussion for all emerging technologies for freight theme panelists

Mr. Grundler asked Mr. Marsh about the future of sustainable hydrogen production. Mr. Marsh replied that 62 percent of hydrogen comes from plants where it would be burned and then liquified with hydroelectric power. He noted there is probably more almost green hydrogen available than people recognize. For instance, there is an upcoming project in Chile to create hydrogen on site at a solar plant. By 2030, Push Power believes that more and more of their customers will be creating hydrogen by electrolysis. Certain companies are committed to 100 percent renewable hydrogen by 2050.

Mr. Grundler asked if the weight of batteries or fuel cells in trucks is an issue. Mr. Kahn responded that there is a barrier over the weight of batteries and fuel cells, noting that certain locations are looking to add pounds to their weight limits. Mr. Marsh responded that while you must add more heavy batteries to get more range, with fuel cells you just need to add a bigger lightweight tank, which results in regulations not needing to be changed. He added that because of this relative weight difference, fuel cells will be used more in larger long-range applications.

Mr. Tonachel noted that Mr. Kahn mentioned Shenzhen, China uses a bus fleet of 16,000 electric buses, which requires a large charging capacity and that Mr. Huang and Mr. Bruce had previously indicated that charging capacity remains a barrier to electrification. Mr. Tonachel asked whether there are lessons to be learned from China and also asked whether there were any comments from utilities regarding vehicle electrification.

Mr. Bruce responded that utilities recognize that the electrification of vehicles is on the horizon, and they are excited about this prospect because energy efficient products have cut demand for

electricity. Utilities have understood changing demands, but the reliability of the grid for a huge truck installation remains a question.

Mr. Kahn responded that charging remains a complicated but solvable issue. He stated that utilities know how to create enough power to support charging infrastructure. He also stated that if charging occurs at night, that benefits utilities because they can dump excess power. Mr. Kahn argued that the overall benefit of electrification is that it brings down everyone's rates because utilities can get more efficiency out of their existing assets. He also remarked that demand charges could be used to incentivize when electric freight is charged. He concluded by stating that public utility commissioners in all areas have begun examining this issue.

Mr. Bruce added that in western states, there are places where the price of electricity is negative during the day, so utilities have made offers to UPS to invest in electrifying their fleet. Since UPS cannot electrify everywhere simultaneously, they will probably electrify fleets in areas where utility companies are willing to provide incentives. Alternatively, he suggested that if UPS was to electrify at scale in California, they would build a microgrid to support charging. Mr. Kahn responded that BYD's electric buses in Colorado were hit with demand charges, which resulted in BYD building them electricity storage systems. Mr. Huang added that different needs remain in different use cases, but working with utilities is a large component of the solution.

Ms. Susan Anenberg asked, as an air quality and public health researcher, about school buses. She inquired about the availability of electric school buses, since they drive through communities and carry a vulnerable population. Specifically, she inquired about range and cost issues. Mr. Huang responded that cost remains a huge barrier, but cost should go down in the future. He stated that school buses could provide a high value and high societal impact for electrification, but there is not an actor present to develop the necessary infrastructure.

Mr. Kahn responded that diesel school buses are extremely inexpensive compared to electric. He also noted that unlike transit buses, school buses travel relatively few miles and are not operated during summer months. Still, he remarked, there are interesting programs such as that in White Plains, New York, where they use electric school buses and can monetize the batteries during the summer. While cost remains prohibitive, Mr. Kahn suggested that some states are using VW settlement money to buy electric school buses.

Mr. Bruce responded that natural gas-powered school buses dramatically improve the amount of criteria pollutants emitted, so they provide a cheaper, cleaner option. Mr. George Lin added that new technology school buses produce lower emissions, and the cost effectiveness makes it difficult to justify an electric bus. Mr. Karl Simon added that electric school buses are occasionally funded under DERA.

Mr. Simon asked the panelists if the EPA could do one thing, what should it be?

