

## Sustainable Freight Advisory Committee *Meeting Summary - DRAFT*

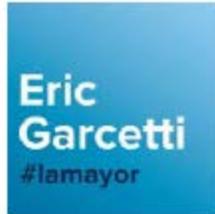
- Date:** November 30<sup>th</sup>, 2016 | 11 am – 3 pm
- Location:** In-person at the Port's Harbor Administrative Building and via phone conference
- Attendees:** Attachment A
- Meeting Agenda:** Attachment B

### Overview:

The November Sustainable Freight Advisory Committee (i.e. the Committee) meeting included a discussion around recent market activities in the port and goods movement sector and the Clean Trucks Program components of the Clean Air Action Plan (CAAP) discussion document. The Committee reviewed and approved a recommendation to the Mayor and to the Port of LA on the Clean Trucks Program. The University of California Riverside presented the findings from a recent project that studied emissions from in-use heavy-duty diesel trucks and the in-use emissions of ultra-low NOx natural gas ISL G near-zero vehicles in duty cycles that are often found in port operations. The Committee also discussed possible future recommendation topics on ship scrubber technologies, system efficiency projects, and innovative funding solutions for cleaner trucks.

### **Key Discussion Items** (Action items in green)

- 1. Review and approve October meeting summary**
  - The Committee agreed to approve the minutes as is.
    - ACTION ITEM:** GNA to send the approved meeting summary to Mayor Eric Garcetti, via Matt Petersen, and Gene Seroka.
  - The group agreed to post meeting summaries and recommendations to the portoflaprogress.org website.
    - ACTION ITEM:** GNA to post meeting summaries and recommendations
- 2. Update from Gene Seroka**
  - Gene provided an update to the group following his quarterly meeting with the chassis providers.



- He also discussed the need for shared data and information throughout all port stakeholders to improve efficiency. POLA is already looking at ways to do this with the recent announcement regarding a partnership with GE that will begin in Q1 of 2017.
- The group then discussed ways to more aggressively adopt cleaner trucks in the Port area, including ideas and feedback on the Clean Truck Program components of the CAAP Discussion Document.

### 3. Kent Johnson from UCR gave a presentation on CE-CERT's in-use emissions testing report of ultra-low NOx natural gas ISL G NZ vehicles

- Kent provided an overview of his findings, which concluded that the ISL G NZ 8.9 liter natural gas engine met and exceeded the target NOx emissions of 0.02 g/bhp-hr and maintained those emissions during a full ration of duty cycles that are often found in a port drayage application and other vocational applications throughout the South Coast air basin.
- Kent also compared the report's findings to other recent reports that did similar testing of diesel engines, which found that in low speed duty cycles, US EPA 2010 emission control technology exceeds certified emissions standards at controlling NOx emissions and these trucks have much higher emissions than their certification levels.
- Kent's presentation can be found in **Attachment C**.
- **ACTION ITEM: GNA to send the final UCR report to the Committee.**

### 4. Review recommendation on the acceleration of cleaner trucks in the harbor

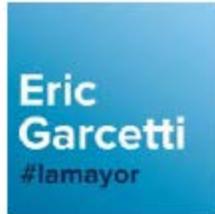
- There was a discussion around how specific the recommendation should be related to a clean truck fee or ban. After consideration from the Committee, it was agreed to put forth a recommendation that doesn't have specifics on a ban or a fee but that the committee would continue to discuss the Clean Trucks Program and make a more specific recommendation on it prior to the close of the CAAP comment period.
- The Committee discussed and finalized a recommendation focused on the acceleration of zero and near zero emission trucks and the need to seek funding resource to assist with the implementation of technology. The approved recommendation can be found in **Attachment D**.

### 5. The Catenary Siemens project overview

- This agenda item was pushed to a future meeting due to time constraints.

### 6. Discussion on increasing use of bonnet system

- A brief update on the current availability of bonnet technology was provided and discussion amongst the Committee ensued. The discussion focused on some of the challenges associated with a more wide spread deployment of the bonnet technology, including business case issues, regulatory issues, and competing technologies and approaches for



marine emission control. The Committee discussed that the group should continue discussing this topic at a future meeting to potentially develop a recommendation and strategy to present to Gene Seroka and Mayor Eric Garcetti.

- ACTION ITEM: Chris Cannon to develop a summary of available bonnet technologies and on board ship controls like scrubbers.

#### **7. Discussion on innovative financing solutions for clean truck technology deployments**

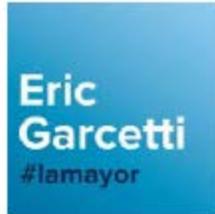
- The Committee quickly discussed the potential for more innovative financing approaches and solutions to accelerate the deployment of cleaner – and often more expensive – trucks in port drayage applications. Due to time constraints, this discussion topic will be continued at a subsequent meetings.

#### **8. Next steps for system efficiency / short-haul rail**

- This agenda item was pushed to a future meeting due to time constraints.

#### **9. Agenda planning for December meeting**

- The Committee agreed on the following the topics for the December meeting:
  - System efficiency projects
  - An overview of the Siemens Catenary Project
  - A report and discussion on ship scrubber technologies and other marine vessel emission control approaches
  - More specific recommendations on the Clean Truck Program and other elements of the CAAP Discussion Document



**Attachment A**  
**Meeting Attendees**

**COMMITTEE MEMBERS**

Louis Dominguez

Michele Grubbs

James Jack (via phone conference)

Joe Lyou

Adrian Martinez (via phone conference)

Cynthia Marvin

Matt Miyasato (via phone conference)

Peter Peyton

Jonathan Rosenthal

Elizabeth Warren

Thomas Jelenic

**CITY OF LOS ANGELES**

Matt Petersen

Michael Samulon

**PORT OF LOS ANGELES & CONSULTANTS**

Gene Seroka

Doane Liu

Chris Canon

David Libatique (via phone conference)

Tim DeMoss

Amber Coluso

Andrew Scott

Erik Neandross

Patrick Couch

Alexis Wiley

Chair of the Port & Environment Committee,  
Coastal San Pedro Neighborhood Council

Vice President, Pacific Merchant Shipping  
Association

Executive Director, Coalition for Responsible  
Transportation

President & CEO, Coalition for Clean Air &  
Governor's Appointee to the SCAQMD Governing  
Board

Staff Attorney, Earthjustice

Division Chief, California Air Resources Board

Deputy Executive Officer, Science and Technology  
Advancement, SCAQMD

Former President, ILWU Marine Clerks Association  
of Los Angeles & Long Beach

Co-Portfolio Manager, Saybrook Capital

Executive Director, FuturePorts

Vice President, Pacific Merchant Shipping  
Association

Sustainability Officer, City of Los Angeles Mayor's  
Office

Policy Analyst, Sustainability Office, City of Los  
Angeles Mayor's Office

Executive Director, Port of Los Angeles

Deputy Executive Director & Chief of Staff, Port of  
Los Angeles

Director of Environmental Management Division &  
Chief Sustainability Officer, Port of Los Angeles

