

Low-Emission Technologies and Solutions for Marine



**Teri Shore, Bluewater Network
Faster Freight, Cleaner Air
Cargo Movement Expo
December 8 and 9, 2004
Oakland, CA**



Break-out Session 3

- **Teri Shore, Bluewater Network**
Intro/Overview and Moderator
- **Bob Maddison, Dock Watts**
Shore Power Connection: An Overview and Recommendations
- **Paul Milkey, California Air Resources Board**
Cleaner Fuels and Retrofit Devices
- **Eric Caris, Port of Los Angeles**
Shore Power Connection Success Stories

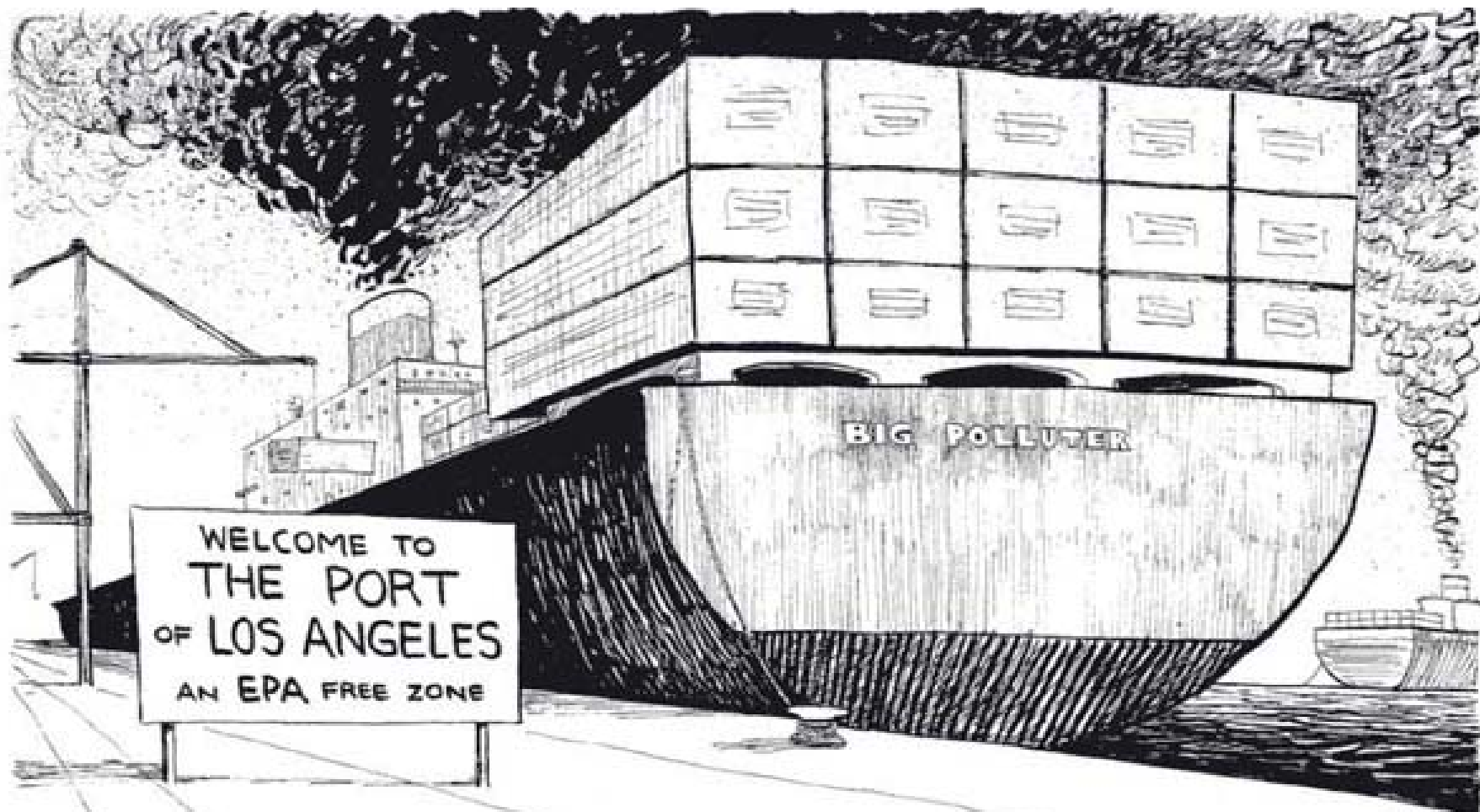


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Phil O'Connor



Shipping Emissions Overview

- Growth: Global shipping will double or triple in coming decades; ports expanding
- Regulations: US and international efforts to clean up vessels lag far behind on-road
- Engines: marine diesels large generators of air pollutants
- Fuels: Bunker fuels far dirtier than on-road fuels
- Air pollution from marine growing both in total and compared to landside

