



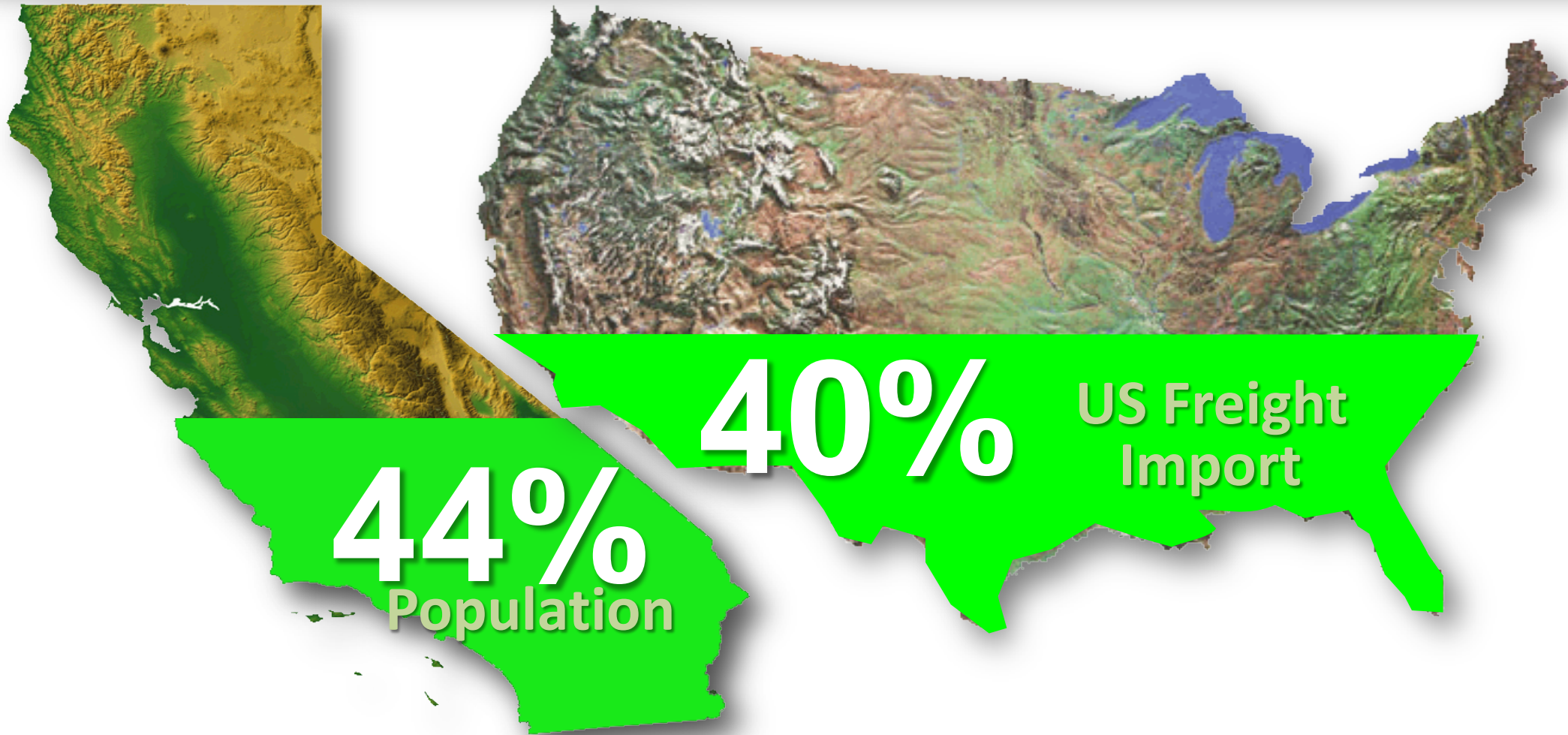
***UC Davis***  
***STEPS3 Symposium***  
*May 13, 2015*

***Session 3:***  
***Sustainable Pathways***  
***for Trucking***

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***South Coast Air Quality Management District***  
***Science & Technology Advancement***