Mr. Bruce responded that there is tremendous opportunity in renewable natural gas, specifically from landfill capture, and this can be used as fuel in a fleet of CNG or LNG trucks. He noted that the issue is the lack of alternative fuel infrastructure for natural gas and if the EPA could

transport natural gas more effectively, it would give UPS time to invest in new technologies. He also stated that a 5-year plan of stability for the RINS program would be helpful.

Mr. Kahn responded that he would like to see the EPA figure out how to make electric vehicles more desirable under the DERA program.

Mr. Huang remarked that his company is dedicated to electrification, but in order for it to happen at scale and in a timely manner, there must be a discussion on subsidies and incentives that push electrification and make it viable for consumers.

Mr. Marsh responded that he believes fuel cells remain behind in the U.S. market and people are skeptical about their potential. He encouraged the EPA to examine the viability of fuel cells and address why policymakers do not see them as a viable technology.

Panel Presentations – Data Gaps in the Non-Road Sector

Mr. David Choi, the moderator for this Data Gaps in the Non-Road Sector panel session, introduced the presenters and the topics to be discussed in this panel.

Presentation – Off-Road Emissions: Summary and Data Gaps

Mr. Choi introduced Dr. Kent Johnson of CE-CERT.

Dr. Kent Johnson began by describing his work in off-road emissions monitoring. He provided a brief history of in-use measuring and CE-CERT's work with the EPA and CARB. Today, there are Portable Activity Measurement Systems (PAMS) and Portable Emission Measurement Systems (PEMS) equipment for measuring in-use off-road emissions. CE-CERT has tested 114 units to date, with 150 more expected to be tested over the next three to four years. Previously, Mr. Johnson logged RPM, temperatures, and other data points for public fleets. In 2005, he stated he used PEMS to do testing for CalTrans. In 2006, he also tested cranes using a mobile emissions lab at ports. In 2012, Mr. Johnson started testing using particulate matter PEMS on CalTrans equipment. He stated he was also able to add quality to the data he collected by using a time-lapse camera to see when non-road sector equipment was in use.

Dr. Johnson noted that PEMS are accurate, but complex. When CARB introduced Real Emissions Assessment Logging (REAL) and on-board sensing, he said it allowed him to get major data points without needing a generator and a crane. Simple Emissions Measurement Systems (SEMS) simplify testing using NO_x and PM sensors that are commercially available. Dr. Johnson stated that regulatory requirements keep him from using SEMS for more measurements, requiring the more complex PEMS system. He remarked that EPA can assist here in getting PM sensors at a market scale. He concluded by saying that he looks forward to working with industry to improve off-road emissions data quality and that he believes there could be a benefit to industry if industry shared data with researchers.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – Telematics in Non-Road Equipment

Mr. Choi introduced Mr. George Lin of Caterpillar (CAT).

Mr. Lin began by stating that telematics refers to getting information from non-road equipment wirelessly. He commented that around 2003, telematics became a customer option in CAT equipment. Later, he said, it became standard on higher-cost equipment and now it is standard on the majority of equipment. In terms of capability, the bulk of equipment shipped today uses cellular radios, while others have satellite radio if they are operating somewhere remote where there is not a cellular signal.

Mr. Lin remarked that CAT sells four different telematic products today: locators for location data, basic - which includes a service clock, pro - which measures product health, and elite - which offers remote service. Each of these products provides a varying level of information for increasing data usage.

Telematics data, as explained by Mr. Lin, is collected from the customer for a fee. There is a fixed rate for each machine and a variable rate for the amount of data. CAT collects information that has customer value: fuel usage, fuel level, idle time, diagnostic codes, location, machine health information, and productivity data. The amount of information CAT collects is the amount of information the customer subscribes to, which is their decision. Any static information is not transmitted. Additionally, customers can request telematic devices to be completely disabled, though this normally only applies to the government or mining companies.

Mr. Lin stated that the other category of data that CAT collects is engineering data. When they build prototypes and pilot products, they put a different software in the communication model that allows them to capture high speed data. This data collection is limited to on-board storage and how quickly they can get the data off the piece of equipment. He noted that high speed engineering data is rarely captured.

