



# Clean Fuels Program Advisory Group Meeting

September 30, 2011

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Technology Advancement Office



*Cleaning the Air That We Breathe...*

# 2011 AQMD Priorities

1. Commence demonstration/deployment of a zero-emission cargo container movement system.
2. Incentivize five megawatts of in-basin renewable distributed electricity generation and storage to support electric technology applications.
3. Make substantial progress in creating programs to facilitate construction of new and modified stationary sources in areas where the supply of emissions offsets is limited, consistent with AQMD's clean air objectives.

# Air Quality Technology Symposium

- Discuss and Identify Potential Technologies and Control Strategies for 2012 AQMP
  - Reduce Size of “Blackbox”
- Technology Areas
  - On-Road
  - Goods Movement
  - Off-Road
  - Stationary

# Air Quality Technology Symposium

- Partners
  - Government
  - Industry
  - Environmental Organizations
  - Public
  - Universities

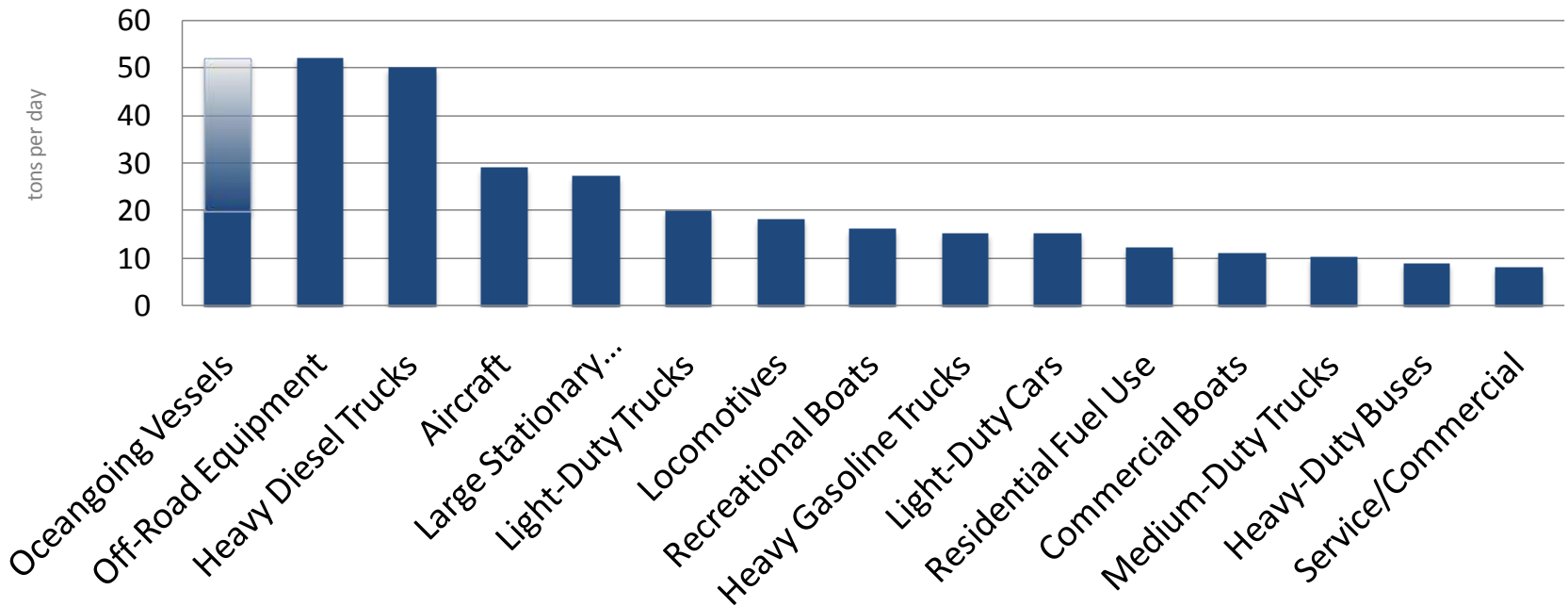
# Key Regional Air Quality Challenge: Reducing Nitrogen Oxides from Mobile Sources