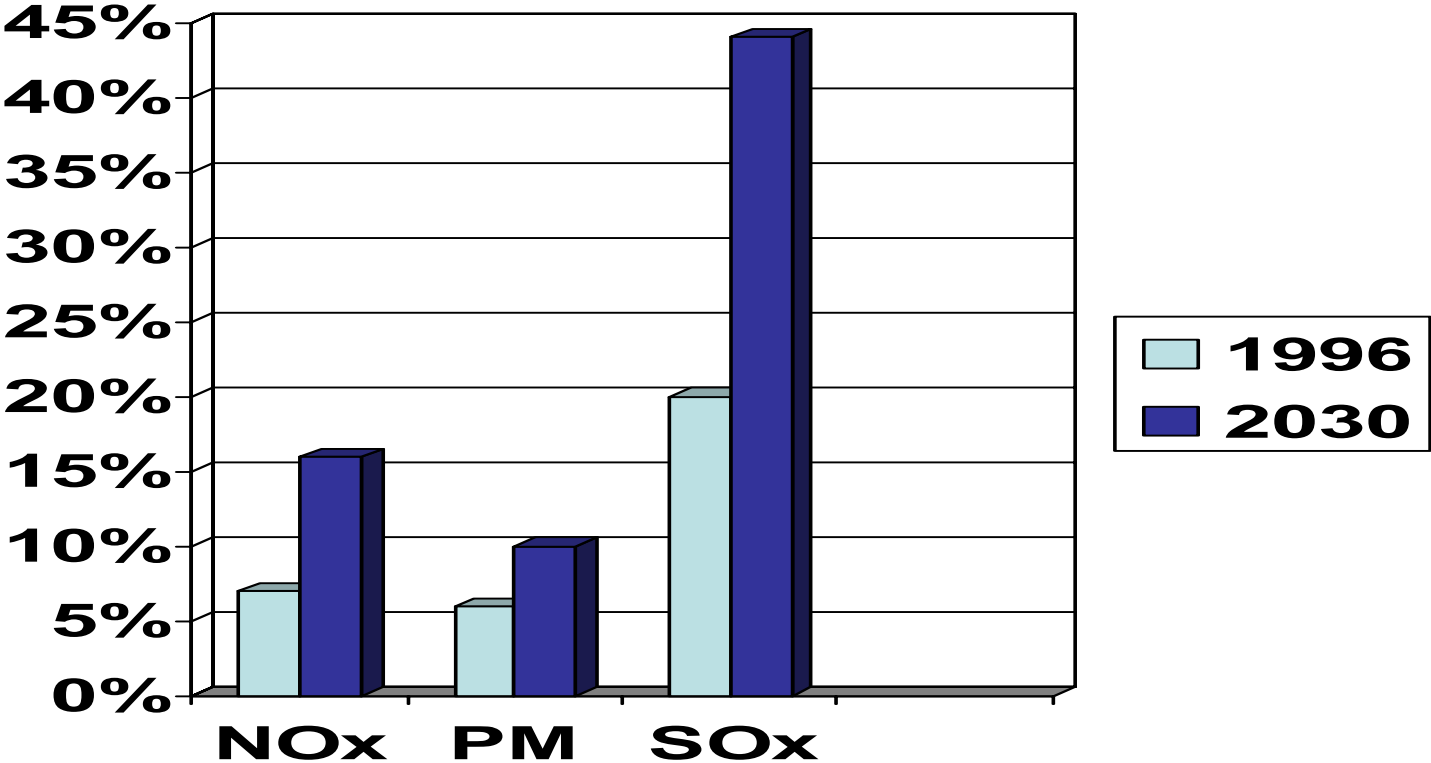
Ship Emissions Comparisons

- A single cargo ship coming into New York Harbor at 20 knots produces as much pollution as 350,000 current-model year cars in one hour
- In Ports LA/LB cargo ships each day produce as many smog-forming emissions as 1 million cars.