Senior Director of Government Affairs, Port of Los  
Angeles

Air Quality Supervisor, Port of Los Angeles

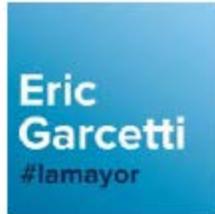
Port of Los Angeles

Port of Los Angeles

Chief Executive Officer, GNA

Vice President, GNA

Communications Manager, GNA



**Attachment B**  
**Sustainable Freight Advisory Committee**  
**November 30<sup>th</sup> | 11 am – 3 pm**  
**Meeting Agenda**

1. Review and approve meeting summary from October meeting – **5 min**
2. Update from Gene – **20 min**
  - a. Chassis shortage
  - b. The Port's work to digitize maritime shipping and partnership with GE
3. Review of CE-CERT's in-use emissions testing report (Kent Johnson & Wayne Miller, UCR) – **30 min**
4. Acceleration of cleaner trucks in the harbor recommendation – **45 min**
5. Lunch – **15 min**
6. Catenary Siemens project overview (Matt M., SCAQMD) – **15 min**
7. Discussion on increasing use of bonnet system – **30 min**
8. Discussion on innovative financing solutions for clean truck technology deployments – **30 min**
9. Next steps for system efficiency / short-haul rail – **15 mins**
10. Agenda planning for December meeting – **10 min**

# Heavy Duty Truck Emissions

Presentation to Port of LA Sustainable Freight  
Advisory Committee, San Pedro CA  
November 30<sup>th</sup> 2016

Presented By:

**Dr. Kent Johnson**

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Co-Authors: Dr. Wayne Miller, and Dr. Thomas Durbin

[www.cert.ucr.edu](http://www.cert.ucr.edu)

(951) 781-5786

University of California, Riverside  
Center for Environmental Research and Technology  
(CE-CERT)

# Background on UC Riverside

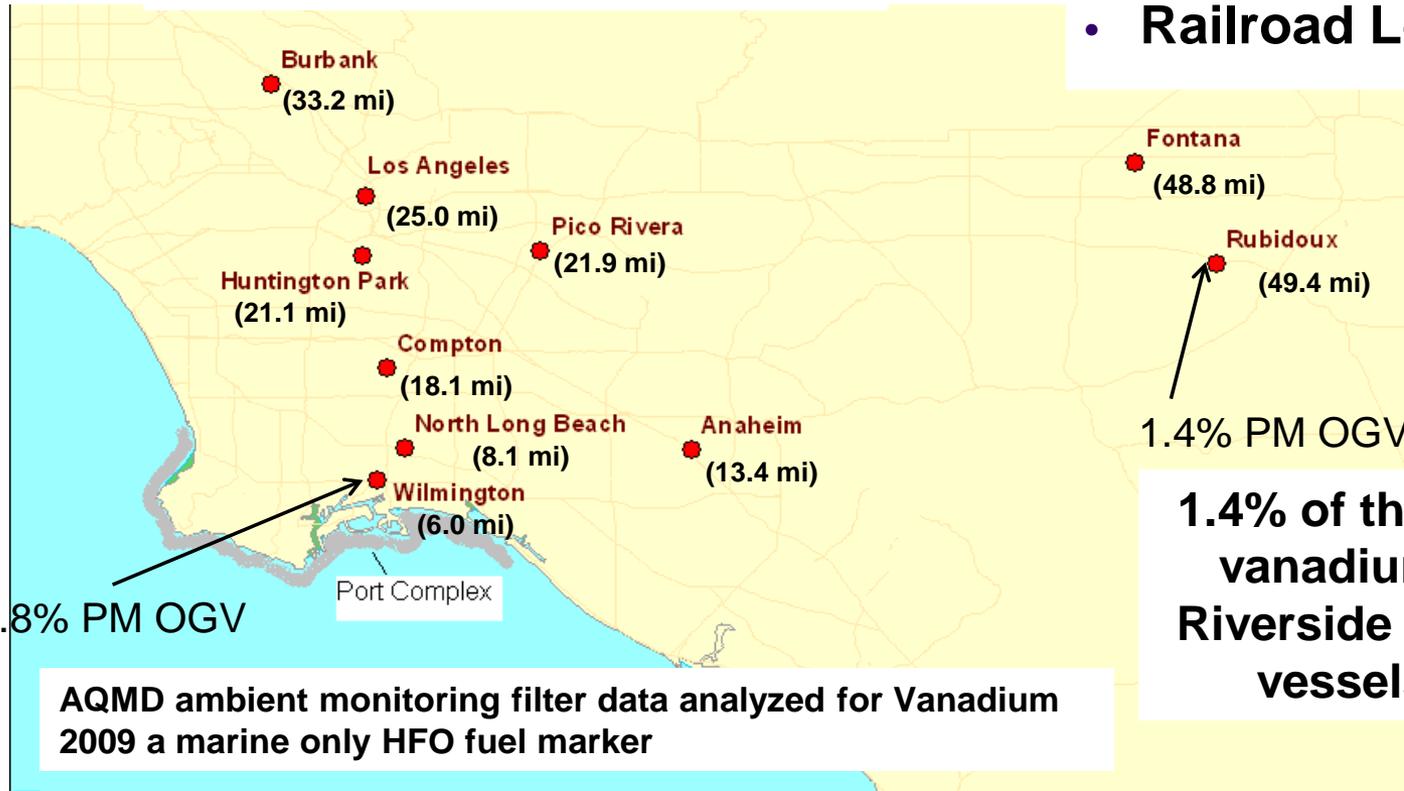
- ❑ **UC Riverside - Center for Environmental Research and Technology**
  - ❑ **Advanced emission laboratories**
  - ❑ **Complete transportation analysis capabilities**
- ❑ **Recognized leader**
  - ❑ **Performs research for ARB, AQMD, CEC and others**
  - ❑ **Works with industry (Cummins, Volvo, Caterpillar, Shippers, Terminals, Ports)**
  - ❑ **Discovery Mythbusters**

