Sustainable Supply Chain Advisory Committee
Meeting Summary

Date: September 20th 2017 | 11:00 am – 3:00 pm PDT

Location: In-person at the Port's Harbor Administrative Building and via phone conference

Attendees: Attachment A

Overview:
The Port's Sustainable Supply Chain Advisory Committee invited heavy-duty truck manufacturers to have an interactive dialogue around the future market for zero and near-zero emission technologies. As the CAAP calls for aggressive measures to drive investment and deployment of near zero emission technology in the near term (by 2023) and zero emission technology in the 2035 horizon, the Committee wanted to get an understanding of the forward landscape for these technologies.

Summary of Discussion:
Following brief introductions from all meeting attendees, the meeting was kicked off by Chris Cannon and Lauren Faber giving a high-level overview of the Clean Air Action Plan, the specific strategies included in the draft plan related to reducing truck emissions, and some key goals of the Port of Los Angeles and Mayor Garcetti.

TTSI and Cal Cartage, two trucking companies that regularly service the San Pedro Bay Port Complex and have been involved in several demonstration projects of alternative fueled vehicles, provided an overview of their experience with various truck technologies, including natural gas, fuel cell, hybrid and battery-electric. Generally, both companies have had success with all of these technologies. While the initial battery electric trucks have been limited in their operation to a 5 to 10-mile geographic area, and 6 hours of operating time, both confirmed that the electric trucks have plenty of power to do the work required. Both companies expressed strong support for natural gas technologies given its full range capabilities. The two end-users expressed strong support and confidence in the 12-liter natural gas engine that will soon be certified to near-zero emissions and that this will be a good option for full duty-cycle port drayage operations where short-range electric trucks cannot fulfill route requirements. Additionally, both companies noted a decrease in maintenance costs for alternative fueled vehicles over diesels.

The engine and truck OEMs each shared their short-term and long-term technology forecast. Highlights include:

- Kenworth is currently focused on a variety of natural gas products (including near zero emission NG engines) and working on a variety of other technology platforms over the next 5-10 years, including natural gas-electric hybrid and hydrogen fuel cell technologies. Additional development work will continue on these technologies in the next three to five-year timeframe. The company will continuously assess the market acceptance of its existing and near-term products to inform projections of future market demand for additional products.

- Volvo continues to invest in the efficiency improvement of its diesel technology, including connected technology and automation. Volvo has several demonstration projects underway with catenary electric and plug-in hybrid electric technologies, but none are being developed commercially at this time. Volvo noted that commercialization of new technology for a major OEM is a significant undertaking, including the need to build out an "ecosystem" of after-sales support (dealership training, technician training, parts distribution, etc.) in order to support any new technology put into the marketplace. While pilot projects of 100 trucks are important to understand technologies and future potential development, projects of this size do not guarantee commercialization of a product or technology. With respect to zero emission technologies, Volvo noted that they were not seeing a lot of customer interest in battery electric trucks and that this technology is likely still several years away from development. In the interim, Volvo will be looking at plug-in hybrid electric technology and technology that will provide zero-emission miles in communities where it is required. Volvo also confirmed it will offer the near-zero emission 12-liter natural gas engine in 2018.

- Daimler is focused on near zero natural gas vehicles with several truck/engine combinations available in 2018. At this time, the company has no plans to build commercial zero emission drayage trucks, but as a major OEM, they are always evaluating various technology options and market demands. Daimler reiterated the need for a robust after-sales support network as trucks placed into the market will be in service for 10 to 15 years. Major OEMs have invested billions of dollars in dealership training, service capabilities, and warranty support networks. Any new technology placed into the market must also consider these as cornerstone issues. Daimler reiterated its support for near zero emission natural gas technologies, noting that the product is available to help provide significant emission reductions without any operational compromises in terms of range and hauling capacity. It was also noted that the ports can again be a catalyst for new technology, as was the case with natural gas trucks in the first Clean Truck Program.