- Attaining federal ozone and PM<sub>2.5</sub> standards will require substantial NO<sub>x</sub> reductions *beyond adopted rules*
- Ozone standard will likely require the greatest reductions
  - Attainment Deadlines:
    - **2023** (80 ppb standard)
    - **2032 (?) timeframe** (75 ppb standard)



## South Coast Air Basin

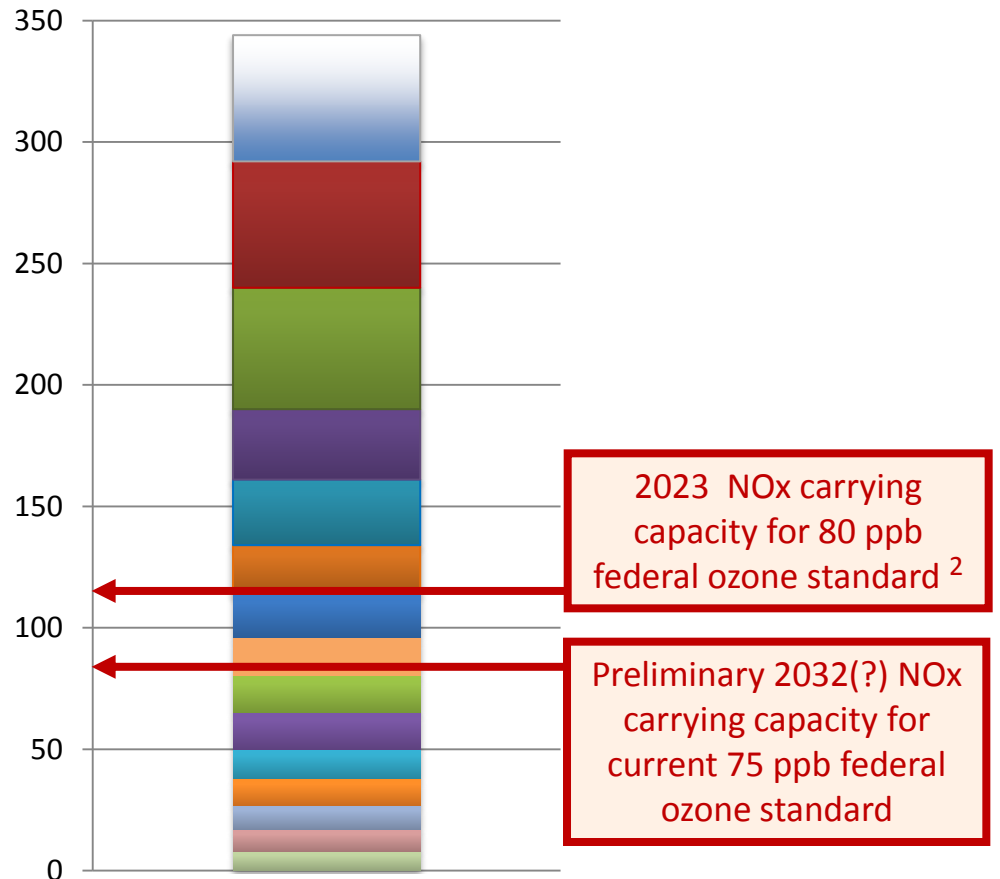
# Top 15 NO<sub>x</sub> Categories: 2023 NO<sub>x</sub> Emissions With Adopted Rules Preliminary SCAQMD Estimates\*



\* Preliminary emissions estimates based on data updated from 2007 AQMP where available: CARB 2010 emissions projections for trucks and off-road equipment; IMO Tier 1 – 3 for ocean vessels; EPA 2008 rule for locomotives; 2007 AQMP short-term measures for other categories. Range for oceangoing vessels based on varying deployment assumptions for IMO Tier 2 and 3 vessels and range of ports' cargo forecasts.