Mr. Lin mentioned that one of the biggest roadblocks to the broader use of this data is getting customers to release it, because telematics data is only available to others with their consent.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – Collecting Consistent Scientific Data on Recreational Boating & Other Off-Road Recreational Vehicles; Case Study: The National Recreational Boating Safety Survey

Mr. Choi introduced Dr. Ed Mahoney of Michigan State University.

Dr. Ed Mahoney discussed the current status of producing reliable estimates from off-road vehicles, including boats. The model he designed faces questions about the amount of off-road equipment that is operational, the age of the equipment, whether it is required to be registered or not, how well it is maintained, how many and what types of equipment and boats are operated, and how often they are operated.

Dr. Mahoney stated that boating is a very significant recreational activity and contributor to our economy, noting that in 2012, there were an estimated 12 million registered boats and 950,000 unregistered boats in the U.S. To understand the “boating system” better, the U.S. Coast Guard (USCG) receives \$1.5 annually from Congress to conduct the National Recreational Boating Safety Survey (NRBSS), which is an effort to produce valid, reliable and consistent data needed by the boating system. This survey, according to Dr. Mahoney, has provided an opportunity for the USCG to work with industry to put together boating data. This data has allowed the USCG to

understand boating activity and the effectiveness of safety programs and has allowed industry to conduct planning and market analysis.

Dr. Mahoney remarked that it is difficult to sample recreational participation and equipment ownership. Because of this, the NRBSS is actually two surveys: (1) a participation survey with demographic data and key information about who boaters, and (2) an exposure survey about people who owned a boat, including how much they used the boat, what they did on it, how many hours they used it, and how many people were on it.

Dr. Mahoney pointed out that this data amounts to exposure data for the USCG, usage data for the EPA, and marketing data for industry, essentially providing multi-use data that the EPA can use to improve their non-road emissions models. While Dr. Mahoney acknowledges the success of the NRBSS, he stated that we still do not have similar data for other off-road vehicles, and generating this data is a potential next step.

Comments and discussion for all data gaps in the non-road sector panelists

Mr. Iden commented that the railroad industry has done a number of studies using PEMS devices for locomotive emissions and that the device readings must be verified against laboratory readings. He commented that some people are using mobile PEMS and comparing those results to certification data to say that the emissions are higher than they should be, but these two types of measurements are not equivalent and should not be compared to each other. Mr. Lin responded that some people may not understand what the certification requirements are.

Dr. Johnson added that while the two types of measurements should not be compared to each other, it is fair to say that the certification data do not reflect real-world in-use conditions.

Dr. Johnson commented that it would be helpful if the laboratory and PEMS collected the same data points. He added that it would be interesting to do a mock up of the certification process in-use using the PEMS equipment.

Mr. Charmley asked why the NRBSS survey is conducted every three years. Dr. Mahoney responded that it is currently conducted every three years at a cost of \$4.5 million, but he is going to recommend it being done every two years. In terms of economization, he noted that there are many surveys of off-road vehicles being done, but they are inconsistent. He said that the real benefit to all parties would come if someone coordinated between groups to agree on common definitions so that the data could be aggregated.

Dr. Anenberg asked how big the public health impacts of emissions of non-road vehicles are. Mr. Choi responded that air quality modeling uses emissions data to estimate exposures for health impacts. He added that when they have access to good estimates of emissions and emissions locations, it helps characterize the true emissions impacts on human health from the off-road sector. Since emissions associated with the on-road sector are decreasing, off-road is becoming a larger relative contributor to emissions and health impacts. Dr. Mahoney added that there is a lot to be learned from public health models and how that data is aggregated and used.

Mr. Charmley commented that the EPA recently conducted a large modeling study of all onroad and non-road emissions using current emissions inventories, which they have used to set priorities. He noted that the results of the study contributed to OTAQ's decision to launch the

CTI. Mr. Charmley stated that there are clearly some non-road sectors that are large contributors to overall mobile emissions. Using the 2014 MOVES and NONROAD emission inventory models, EPA knows that large data gaps exist for the non-road sector, and they aspire to make improvements in this space.