- Rush Peterbilt confirmed that it already selling the near zero emission 9 liter natural as engine in its truck platforms, and will offer the 12-liter near zero engine when it is certified in the coming months. Peterbilt is working on four electric demonstration units with Transpower, but confirmed that these are not commercial products (which was later confirmed by Transpower).

- Navistar continues to focus on its diesel truck business and is working on near zero and zero emission products, although it was not prepared to provide specific details at the time of this meeting. Navistar commented that for a major OEM to develop a new technology platform, it

must see a consistent volume of sales annually and not just in one year. The company also confirmed prior comments about the importance of having a support network in place for new technology.

- Freightliner's southwestern U.S. dealership network (Velocity Vehicle Group / LA Freightliner) was a very activate participant in the first Clean Truck Program. The company confirmed prior comments about the need to have an "ecosystem" of support for new technologies. Near zero natural gas was noted as being instrumental in achieving near-term emission reductions because of the super low emissions and the existing ecosystem of fueling infrastructure and trained mechanics throughout Southern California that can support the technology. While electric truck technology is promising and will see opportunity in the near term, it was noted that the technology is just not yet available, and, there remain a number of other hurdles that must be overcome, including refueling infrastructure availability, the cost of such infrastructure, and/or the capability to permit and develop such infrastructure.

- Cummins Westport's (CWI) confirmed that its 12-liter natural gas engine will soon be certified by CARB and EPA at 0.02 g/hp-hr NOX and commercial deliveries will begin in 2018.

- Cummins confirmed that while it continues to improve diesel engine products, it is working on a variety of electric, hybrid electric and near zero emission natural gas engine products and drivetrain technologies. It was noted, however, that Cummins will simply provide the technology and components to OEMs – as it does now with its engine products – and that it does not plan to become a manufacturer of these advanced technology trucks and buses. The company will start to introduce battery electric and range-extended hybrid transit products in the 2019 to 2020 timeframe, and see opportunity for medium-duty electric delivery trucks for in-city delivery applications. In the Class 7 and 8 market, Cummins see short-haul (delivery radius of 50 miles with total per day range of 300 miles) battery electric trucks potentially becoming economic in the 2020 to 2024 timeframe. It was noted that new technologies must work as well, if not better than existing technologies, and that maintenance facilities must be available and ready to support new technologies, and they must also be affordable to the customer. Cummins expressed support for the use of the near zero emission natural gas engine technology in the immediate term as a significant air quality improvement strategy for the ports. It noted, however, that the "door should remain open" for electric truck technologies in the future and that demonstrations and investment should continue in the years ahead in order that this technology could be commercialized in the future.

- Tesla is set to unveil their first heavy-duty electric truck in the next month. Given the forthcoming announcement, additional details were not provided. However, Tesla noted that they see a market for fully electric trucks and full support the current goals as written in the draft CAAP. Given the likely development timeline for such product, Tesla did express support for the near zero emission natural gas truck technology in the interim as an effective air quality improvement strategy for the ports.

- TransPower noted the three primary challenges with electric trucks: range, high cost (including charging) and weight. However, given the rapid and continued advancements in battery chemistry, battery pack production, delivered battery costs, and battery weight (relative to range), these issues continue to be effectively addressed. The company remains bullish on electric truck technology and sees increasing signs of product commercialization in the next one to five years. Within this timeframe, the company predicts the electric truck market will start to ramp up from tens of units to hundreds of units and eventually thousands of units. Getting to 10,000 units of production is seen as a critical milestone in order to reduce the capital costs of electric trucks. Infrastructure and utility demand charges are also important issues to continue to address. Transpower also confirmed that it does not plan to be a truck manufacturer, instead it will focus on supplying its electric drive technology to mainstream OEMs.