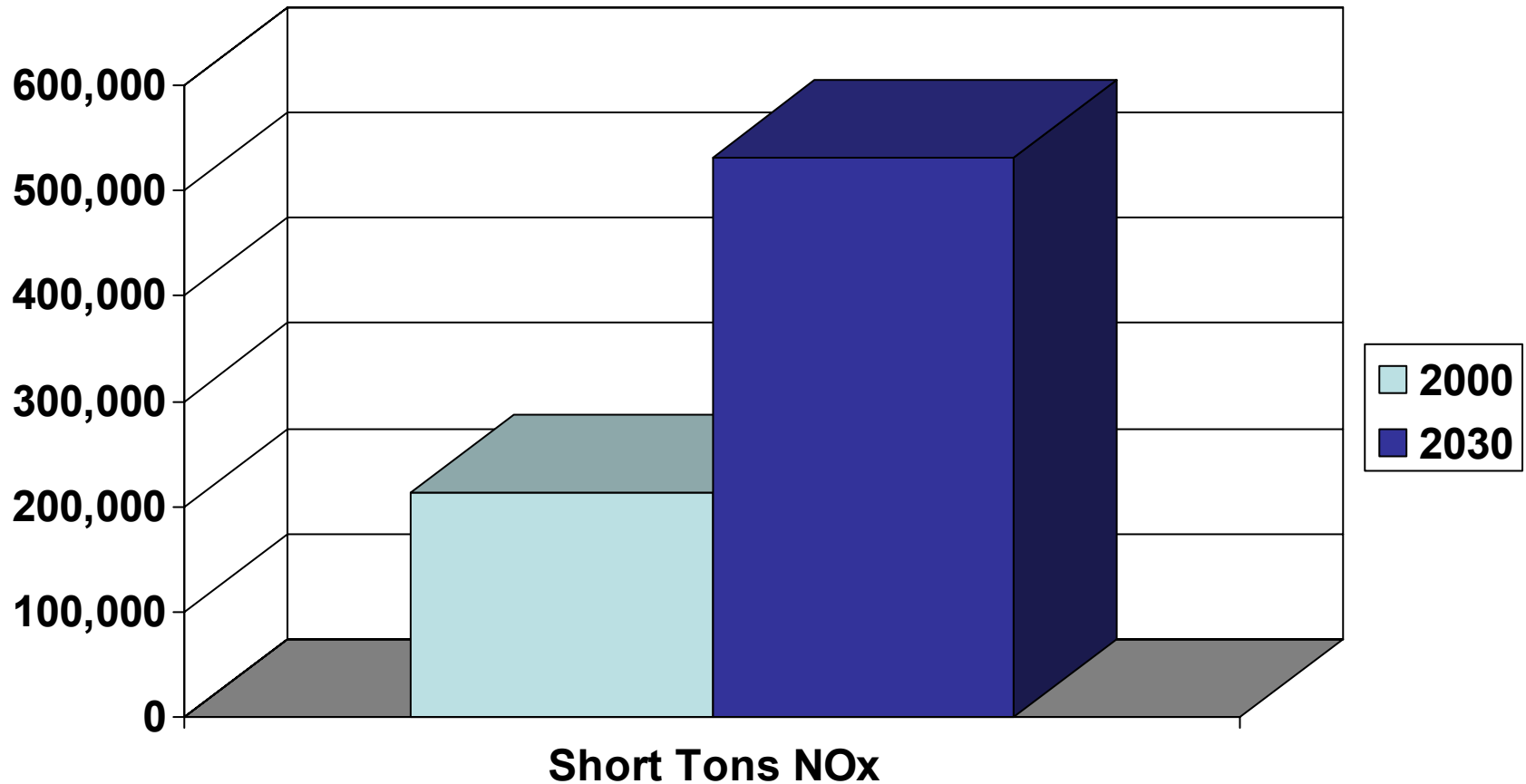


US Marine Emissions Growth

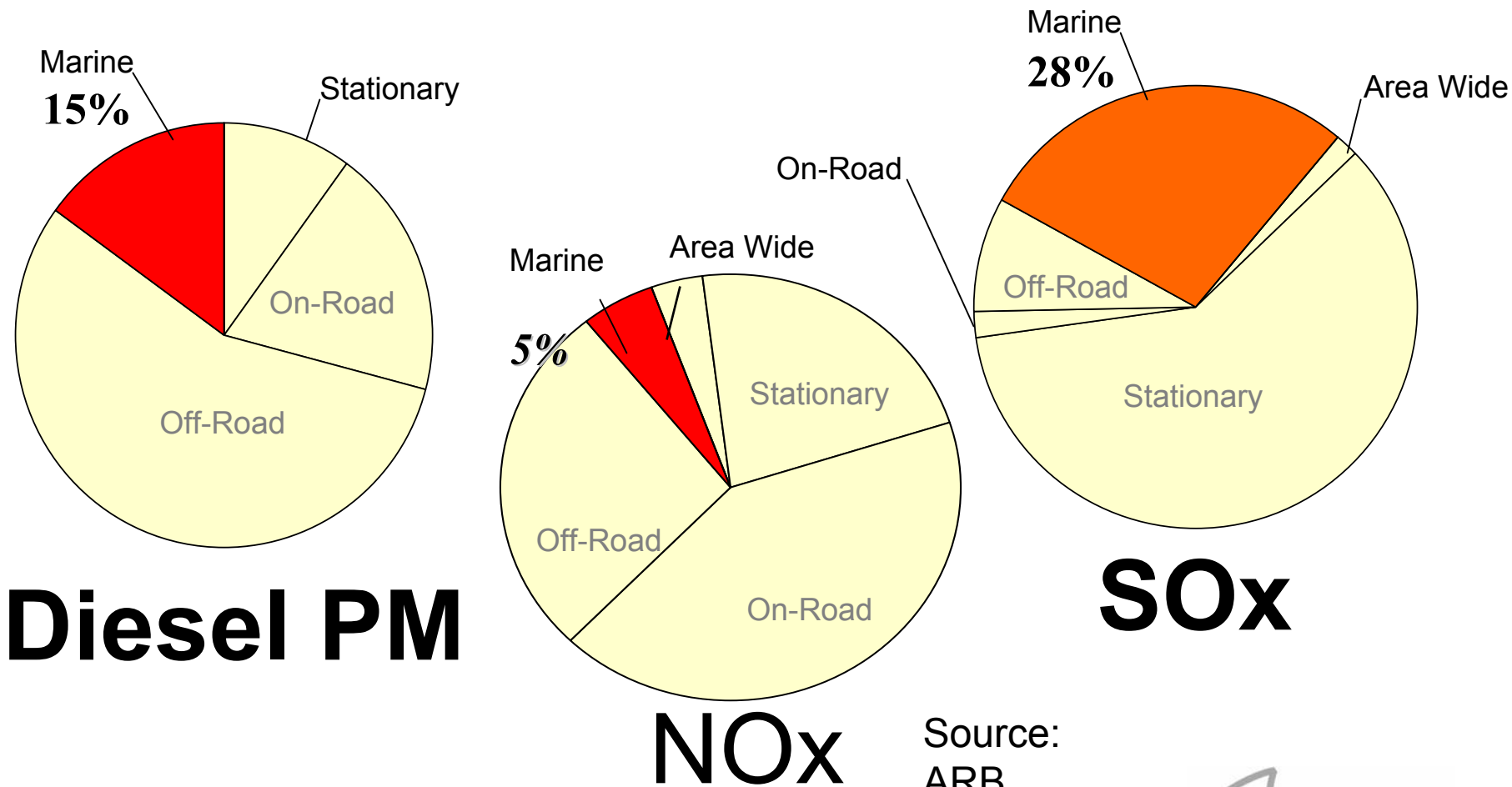
Percent of US Mobile Source Emissions



US ocean-going vessel emissions NOx increase 150%



Commercial Marine Vessel Contribution to Statewide 2010 Emissions



Source:
ARB

Public Health Risks

- In California, 70 percent of increased cancer risk due to air toxics is from diesel exhaust exposure
- Ports are located next to communities, often low-income communities of color – environmental justice
- Elevated cancer rates in port communities such as Long Beach, 1,500 in a million



Window of Opportunity

- Ports and shipping expanding now
- Lack of action could delay chance to install dockside power by decades
- Ports and shipping more receptive than ever due to regulatory focus



- Projects are already underway

Solutions

- Cleaner fuels
 - provide immediate air quality benefits
 - cleaner fuels open the door to pollution controls that require low-sulfur