# South Coast Air Basin



# Daily Combined AQI

Saturday, May 17, 2014



Good

Moderate

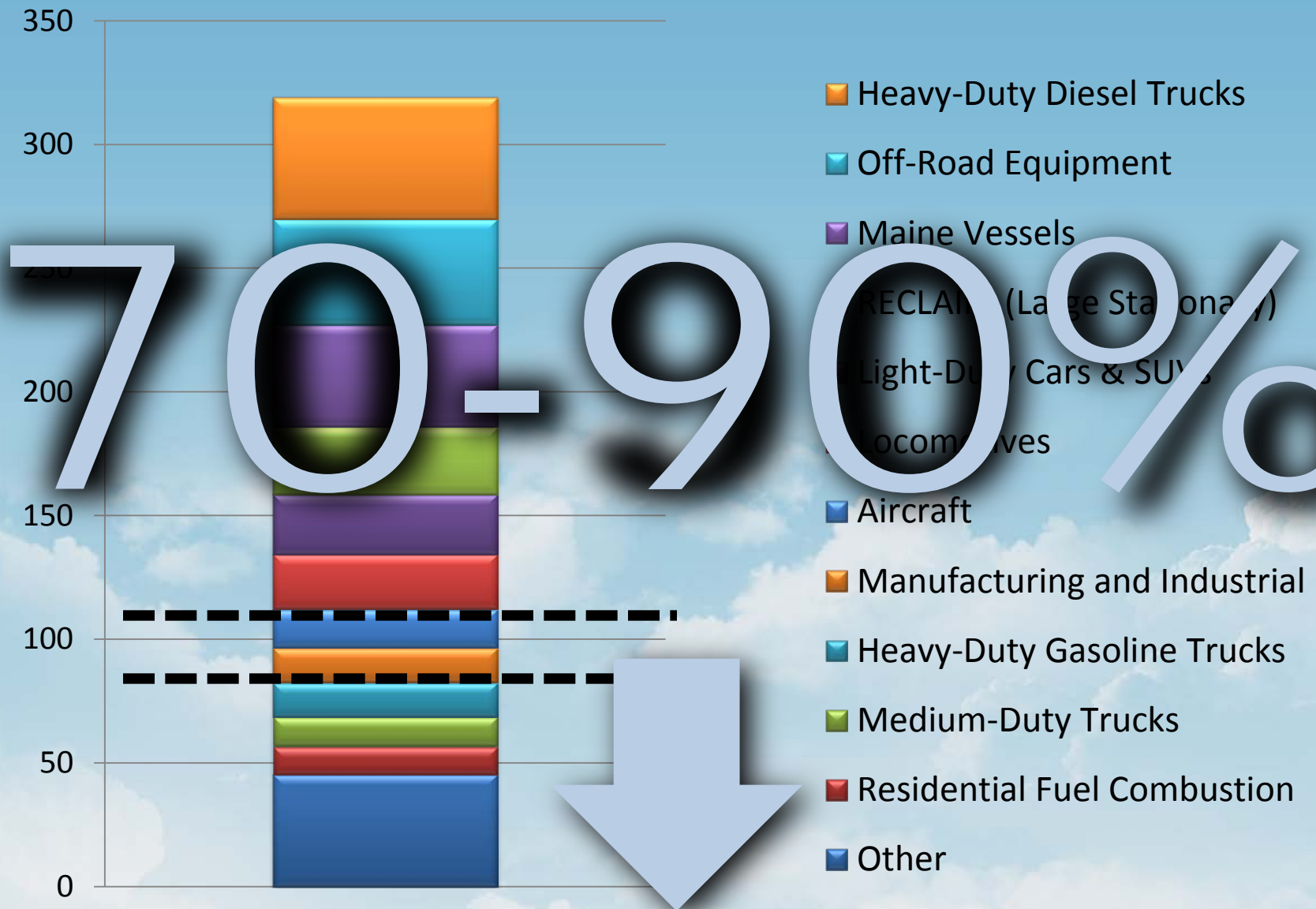
USG

Unhealthy

Very Unhealthy

Hazardous

# Top NOx Sources in the Region



# Technology Demonstration Clean Fuels Program

- **Established in 1988**
- **\$1 fee on DMV registrations (\$~12M/yr)**
- **Stationary source fee (~\$400k/yr)**
- **Research, develop, demonstrate, and deploy (RD3) clean technologies**



- **[H&SC Sections 40448.5 and 40512 and Vehicle Code Section 9250.11](#)**
- **<http://www.aqmd.gov/home/library/documents-support-material/clean-fuels-annual-report>**

# Cleaner Transportation



The Press Enterprise  
[www.pe.com](http://www.pe.com) July 17, 2013

- *Potential freight elements:*
  - *Zero-emission port container transport*
  - *Zero-emission truck corridors*
  - *Rail electrification*
- *Zero Emission Transit Buses*