2015/11/13

Powered By  
Clean  
Natural Gas

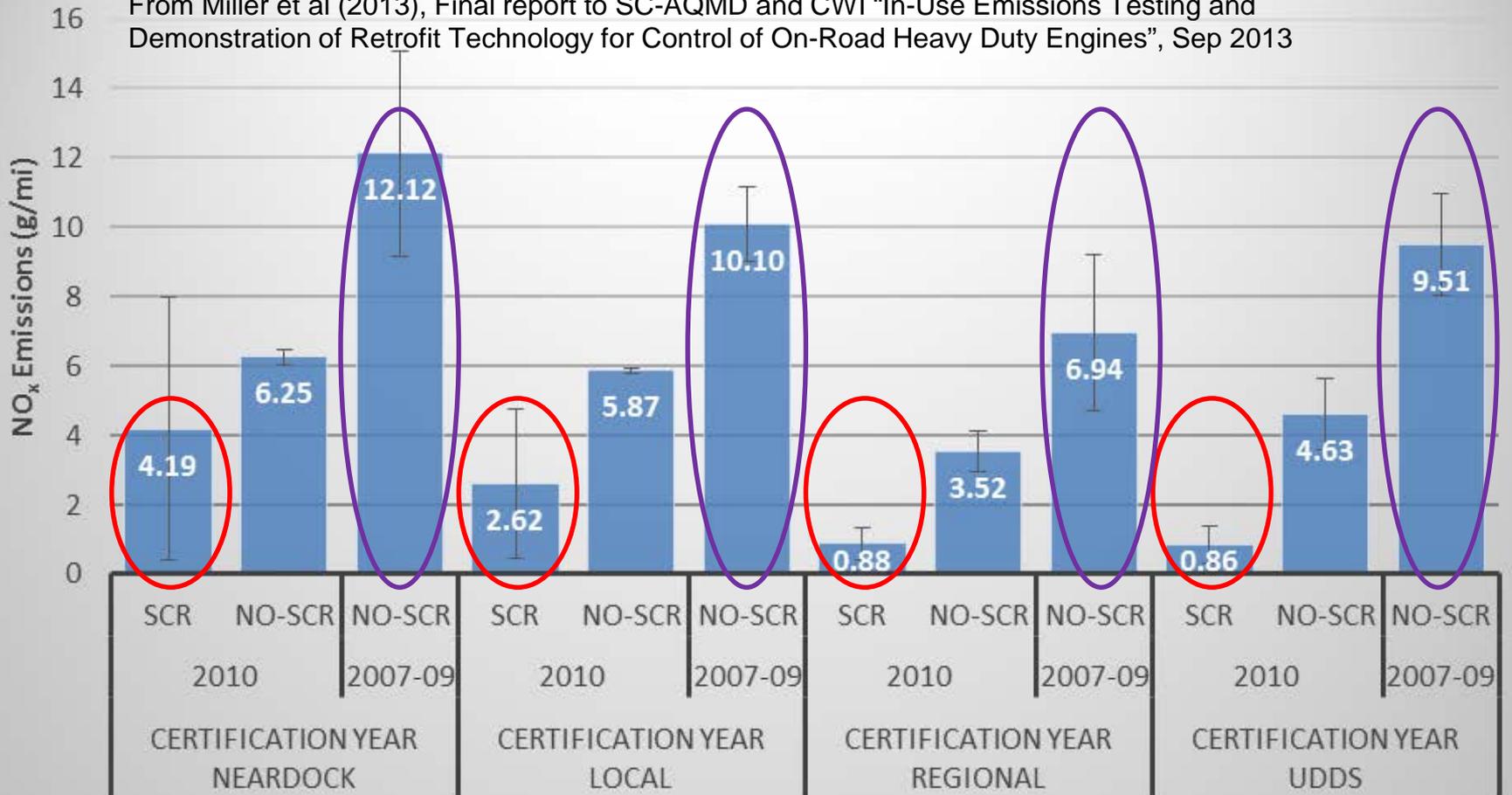
# Ocean Vessels Emissions Impact the Region

- Diesel Particulate Matter
- Nitrogen Oxides (NO<sub>x</sub>)
- GHGs (primarily CO<sub>2</sub>)
- Ocean-going Vessels (OGV)
- Heavy-Duty Trucks
- Cargo Handling Equipment
- Harbor Craft
- Railroad Locomotives



# Diesel Trucks at the Port May Emit More NO<sub>x</sub> Than Models Predict

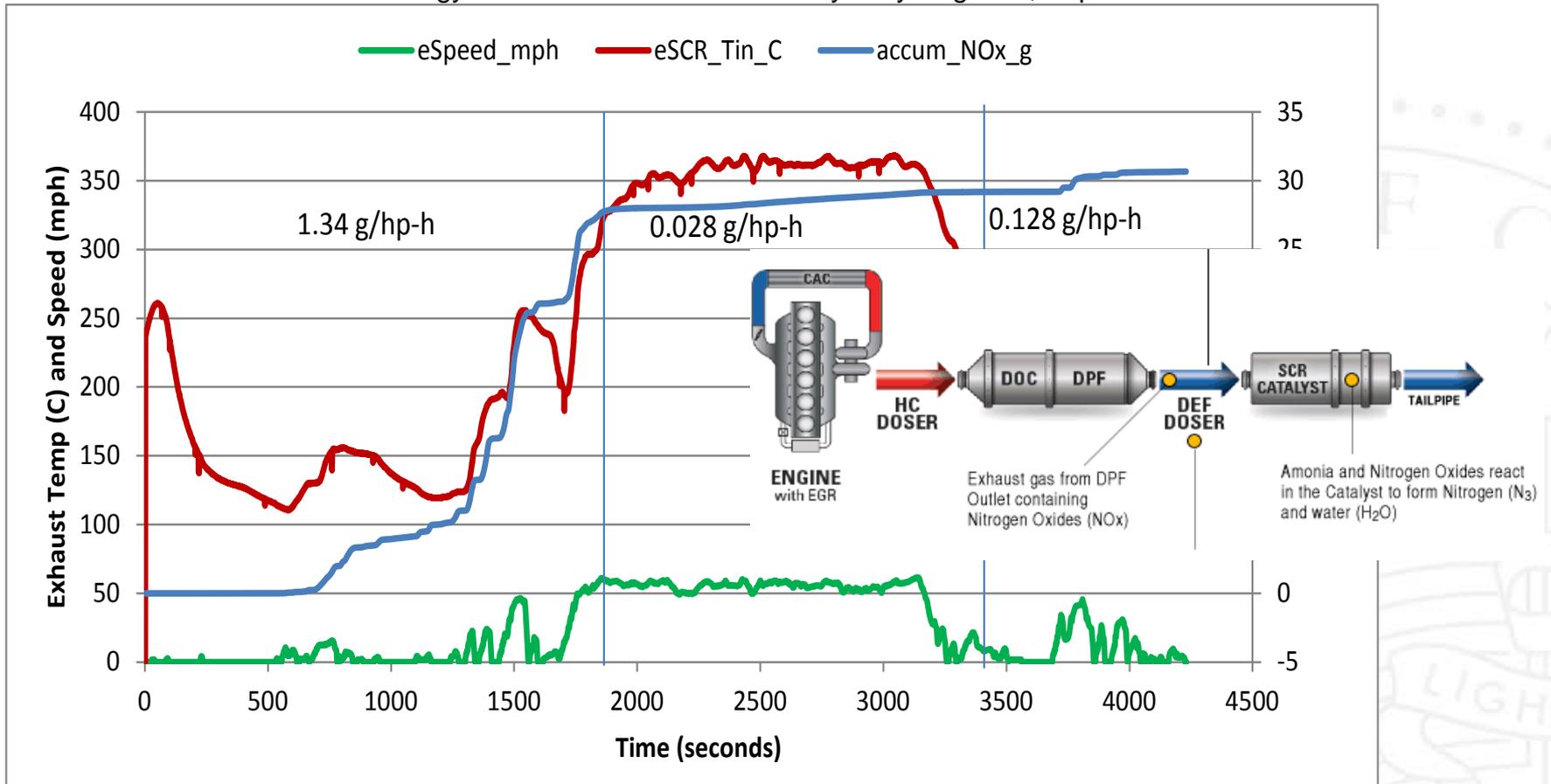
From Miller et al (2013), Final report to SC-AQMD and CWI "In-Use Emissions Testing and Demonstration of Retrofit Technology for Control of On-Road Heavy Duty Engines", Sep 2013