- BYD confirmed many of the points made by Transpower with respect to the three major challenges (range, costs, weight) and the goal of zero emission trucks being cost effective at some point in the future. BYD's current platform provides 100 miles of range and a 1 hour refueling time. Given the year-over-year improvements in battery technology / energy density, BYD hopes to have within five years a truck that can provide 200 miles of range with good payload capacity. They are also looking at 15-minute charging windows and/or battery swap technologies. BYD is looking at a broader truck market than just the ports, although the volumes that can be provided by the ports are important. Like Tesla, BYD confirmed the value of near zero emission natural gas technology as an immediate air quality improvement strategy while electric trucks are further commercialized. To this end, BYD recommended that the ports continue to work on zero emission technology demonstrations and investment in order to drive the market for this technology to gain a stronger foothold in the future. Accordingly, BYD confirmed that the concept of a 100 EV truck demonstration project would be important to BYD to validate the technology, to begin to get to larger scale/volume for EV trucks, and to confirm with OEMs like BYD that they are on the right track with their technology approach.

- US Hybrid currently builds natural gas hybrids, hydrogen fuel cell and battery-electric products. It is working on several large-scale projects in China to deliver up to 1,000 units, which it noted it can leverage to support the deployment of zero emission trucks in the San Pedro Bay Ports. US Hybrid noted that it would provide the maintenance and after-sales support for its product given it presence in Southern California. US Hybrid suggested that the ports should only consider zero emission trucks (hydrogen fuel cell and battery electric) and natural gas hybrid technologies to meet its clean air goals.

Following each engine and truck OEMs technology forecast, the group discussed the truck strategies that are included in the draft Clean Air Action Plan and provided "final thoughts" and recommendations to the Port on how best to proceed. There was general agreement among all meeting participants on the following key points.

- It is important for the ports and OEMs to maintain a “portfolio approach” with both near and long-term focus.

- Near zero emission natural gas engines/trucks are ready and available and should be pursued as an effective air quality improvement strategy in the immediate term. They are cost competitive and have a robust support network (maintenance, infrastructure, etc.) in place to provide the necessary after-sales support required for the technology to be successful.

- Longer term, commercialization of electric truck technologies should be pursued, with increased hybridization and potential zero-emission capability trucks being an interim step. Infrastructure and other after-sales support networks must also be a critical focus of these efforts in moving from pre-commercial to commercial technology. Increased deployments of zero emission technology will be important to help accelerate these issues and to help drive the high upfront costs of this technology down. To drive continued investment and focus on zero emission technologies, some kind of “extra credit” or preferential treatment to zero emission trucks should be included in the CAAP.

- The group agreed that any future plans to reduce emissions should not be technology-prescriptive but rather looking at the lowest cost per ton of emissions reduced.

- All meeting participants agreed that this type of dialogue is needed and should continue on a regular basis.

Attachment A

Meeting Attendees

Guests		**Staff/Consultants**	
Daimler	Bob Carrick	City of LA	Lauren Faber
Volvo	Dawn Fenton	City of LA	Michael Samulon
Volvo	Pascal Amar	City of LA	David Reich
Cummins Westport	Hugh Donnell	POLA	Gene Seroka
Cummins	Tom Dollmeyer	POLA	Chris Cannon
Peterbilt	Dale Snowden	POLA	David Libatique
US Hybrid	Abas Goodarzi	POLA	Tim DeMoss
Tesla	Gina Goodhill	POLA	Carter Atkins
BYD	Andy Swanton	POLA	Lisa Wunder
Kenworth	Jeff Stevens	GNA	Erik Neandross
Freightliner	Brad Fauvre	GNA	Lexi Wiley
Navistar	Matt Smith	GNA	Patrick Couch
TransPower	Mike Simon		
CalCartage	Bob Lively		
TTSI	Tony Williamson		
SSCAC			
CCA / AQMD	Joe Lyou		
AQMD	Matt Miyasato		
CARB	Kathleen Mead		
CARB	Kim Pryor		
CARB	Paul Arneja		
CARB	Jason Wong		
EarthJustice	Paul Cort		
EarthJustice	Adrian Martinez		
Coastal San Pedro Neighborhood Council	Louis Dominguez		
PMSA	Michele Grubbs		
PMSA	Thomas Jelenic		
FuturePorts	Elizabeth Warren		