# Top 15 NO<sub>x</sub> Categories: 2023 NO<sub>x</sub> Emissions With Adopted Rules Preliminary SCAQMD Estimates<sup>1</sup>

- Oceangoing Vessels
- Off-Road Eq<sup>t</sup>
- Heavy Duty Diesel Trucks
- Aircraft
- Large Stationary
- Light Duty Trucks
- Locomotives
- Recreational Boats
- Heavy Duty Gasoline Trucks
- Light Duty Cars
- Residential Fuel Combustion
- Commercial Boats
- Medium Duty Trucks
- Heavy Duty Buses
- Service/Commercial

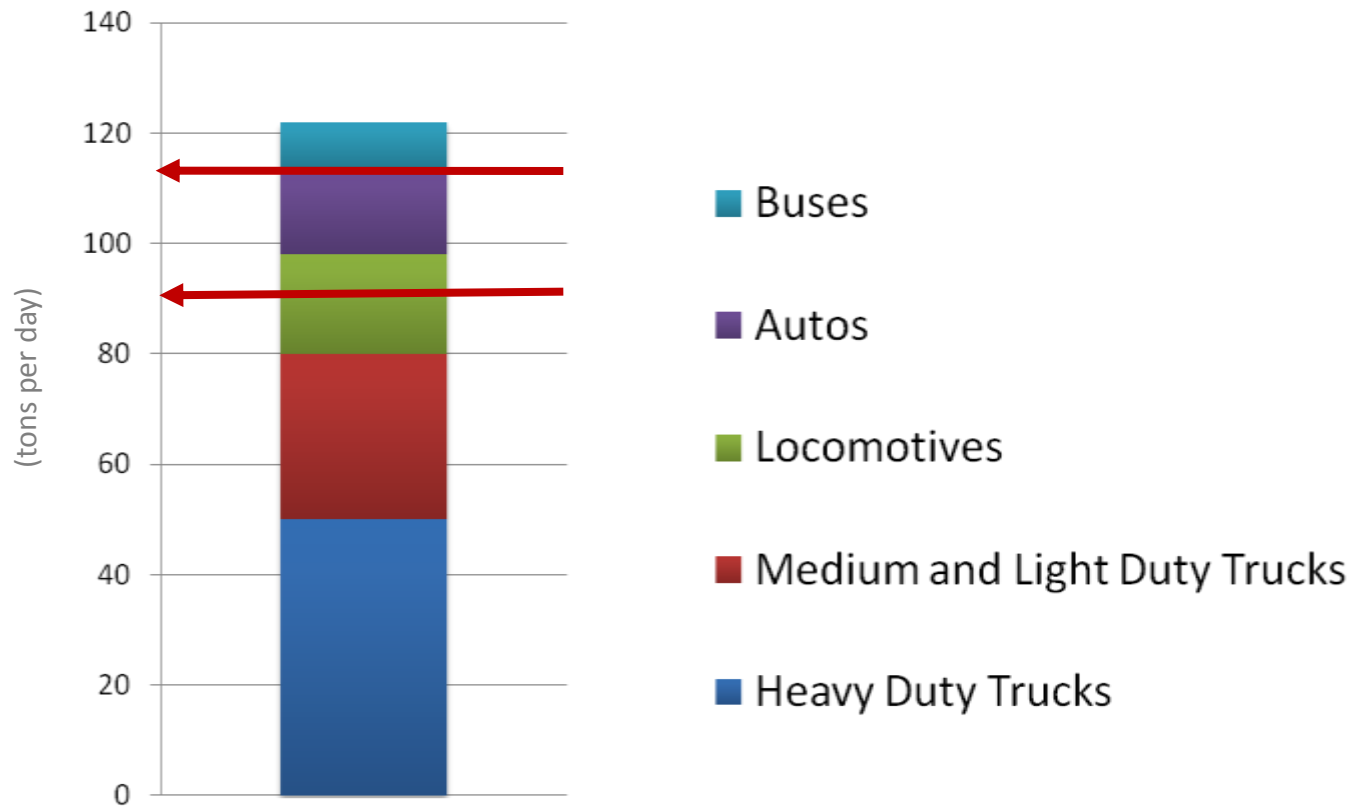


1 Preliminary emissions estimates based on data updated from 2007 AQMP where available: CARB 