



California's Strategies to Address Commercial Marine Vessels and Ports

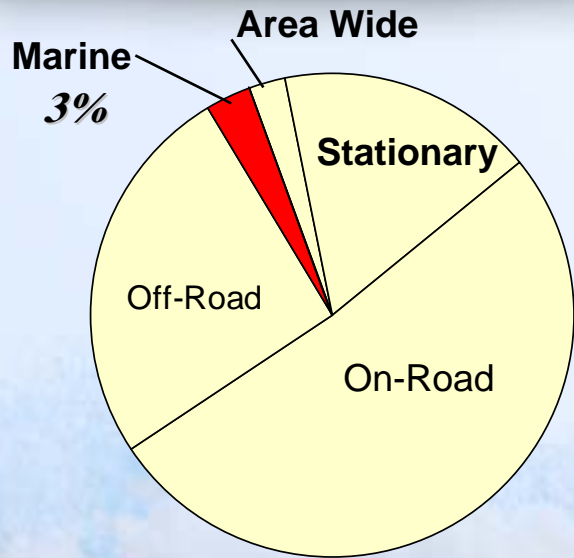
**Catherine Witherspoon
Executive Officer
California Air Resources Board**



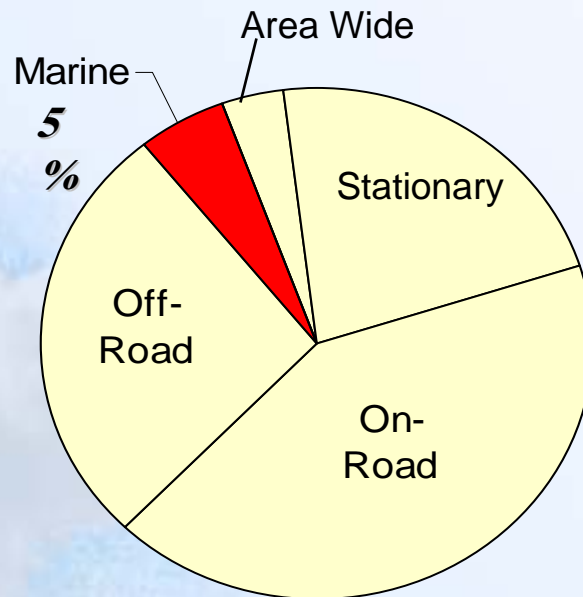
Public Health Imperative

- Port emissions are substantial
- Will prevent attainment if not addressed
- Localized exposure & risk also a significant concern

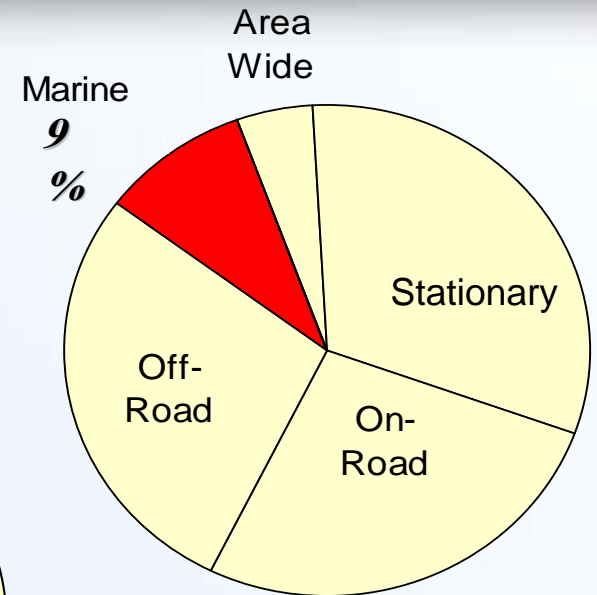
Share of CA Statewide NOx Emissions (commercial marine vessels only)