- Shoreside power
- Engine technology
- Operational controls such as speed reduction

Benefits of Switching to Cleaner Fuels from Marine Bunker

Fuel Type	NOx	PM	SOx
Marine 1.5 % sulfur	0 percent	18 percent	44 percent
Marine Gas Oil .5 % sulfur	6 to 10 percent	60 percent	90 percent
CARB On- Road Diesel	16 percent	72 percent	99 percent
Emulsified Fuels	15 – 30 percent	60 percent	na
Biodiesel 100 %	Neutral	60 to 70 percent	99 percent

Engine Technology

- Selective Catalytic Reduction – 90 percent NOx reductions
- Water injection into combustion chamber – 30-60 percent NOx reductions
- Combined power plants (diesel-electric, gas turbine, steam)
- “Smokeless” engines reduce visible PM
- Gas turbines, gas-guzzling, more CO2
- New technologies Combustion Air Saturation

Shoreside Power Emissions Reductions

- ✓ **NOx emissions 99 percent**
- ✓ **PM emissions 83-97 percent**
- ✓ **Greenhouse gas emissions 66 percent**
- ✓ **SOx emissions nearly 100 percent**

Sources: Environ for the Port of Long Beach, West Coast Governor's Global Warming Initiative
Ports Working Group Report

California's power generated without use of high-sulfur fuels



Cruise ships

Fewer calls, huge emissions,
one ship call =

- 12,400 cars
- Hunter's Point Power Plant
- daily emissions



Port of San Francisco

- considering incentives for low sulfur fuels
- studying shoreside power for new cruise terminal

Port of Seattle

- failed to implement cleaner fuels
- shoreside power to be installed 2005

Port of LA/LB

- evaluating shoreside power



Passenger Ferries

- **SF Bay Area Water Transit Authority new fleet standard – 85 percent below EPA 2007**
- **Hybrid fuel cell ferry, \$2.5 federal earmark**
- **Vallejo boat equipped with SCR**
- **Private operators: testing emulsified fuels, biodiesel, add-on controls**



- **Seattle: biodiesel on car-passenger vessels**
- **New York: SCR on Staten Island Ferry**

Bluewater Network

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