Mr. Steve Cliff commented that ports and freight hubs are large sources of emissions that are near population centers.

Ms. Peg Hanna inquired about statistics on average idling time. She asked whether the benefits of automation would be incorporated into models. She also noted that some of the equipment at the Port Authority of New York and New Jersey (PANYNJ) is remote controlled.

Dr. Johnson responded by saying that idling time can range from 15 to 40 percent, and that private fleets are much lower than public fleets. In terms of automation, he added that there are obvious benefits, but it is sometimes difficult to quantify.

Mr. Jitesh Panicker commented that Dr. Johnson mentioned different types of PEMS equipment, including a mini one and a simple one. He asked Dr. Johnson to comment on the pros and cons of each. Dr. Johnson replied by saying that the traditional accuracy of on-board sensing is about 10 percent for PM, due to interferences. He added that they want to make it into a sensor, which would improve accuracy. He also added that with PM, a lot can be learned from qualitative data rather than only quantitative data.

Public Comments

Matt Spears, EMA

A New Paradigm for Next-Tier In-Use-Focused HDOH Low-NOx Regulations: A Vision for EPA's Cleaner Trucks Initiative

Mr. Matt Spears commented that EMA thinks of the EPA's CTI as a way to move away from the past regulatory strategies and shift towards a new paradigm of developing regulations reflecting in-use, real-world conditions for vehicles. He noted that industry should be held accountable through a compliance program that leverages aggregate in-use data, such as data from NOx sensors. Mr. Spears also said the CTI provides an opportunity to promote zero-emission technologies in the heavy-duty sector.

Mr. Spears remarked that EMA would like in-use monitoring to be a nationwide program. He stated that a national program would increase emissions reductions over that of a California-only based program for heavy-duty on-highway vehicles, and the national program could leverage the tools of the California program as well as sensors and telematics.

In terms of development times for new engines that can show large in-use reductions, Mr. Spears states that EMA sees 2027 as the earliest a paradigm shift could occur, but views 2024 as a time that a pilot program for the new paradigm could begin. EMA and its members are open to voluntary, nationwide programs and want to give their input to make sure greater emission reductions are achieved.

Mr. Spears believes the key here is to use NO_x sensors and telematics to move towards better compliance so that virtually all vehicles are their own laboratories. EMA wants compliance to be based on thousands of data points throughout a model's life. As data comes in telematically, EMA can track how well engines are doing throughout their useful regulatory lives and can aggregate this data.

EMA has done research in this space. They funded a study by West Virginia University to attach sensors to 100 vehicles to see what in-use emissions data could be gathered and used to inform the best and most cost-effective performance strategies to reduce NO_x emissions. Mr. Spears stated that EMA seeks collaboration and believes the WVU data set can be used by others. Once aggregated with manufacturer data, Mr. Spears remarks that EMA can create a pilot program for in-use compliance by 2024, similar to previous in-use pilot programs.

Mr. Spears concluded by laying out next steps. He said EMA must evaluate technology effectiveness on in-use vehicles, understand where higher emissions are coming from, and assess protocols and metrics for the new in-use compliance paradigm in the 2024 timeline, which build upon CARB's REAL model. After that, he thinks a regulatory scheme can be implemented to drive reductions throughout useful regulatory lives, and data can be aggregated to devise a compliance program. Mr. Spears reiterated that when there is a focus on aggregate in-use emissions, which establishes an aggregate in-use baseline based on this new metric, there will be a significant reduction in emissions. Lastly, Mr. Spears envisions phasing in compliance with this new in-use paradigm and allowing for an appropriate transition.

Comments and discussion

Mr. Grundler asked Mr. Spears if he believes the vision he outlined would be applicable to the light duty sector as well. He remarked that Mr. Spears' comments provide a very good starting point for EMA and the EPA to find common ground. Mr. Spears responded that EMA wants to stay engaged in this conversation.

Final Remarks and Adjourn

In closing, Mr. Rich Kassel thanked Mr. Spears for the information he shared regarding EMA's thoughts on the CTI. He thanked all attendees for their participation, he then thanked presenters and moderators, thanked Mr. Grundler and Mr. Charmley for starting the day, and thanked Mr. Johnson and Mr. Choi for moderating.