Data suggests port savings may be larger than models could predict

# Current State-of-the-Art Diesel Aftertreatment Performs Poorly Under Low Power Operation

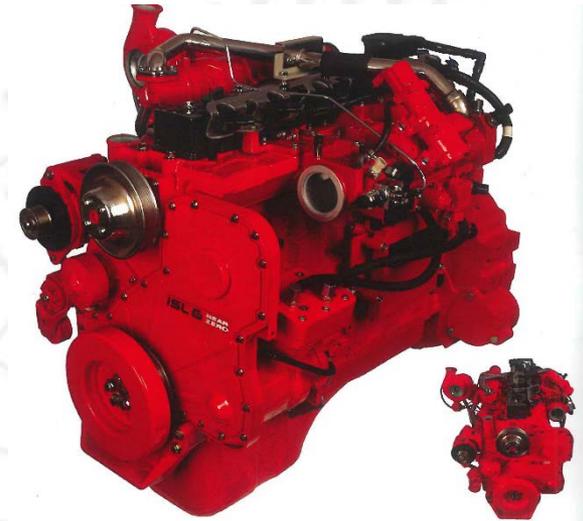
From Miller et al (2013), Final report to SC-AQMD and CWI "In-Use Emissions Testing and Demonstration of Retrofit Technology for Control of On-Road Heavy Duty Engines", Sep 2013



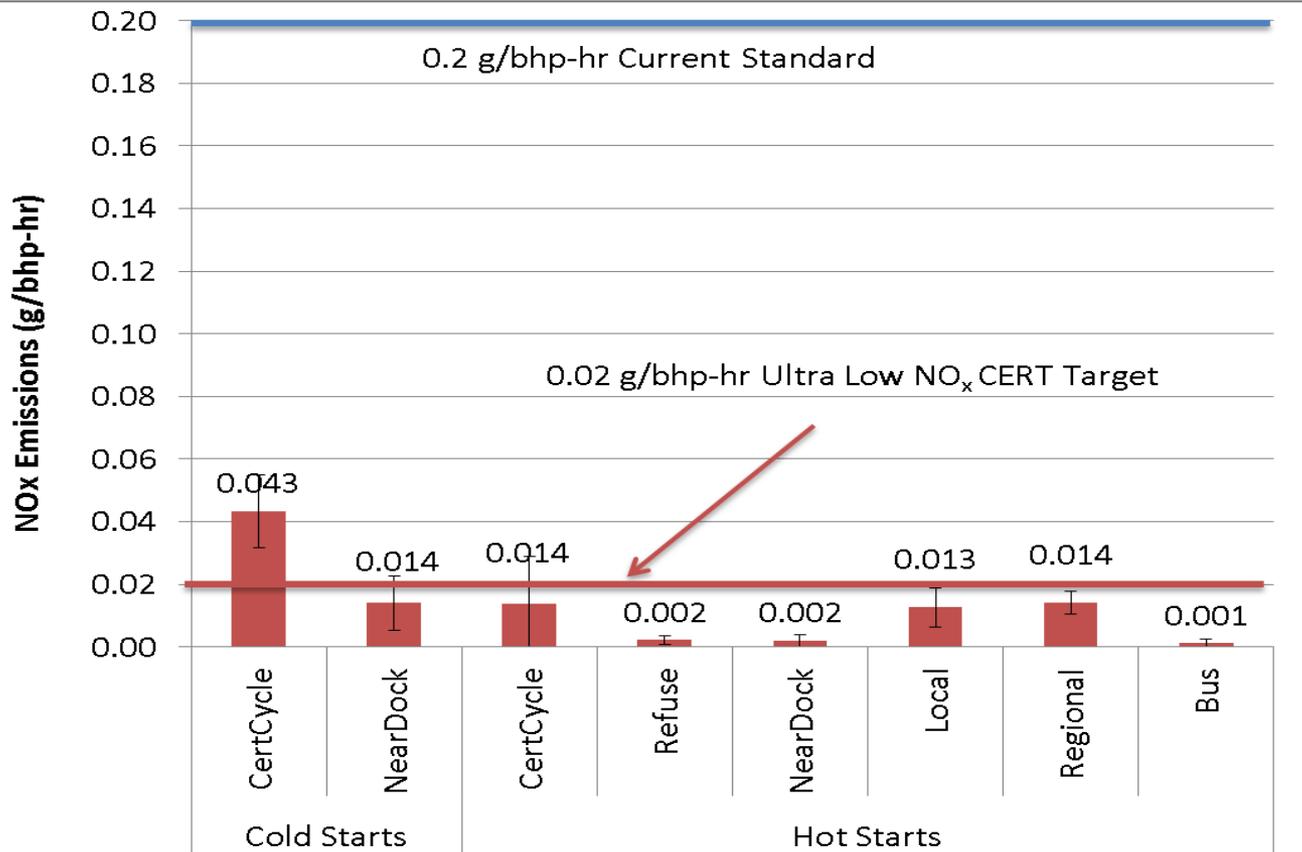
**Data suggests replacing SCR vehicles at the ports is needed**