2000

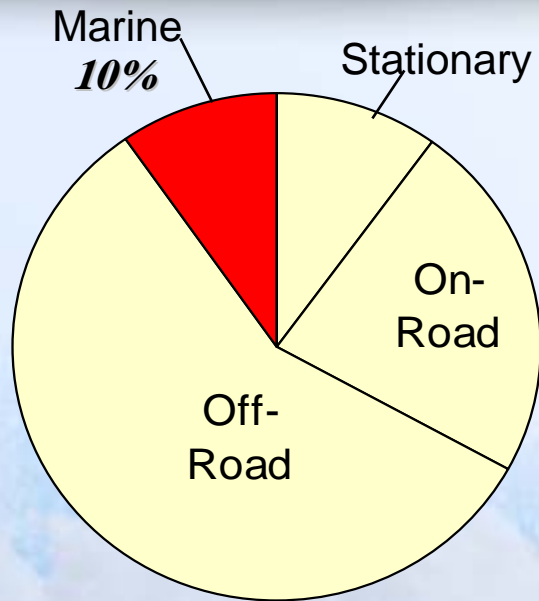


2010

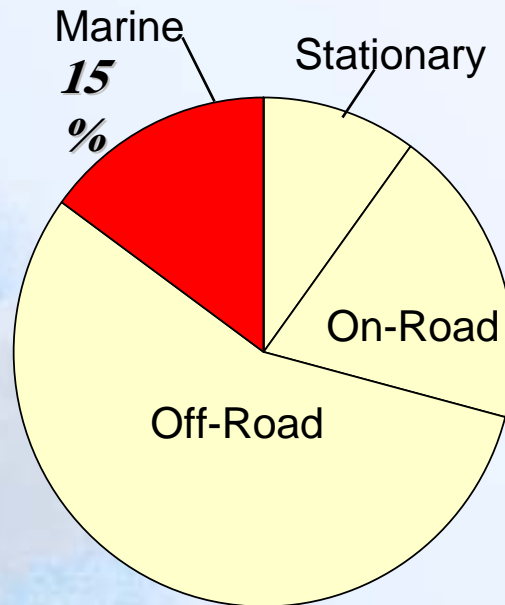


2020

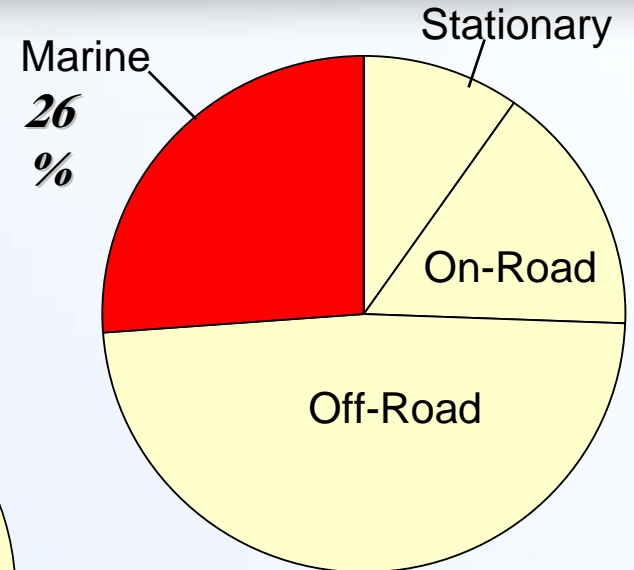
Share of CA Statewide Diesel PM (commercial marine vessels, only)



2000



2010



2020

Future Trends

- Dramatic increase in trade
- More emissions from entire goods movement system
- Concentrated near population centers

Maritime Activities

- Ports, waterway activities include...
 - containerized, bulk, and other cargo
 - tourism
 - fishing
 - passenger ferry service
 - military

Emissions Sources

- Commercial marine vessels
- Diesel trucks
- Locomotives
- Diesel cargo handling equipment
- Stationary sources