2010 emissions projections for trucks and off-road equipment; IMO Tier 1 – 3 for ocean vessels; EPA 2008 rule for locomotives; 2007 AQMP short-term measures for other categories. Range for oceangoing vessels (20 -52) based on varying deployment assumptions for IMO Tier 2 and 3 vessels and range of ports' cargo forecasts.  
2. 1997 80 ppb federal ambient ozone standard. Source: 2007 AQMP.

South Coast Air Basin

# Landside Transportation Sources

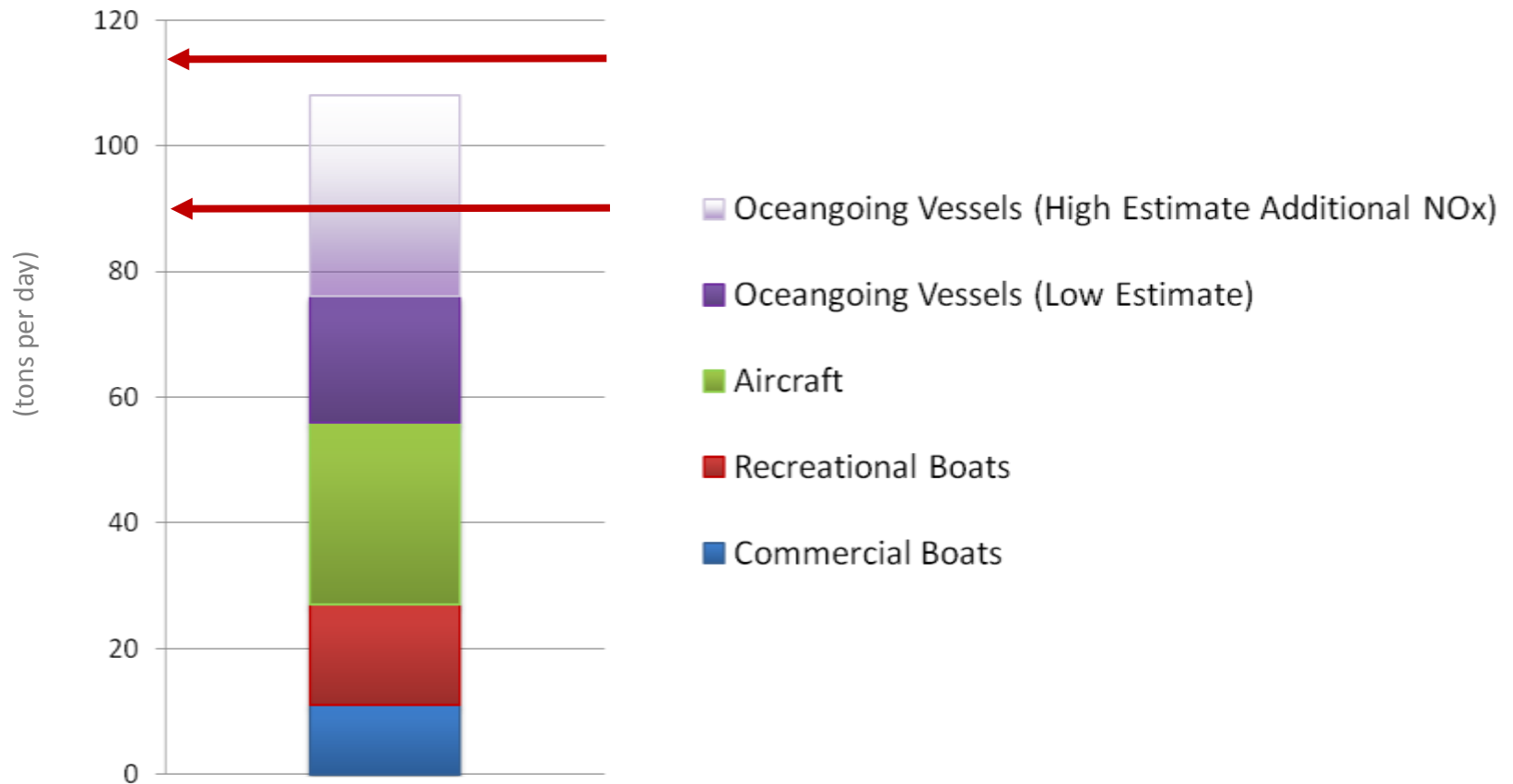
2023 NO<sub>x</sub> Emissions  
With Rules Adopted (Preliminary Estimates)<sup>1</sup>