Ms. McCubbin thanked everyone for their attendance and noted the next meeting will be in September 2019. She then adjourned the meeting.

Appendix

MSTRS Meeting Attendance List	
Subcommittee Members and Presenters	
Name	Organization
Robert Anderson	Chevron Global (Chevron)
Dr. Susan Anenberg	Environmental Health Analytics
Amanda Appelbaum	Fuel Institute
Dr. Matt Barth	Institute of Electrical and Electronics Engineers (IEEE)
Michael Berube	U.S. Department of Energy
Kate Blumberg	International Council on Clean Transportation
Dr. Rasto Brezny	Manufacturers of Emission Controls Association (MECA)
Jim Bruce	United Parcel Service (UPS)
Bill Charmley	U.S. Environmental Protection Agency
Blair Chikasuye	Hewlett Packard (HP Inc.)
David Choi	U.S. Environmental Protection Agency
Steve Cliff	California Air Resources Board (CARB)
Elena Craft	Environmental Defense Fund
Andrew Cullen	Penske Logistics
Chris Grundler	U.S. Environmental Protection Agency
Peg Hanna	New Jersey Department of Environmental Protection
Steve Henderson	Ford Motor Co. (Ford)
Dr. Kent Hoekman	Desert Research Institute
Ritchie Huang	Diamler Trucks of America
Michael Iden	Association of American Railroads
Dr. Kent Johnson	CE-CERT
Zachary Kahn	Build Your Dreams North America
Rich Kassel	Tri-State Transportation Campaign
Barbara Kiss	General Motors
Jim Kliesch	American Honda Motor Company
Vince Lichtenger	Marathon Petroleum Co. (Marathon)
George Lin	Caterpillar, Inc. (CAT)
Dr. Ed Mahoney	Michigan State University (MSU)
Andy Marsh	Plug Power
Courtney McCubbin	U.S. Environmental Protection Agency
Dr. Matt Miyasato	South Coast Air Quality Management District
Chris Nevers	Alliance of Automobile Manufacturers
Elaine O’Grady	Northeast States for Coordinated Air Use Management
Jitesh Panicker	Cummins
Michael Replogle	NYC Department of Transportation (NYC DOT)
Joanne Rotondi	Hogan Lovells US LLP
Simone Sagovac	Southwest Detroit Community Benefits Coalition
Rashid Shaikh	Health Effects Institute
Matt Spears	Engine Manufacturers Association (EMA)
Luke Tonachel	Natural Resources Defense Council

Other Attendees	
L. Joseph Bachman	Consultant
Erin Birgfeld	U.S. Environmental Protection Agency
Michael Block	Mitsubishi Motors
Julia Burch	U.S. Environmental Protection Agency
Mike Cammisa	Michael Cammisa Consulting, LLC (MCC)
Ray Chang	U.S. Environmental Protection Agency
Jeff Clarke	NGV America
Gerry Conway	Plug Power
Anthony Erb	U.S. Environmental Protection Agency
Paul Fiore	Auto Care Association
Robert Fronczak	Association of American Railroads
Marilyn Herman	Herman & Associates
Tim Hogan	American Fuel & Petrochemical Manufacturers (AFPM)
Dennis Johnson	U.S. Environmental Protection Agency
Maxine Joselow	E&E News
Kristin Kenausis	U.S. Environmental Protection Agency
Erin Lane	Cascade
Rick Lattanzio	Congressional Research Service
Andy Mabutoc	Mitsubishi Motors
Britney McCoy	U.S. Environmental Protection Agency
Chris Mylan	U.S. Environmental Protection Agency
Alexandria Reed	Mercedes Benz
Julia Rege	Global Automakers
Karl Simon	U.S. Environmental Protection Agency
Sarah Sullivant	U.S. Environmental Protection Organization
Arman Tanman	U.S. Environmental Protection Agency
Contractor Support	
Lesley Stobert	SC&A, Inc.
Allison Owens	SC&A, Inc.