## Advanced Natural Gas Engines are Success

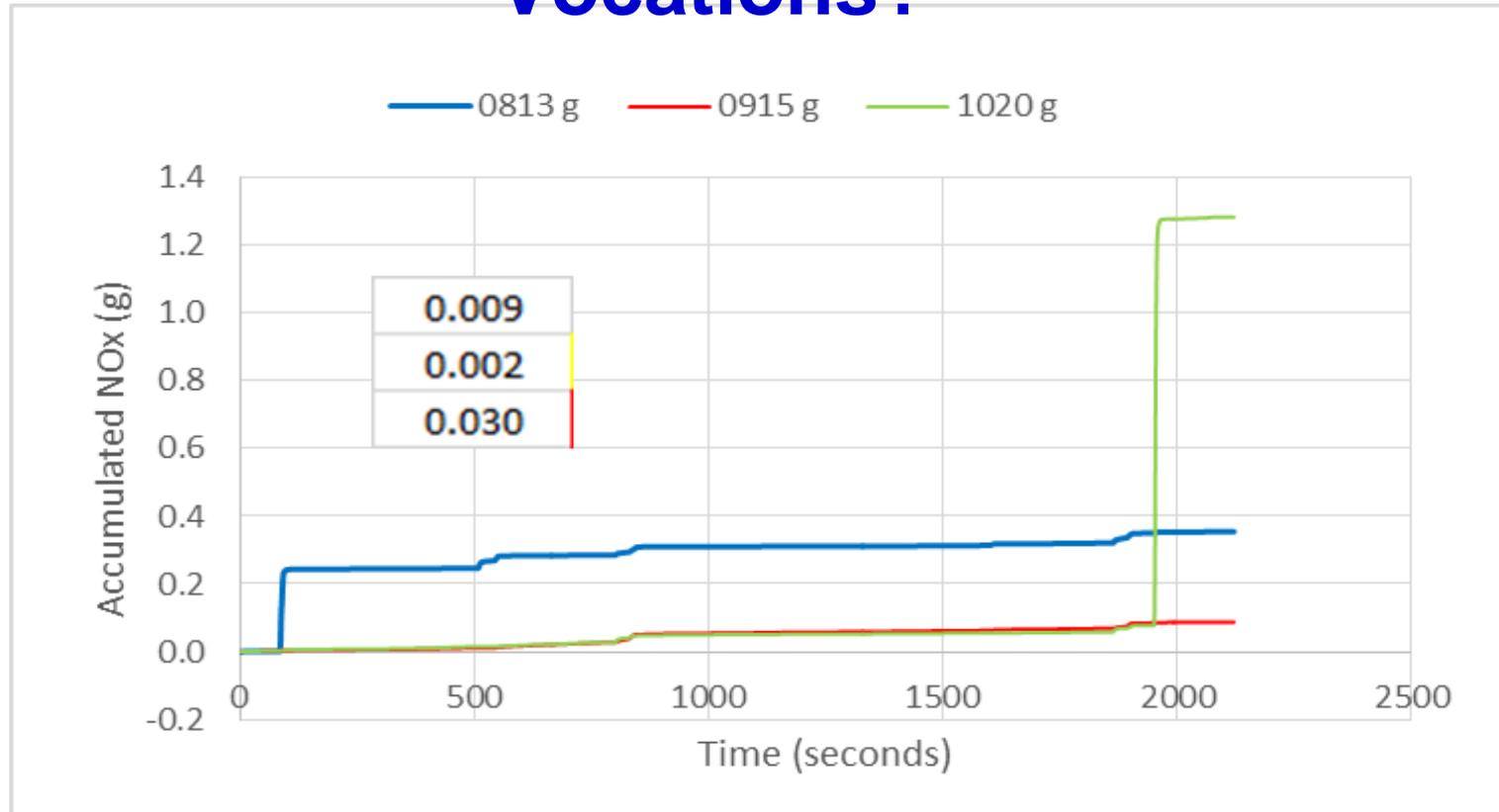
- EPA/CARB 2007 Standard: 0.2 g/bhp-hr of NO<sub>x</sub>
- California Optional (Voluntary) Standards: 0.02 g/bhp-hr
- SCAQMD-managed \$5M program to develop a 0.02 g/bhp-hr engine
- Cummins-Westport ISL G NZ 8.9L Engine:
  - Success Story:
    - Emissions Testing Results show they meet the voluntary 0.02 standard for both certification and non-certification cycles
    - Incentives being provided for future deployments



# ISL G NZ Engine Show Lower Emissions (90% lower than 0.02 g/bhp-hr) On Port Cycle Compared to Certified Cycle



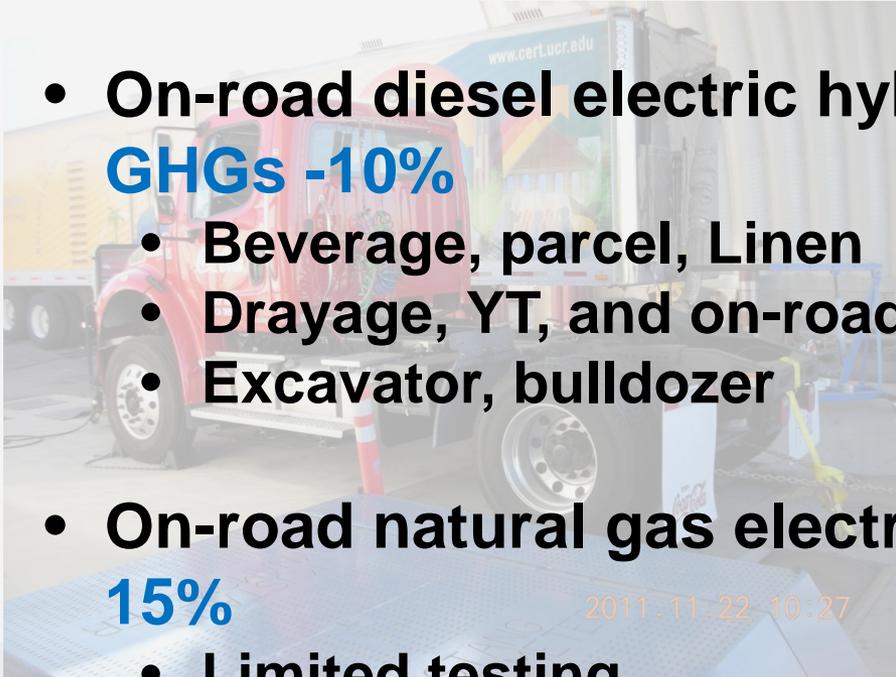
# Will Those Low Emissions Exist On All Vocations?