1. Preliminary emissions estimates based on data updated from 2007 AQMP where available: EPA 2008 locomotive rule; updated 2010 CARB truck emissions data.



South Coast Air Basin  
**Marine & Aviation Sources**  
2023 NO<sub>x</sub> Emissions  
With Adopted Rules (Preliminary Estimates) <sup>1</sup>



<sup>1</sup> Preliminary emissions estimates based on data updated from 2007 AQMP where available: IMO Tier 1 – 3 for ocean vessels; EPA 2008 rule for locomotives; 2007 AQMP short-term measures for other categories. Range for oceangoing vessels based on varying deployment assumptions for IMO Tier 2 and 3 vessels and range of ports' cargo forecasts.

# Pathway Toward Zero-Emissions

Heavy-duty battery truck



Catenary mining truck



Battery Bus



Medium-duty battery truck



Electric car (Nissan Leaf)



Electric/diesel passenger train



Catenary electric bus (Los Angeles 1948)

# Autos



- Plug-In Hybrid s(Chevy Volt and Toyota Prius)
- Battery-Electric (Nissan Leaf)
- Fuel Cell (Honda Clarity)



# Trucks



- Hybrid Electric (Meritor)
- Fuel Cell Hybrid (Vision)
- Medium-Duty Battery Electric  
(Fed Ex: Smith Electric)
- Heavy-Duty Battery Electric (Balqon)
- Vision Fuel Cell
- Siemens eHighway



# Transit Buses



- Battery-electric with quick charge (Foothill Transit: Protera)
- Hydrogen fuel cell (Sunline Transit: Van Hool, UTC Fuel Cell)