# Zero Emission Drayage Trucks

- **In Oct. 2012, four contractors awarded to develop and demonstrate zero emission drayage trucks with \$4.17M DOE grant**
  - **Nine battery electric trucks: Balqon, TransPower, US Hybrid**
  - **Four fuel cell electric trucks: Vision Industries**
- **Vision ceased operation and Balqon withdrew**
- **Potential replacement projects**
  - **Zero emission capable**
  - **Related project experience**
  - **Matching cost-share**
  - **Timely execution**





# Zero Emission Cargo Transportation

- San Pedro Bay Ports FCEV Demonstration

- BAE Systems – develop 1 Class 7 battery electric truck with H2 range extender
- TransPower – develop 2 Class 8 battery electric trucks, one with 30kW FC and one w/60 kW FC
- U.S. Hybrid – develop 2 Class 8 equivalent battery electric trucks with on-board H2 FC generator



# Catenary Demonstration Project

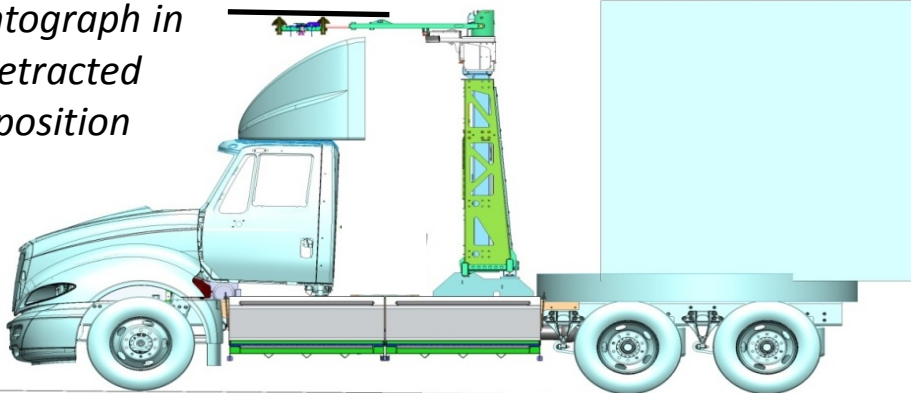
- **Designed to prove catenary truck concept in real-world drayage operations**
- **Catenary system**
  - **One mile length, both directions**
  - **Pole spacing similar to street lights**
  - **DC power substation with remote monitoring**
  - **Small test track and monitoring station**
- ***Four demonstration trucks***
  - *Volvo Diesel hybrid*
  - *TransPower CNG hybrid and Battery-electric trucks*
  - *BAE/Kenworth CNG hybrid truck from ZECT II project*



# The Catenary Trucks

## Electric Truck

Pantograph in retracted position



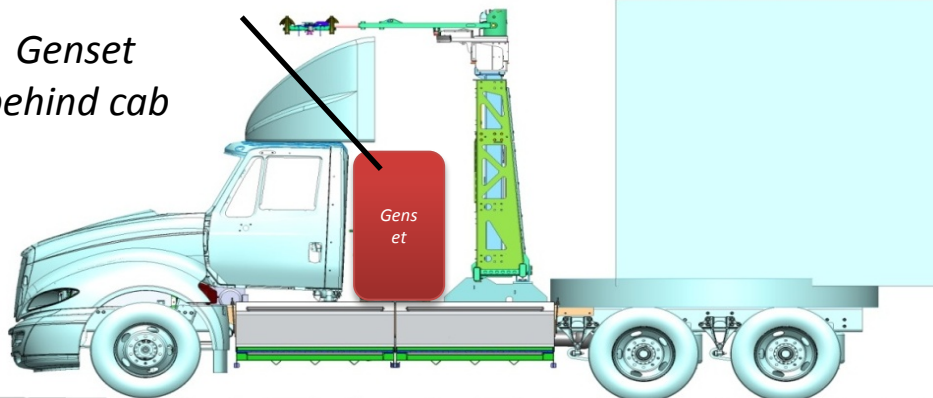
## System Based on the ElecTruck Platform

Flexible full speed, load, and grade capable class 8 tractor

## CNG Hybrid Truck

Gen-set located behind

Genset behind cab



Catenary versions use half of the ESS



# Collaborative Effort

- **Zero & near-zero emission technologies are needed to meet NAAQS**
- **Substantial co-benefits**
- **Our time to act is now**
- **The future health of our region, nation and planet is up to us**

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