- **Three spikes show most of the emission increases**
- **What will happen if a manual transmission is used?**

# New Technologies: Hybrid Heavy Duty

- On-road diesel electric hybrid: **emission reduction mixed, GHGs -10%**
  - Beverage, parcel, Linen
  - Drayage, YT, and on-road
  - Excavator, bulldozer
- On-road natural gas electric hybrids: **benefit limited GHG 15%**
  - Limited testing
- Marine diesel electric hybrid
  - Technology benefit **both 10-15%**
  - **Logistic benefits: emissions 70% and GHG 27%**

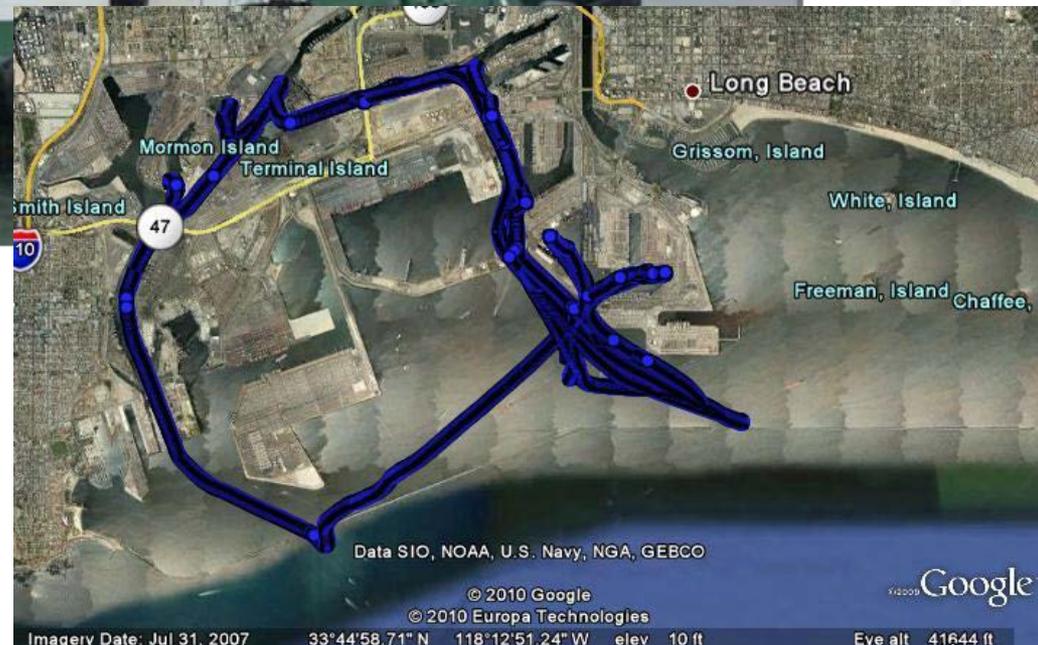


# Improved Logistics Caused the Large Hybrid Tugboat GHG and Emission Benefit



## ➤ Reductions

- 73% for  $PM_{2.5}$
- 51% for  $NO_x$
- 27% for GHG, Fuel,  $CO_2$



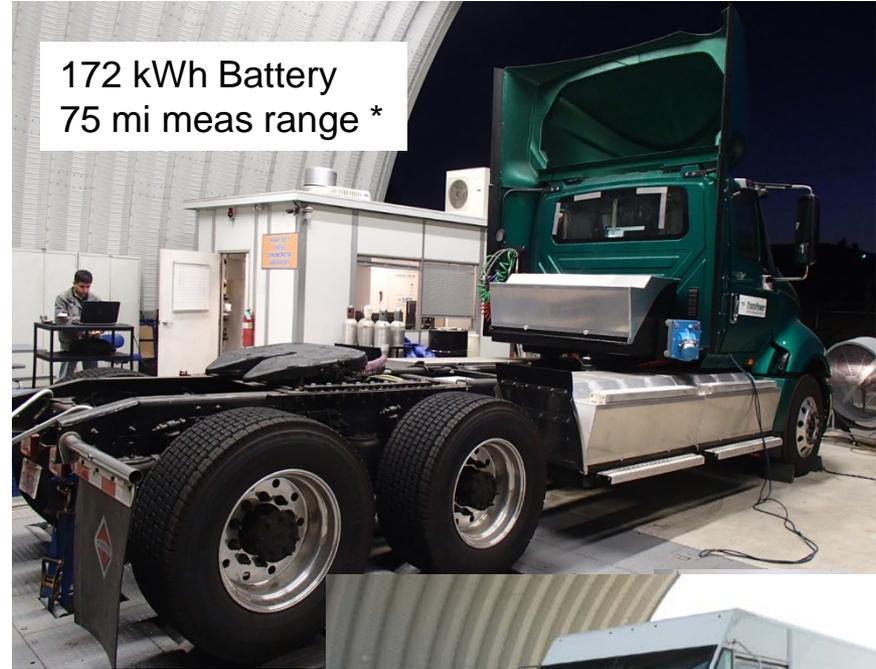
# New Technologies: Battery Electric Heavy Duty