Commercial Marine Vessels



Commercial Vessels

- Harbor Craft

- Captive Fleet

- Tugboats, work boats, ferries, commercial fishing vessels



- Oceangoing Ships

- Travel internationally

- Cargo ships, passenger cruise ships



Land-side Emission Sources



Shipping Lanes and Major Ports in California



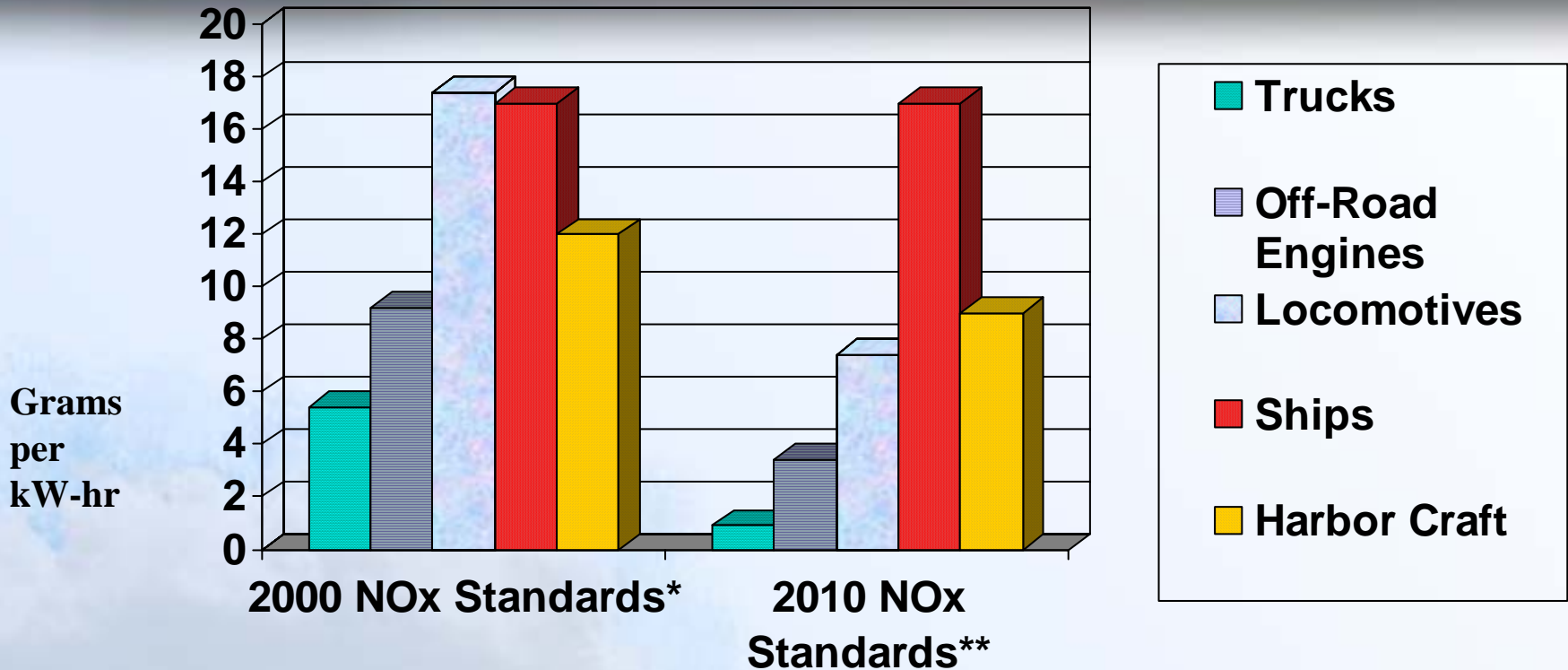
Baseline Controls for Oceangoing Ships

- IMO, USEPA new engine standards
- IMO 4.5% sulfur limit for bunker fuel
- Voluntary speed reduction at Ports of LA & Long Beach

Baseline Controls for Harbor Craft

- USEPA “category 1 & 2” new engine standards
- California ferries required to use CARB on-road diesel
- Carl Moyer incentive program

Relative Stringency



* 2000 line haul locomotive and harbor craft emissions are uncontrolled averages.