# Rail

- Electrified Freight
- Dual-mode Locomotives
- Linear Synchronous Motor



# Clean Fuels Program Strategy for Technology Advancement



Regulate



Incentives & Funding

Technology Demonstrations



Technology Providers



End-Users

# Clean Fuels Program Technologies

## Near-Term

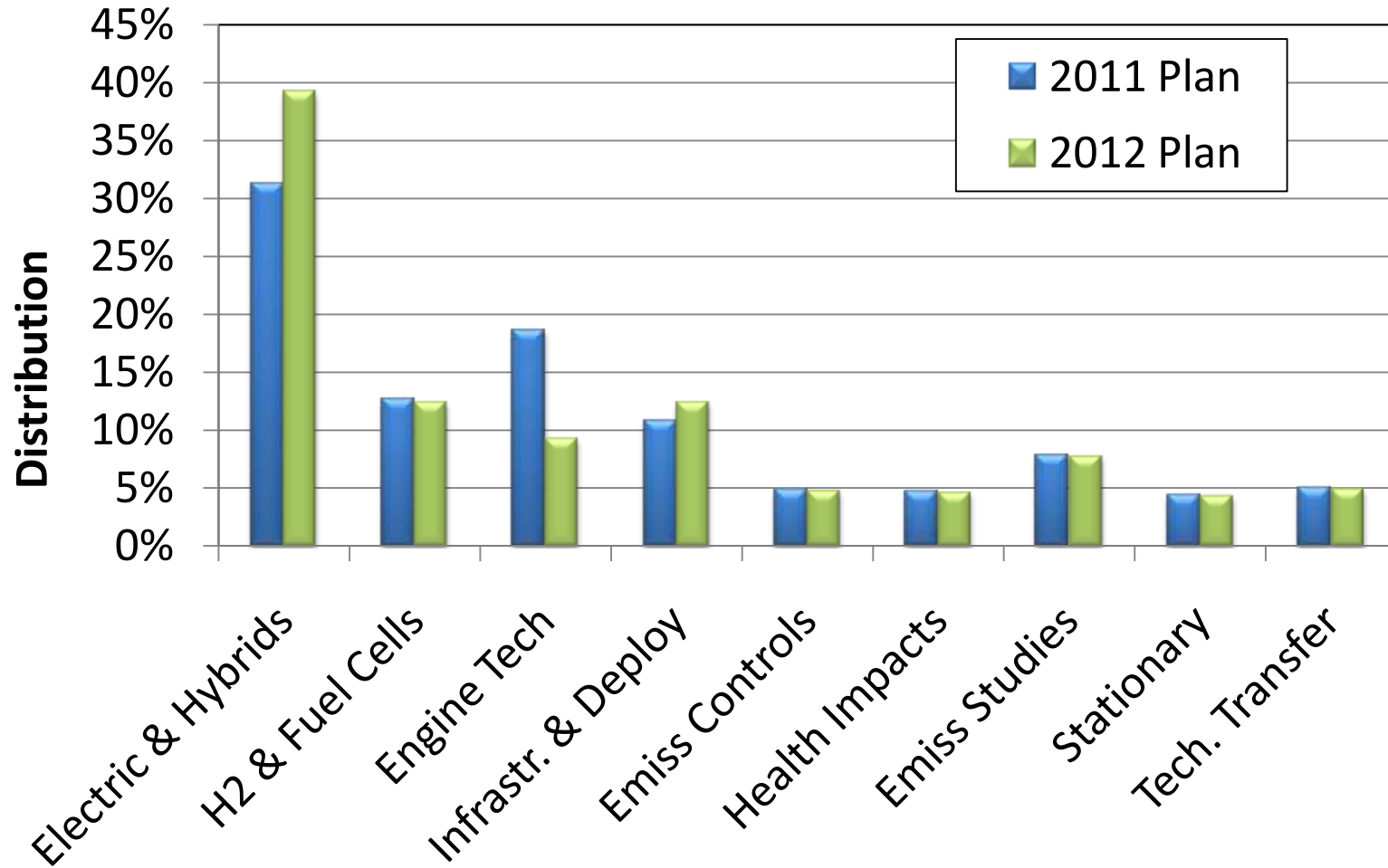
- Aftertreatment
- Emulsified Diesel
- HD Natural Gas Engines
- Natural Gas Fueling Infrastructure
- Advanced Diesel Engines
- Hybrid Vehicles (Plug-in & Hydraulic)
- Gas to Liquid Fuel
- Renewables/Biofuels
- H2 Technologies & Refueling
- Fuel Cell Vehicles



## Longer-Term



# Plan Update Comparison



# Meeting Goals

- Present Zero- and Near-Zero Emission Projects
  - Discuss
  - Seek Input
  - Propose Projects and Technologies
    - AQMD 2011 Priorities
    - AQMP Control Strategies
    - Clean Fuels Program