154kWh Battery  
60 mi meas range \*



\*Usable capacity implies about 20% reserve on batteries

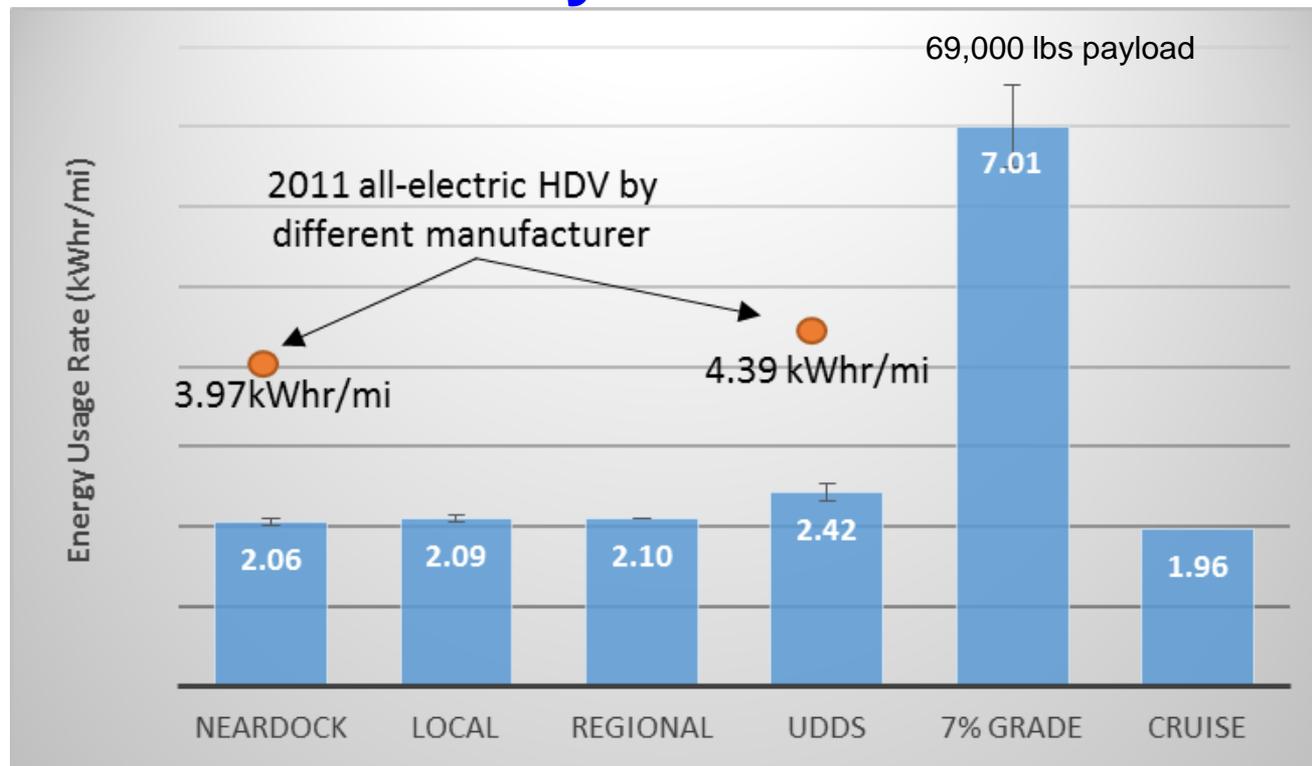
172 kWh Battery  
75 mi meas range \*



80 kWh Battery

Source varies and each were separate projects and final reports. Contact Kent Johnson At [kjohnson@cert.ucr.edu](mailto:kjohnson@cert.ucr.edu) for more information.

# Heavy Duty Truck Energy Usage Have Improved Since Early 2011 Versions



From Johnson et al (2015), Final report to TransPower via SC-AQMD funding "Performance Evaluation of TransPower All-Electric Class 8 On-Road Truck", April 2015.

- Yard Tractors show similar energy usage (YT cycles)
  - 26,000 lb = 1.7kwhr/mi
  - 72,000 lb = 2.8 kWhr/mi

# Battery HD Electric Vehicle Summary and New Projects

- **UCR experience with electric heavy duty vehicles**
  - TransPower, US Hybrid, Balcon, and Smith Electric Tested
  - 10-15 hr charge times
  - < 100 mi practical range
  - 2 to 2.5 kWhr/mi (up to 7 kWhr/mi with grade)
- **Recent news is showing a lot of funding**
  - BYD is offering HD solution *324kWhr battery at > 150 mi range*
  - UPS Awarded DOE Funding \$1mil (up to \$10 mil) *Fast charging development (non contact charging/storage)*
  - The Mercedes-Benz Urban eTruck, Vision Van and Future Bus eTruck *designed for 124 miles*

## Summary Thoughts

- **Pre-2010 HD diesel trucks operating on port cycles are emitting higher NO<sub>x</sub> than 1.25 NO<sub>x</sub> certification (up to 3 times)**
- **New 2010 HD diesel trucks show lower NO<sub>x</sub>, but are up to 10 times higher than 0.02 g/bhp-hr standard at the port**
- **NG HD trucks show very low NO<sub>x</sub> especially for port operation (~0.002 g/bhp-hr), but have not been demonstrated with vehicle types (YT or dray trucks)**
- **Electric HD trucks are promising... Limited range and charge times. Benefit of Logistics**

# Backup



# New Integrated Systems Example

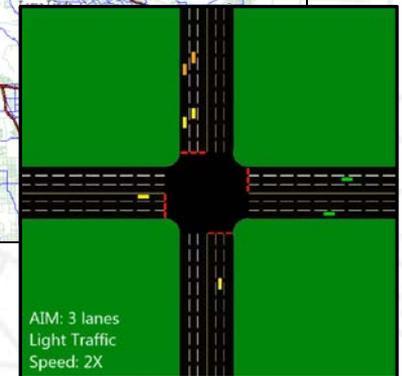
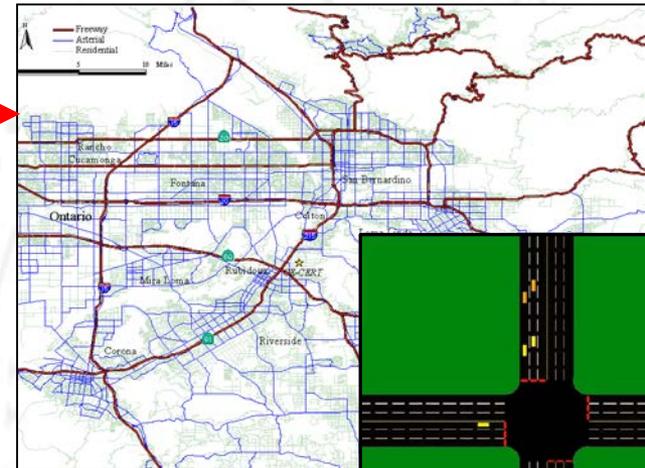
## Dynamometer-in-the-Loop Control System

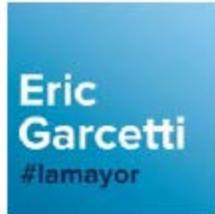


Dynamometer  
Operation



Transportation Systems  
Research Microscopic  
Traffic Modeling





## Attachment D Clean Truck Program Acceleration Recommendation

The SFAC recognizes that the immediate and wide scale implementation of zero and near-zero emission heavy-duty trucks in the South Coast Air Basin and throughout California is a priority focus. Such efforts are required to protect public health, comply with state and federal air quality standards, and avoid Clean Air Act sanctions that could cut off federal transportation funding, result in the potential takeover of local air quality regulatory programs by the federal government, and an increased offset ratio (2:1) that would make it much more difficult for stationary sources wishing to obtain required permits for new or modified equipment. In addition to immediate and large scale criteria pollutant emission reductions, clean trucks and the fuel that powers them must also provide critical greenhouse gas (GHG) emission benefits.