** U.S. EPA harbor craft 2010 engine standards range from 7.2 to 11 g/kW-hr.

CARB 2004 Priorities

- **Ocean Going Ships**
 - Strategy for auxiliary engines
 - Cold-ironing feasibility evaluation
 - 3-state initiative (CA, OR, WA)
 - Designation of sulfur emission control area
 - IMO ratification
 - Speed reduction MOU
 - Water emulsion technology demonstration
 - Emissions inventory update

CARB Priorities (continued)

- Harbor Craft
 - Adopt requirement to use on-road CARB diesel fuel
 - Develop regulation to reduce NOx and PM
 - Complete Navy demonstration project
- Ports
 - Complete port specific inventories
 - Begin development of cargo handling ATCM

Strategies for Existing Ships

- Evaluate options
 - Cleaner fuels, operational controls, incentives, opacity limits, retrofits, cold ironing (on-shore power)
- Adopt programs 2004-2005
- Implement 2005-2010



Strategies for Auxiliary Engines

- Cold-ironing for frequent visitors
 - Evaluate 2004
 - Adoption 2005 (pending evaluation)
- Reduce hotelling emissions
 - Evaluate 2004
 - Adopt by 2006 (pending evaluation)

Strategies for Existing Harbor Craft

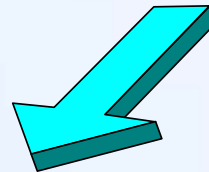
- Reduce emissions with add-on controls, cleaner fuels, and/or repowered engines
- Adopt programs 2004-2005
- Implement in 2005



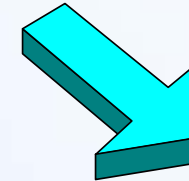
Cleaner Fuel Opportunities



CARB Diesel:
Harbor craft
~10-25% *PM Reduction*
~6% *NOx Reduction*
Enables add-pn controls



Marine Distillate:
Ships at Dockside
(auxiliary engines)
~60% *PM Reduction*
~6-10% *NOx Reduction*
~90% *SOx Reduction*



Lower Sulfur Marine Bunker Fuel (SECA):
Oceangoing ships at sea
(main engines)
~20% *PM Reduction*
~40% *SOx Reduction*

Strategies for Land-side Emissions

- 3-step process
 - Create port specific inventories
 - Assess impacts of existing measures
 - Develop additional measures
- Adopt 2004-2005
- Implement 2004-2010



More Stringent New Engine Standards

- Adopt more stringent federal standards or work with the IMO on international standards
 - **NOx standards based on the federal Tier II and Tier III off-road standards**
 - **PM standards based on state-of-the art technology**
- Adopt programs 2004, implement 2008-2010
- Concept for federal action



Current Research

- Ship in-use emission testing
- Ship retrofit demonstration
- Evaluation of harbor craft retrofit strategies



Ship In-Use Emissions Testing

- Emissions testing of Sine Maersk conducted February 2004
 - MAN B&W did testing, observed by UCR
 - Funded by Port of LA & U.S. Maritime Admin.
- Additional testing planned for cleaner fuels in auxiliary engines

Ship Retrofits - Matson Project

- Ship owned by Matson Navigation
- Will retrofit main engine of R.J. Pfeiffer in Spring 2004
- Seaworthy Systems expected to install water/fuel oil emulsification system
- Emissions testing pre and post retrofit

Harbor Craft Retrofit Project

- ARB co-funding with Navy & others
- Program will evaluate several potential control technologies

Collaborative Efforts

- Maritime Working Group
- 3-State Initiative (CA, OR, WA)
- Multi-state Staff Coordination
- San Pedro Technical Conference
 - September 9 -10, 2004

Keys to Success

- Strong national / international push for clean fuels and tighter engine standards
- National funding for in-use engines
- Broad implementation
- Consistent signals for goods movement