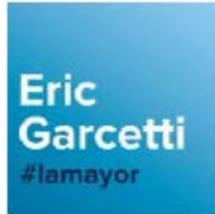
- California's Sustainable Freight Action Plan seeks to improve freight efficiency, transition to zero-emission technologies, and increase competitiveness of California's freight system. Zero and near-zero emission heavy-duty trucks are a cornerstone of the on-highway elements of this plan.
- The City of Los Angeles Sustainability pLAn targets an increase in the percentage of Port-related goods movement trips that use zero-emission technology to at least 15% by 2025 and 25% by 2035.
- The Ports of Los Angeles and Long Beach are considering putting a goal in the updated Clean Air Action Plan that results in 100% zero-emission cargo handling equipment and drayage trucks by 2030 and 2035 respectively.
- CARB's Mobile Source Strategy and State Implementation Plan (SIP) calls for the reduction of NOx from mobile sources by 70 percent by 2023 and 80 percent by 2030. To reach these required reductions, and thus federal ozone attainment deadlines, ARB has stated that 900,000 zero and near-zero emission trucks must be deployed by 2030, with a majority of these required by 2023 to meet the major NOx emission reductions required by this time.<sup>1</sup>
- In the South Coast Air Basin, significant progress towards federal ozone standard attainment deadlines must be achieved by 2023. The SCAQMD, joined by 17 other air quality agencies across the U.S., has recently filed a petition with the US EPA calling for a 0.02 g/bhp-hr NOx heavy-duty emission standard. Without near-term access to and deployment of heavy-duty trucks with emissions at or below a 0.02 g/bhp-hr NOx standard, the South Coast Air Basin will be unable to reach its near-term ozone attainment goals by 2023.
- Governor Brown has called for the reduction of petroleum use in California cars and trucks by up to 50 percent by 2030<sup>2</sup>. In addition, California has stated widespread transportation

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<sup>1</sup> CARB Mobile Source Strategy, Table 2: On-Road Fleet Transformation (p.50), May 2016.

<https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>

<sup>2</sup> <https://www.arb.ca.gov/cc/pillars/pillars.htm>



electrification is critical to achieving ambient air quality standards and greenhouse gas emission reduction goals<sup>3</sup>. Significant deployment of non-petroleum fueled heavy-duty vehicles will be required to meet this goal.

Further, the widespread use of low carbon and renewable fuels that achieve a 40 percent to 80 percent reduction in well-to-wheel based carbon emissions will be critical to the State's efforts to achieve the goals of SB 32 and AB 32, respectively.

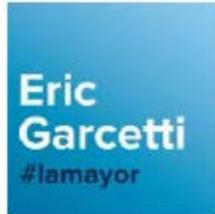
The SFAC recognizes that the ports have the ability to influence and drive investments in cleaner technologies by virtue of their unique leadership position in the marketplace and ability to develop and implement aggressive clean air programs. As an example, the original Clean Truck Program was a key contributor to moving nearly all of the heavy-duty truck manufacturers to develop and sell natural gas powered trucks as part of their technology portfolio. As the onset of the Clean Truck Program, Cal Cartage's 132 Daimler (Sterling brand) natural gas truck project, co-funded by Proposition 1B bond monies, was the first time a major truck OEM engineered and sold a natural gas truck in the U.S. Kenworth, Volvo, Mack and Peterbilt immediately followed with commercial natural gas products. Since this port-driven catalyst, more than 10,000 heavy-duty natural gas on-road trucks have been sold throughout the U.S. and Canada to fleets such as UPS, Frito Lay, Anheuser-Busch and many others, including more than 8,000 units powered by 12 liter Cummins Westport natural gas engines. The wide scale adoption of this technology by major trucking companies indicates an important level of technological robustness has been achieved in the last decade. The importance and opportunity for the ports to drive such technological innovation and development in the marketplace should not be underestimated.

A near-zero emission 9-liter natural gas engine is now commercially available to the heavy-duty market. A manufacturer expects to request CARB and EPA certification of a 12 liter near-zero engine – fully capable of meeting the needs of a port drayage application - in 2017, with commercial sales of this product starting in Q1 2018. Testing taking place at Southwest Research has raised the possibility of having diesel engines certified to 0.02 g/bhp-hr NOx in the 2023 timeframe. At the same time, new battery and fuel cell electric and hybrid heavy-duty trucks are being built and tested by Volvo, BYD, TransPower, US Hybrid, and others.

Given the need for zero emission and ultra-low NOx heavy-duty engine technology to be immediately deployed on a wide scale, the SFAC sees a unique opportunity for the updated San Pedro Bay Ports Clean Truck Program to again provide the catalyst needed to see an acceleration of industry-leading technology in the heavy-duty truck sector in the next three to five years. Given the higher cost of these

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<sup>3</sup> <https://energycenter.org/blog/senate-bill-350-major-triumph-transportation-electrification>

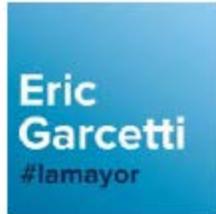


ultra-low NOx and zero emission technology, it will be imperative that public funding and innovative financing mechanisms be utilized to ensure that the financial burden of clean technology does not become the sole responsibility of the port truck driver, nor result in cargo diversion due to a requirement that would significantly increase the cost of trucking from the San Pedro Bay Ports. The SFAC values solutions that advance both the economic and environmental sustainability of the Port.

Provided that the necessary public and private funding and financing are available to the market, replacing 100 percent of the existing diesel powered drayage fleet in the San Pedro Bay Ports with equipment that provides zero and near-zero emissions is a shared goal of the SFAC. The SFAC, therefore, recommends that LA Mayor Eric Garcetti and the Port of Los Angeles executive director, Gene Seroka:

- Take advantage of the diverse stakeholder group represented within the SFAC to further build and lead a coalition of businesses (including cargo owners, shipping companies, terminal operators and others), environmental, community, regulatory agency, and other stakeholders to advocate for this shared vision to the greatest extent possible.
- Leverage this coalition to work with federal, state and local agencies, elected officials and others to advocate for the allocation of existing and new financial resources required to implement this vision by the end of 2023.
- Continue to work with Long Beach Mayor Robert Garcia and the Port of Long Beach to develop and implement a series of new measures related to drayage trucks that will cause older and higher emitting trucks to be removed from port drayage service in order that they are replaced with ultra-low emission and/or zero emission technology.
- Ensure that the San Pedro Bay Ports' competitiveness is increased based upon the sum of actions taken.
- Utilize existing and new port resources, public funding, incentives, grants, bulk purchasing collaboratives, and innovative financing to lower the cost to the truck owner to transition to zero and near-zero emission trucks (i.e., those with emissions at or below the 0.02 g/bhp-hr NOx standard) that are commercially available and viable for commercial deployment as fully-capable heavy-duty drayage trucks in a port application.
- Require zero and near-zero emission trucks that receive funding to use a low carbon fuel that achieves at least a 40 percent well-to-wheels based carbon reduction from CARB diesel.
- Provide meaningful support for public, private, and Public/Private joint ventures to develop low carbon fueling and charging infrastructure projects that enhance and/or accelerate the efficacy of zero and near zero emission trucks.

The SFAC recommends that a new Clean Truck Program, with the above elements incorporated, be implemented as soon as possible, but no later than April 1, 2018.



It is recommended that a letter be submitted to relevant federal, state and local agencies and elected officials by January 15, 2017 in order to outline the above goals and request funding support for this important initiative. With hundreds of millions of dollars in incentives available in the marketplace today from a variety of other sources, now is the time to demonstrate the leadership needed to focus these resources on the Clean Trucks initiative being recommended by the Port of Los Angeles Sustainable Freight Advisory Committee.