



Why Shore Side Emissions Matter

Clean Ships: Advanced Technology for Clean Air Conference

February 8-9, 2007

California Environmental Protection Agency

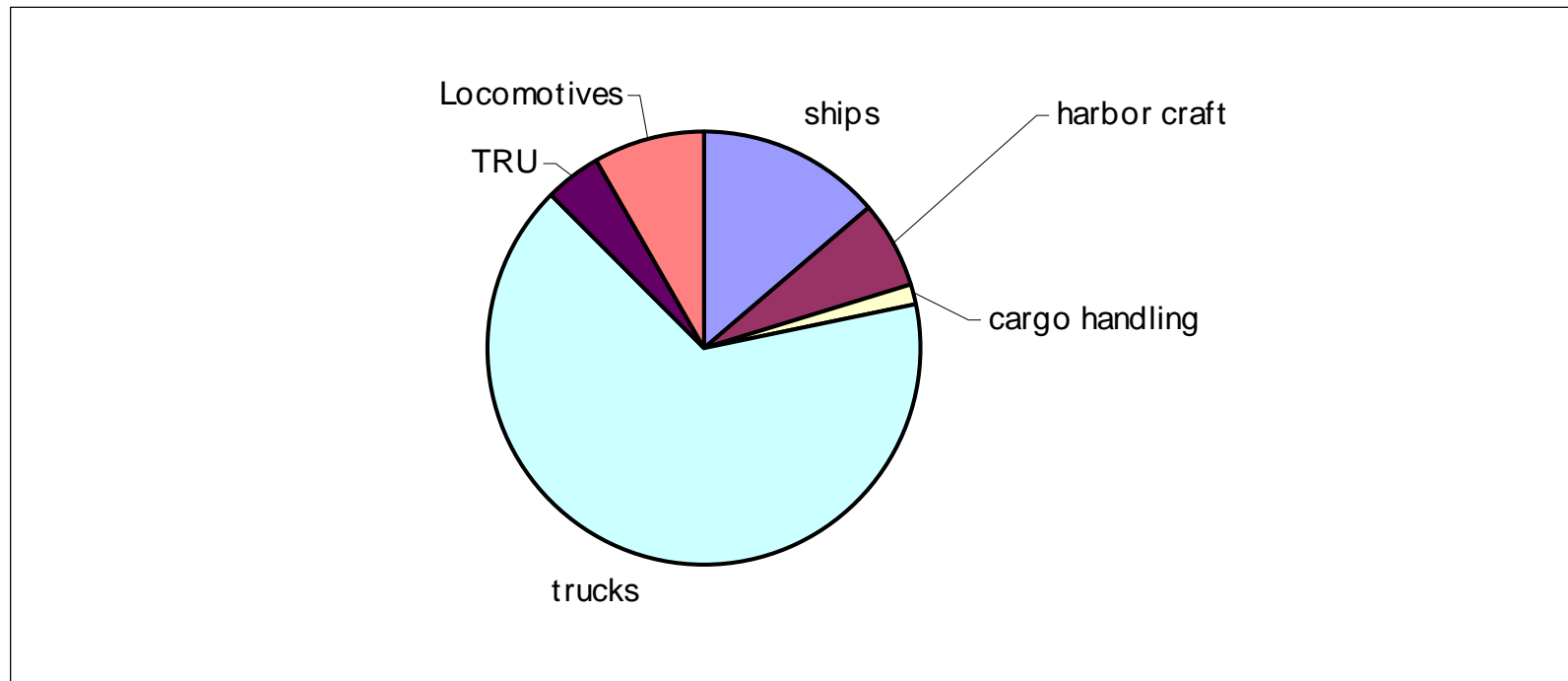


Air Resources Board

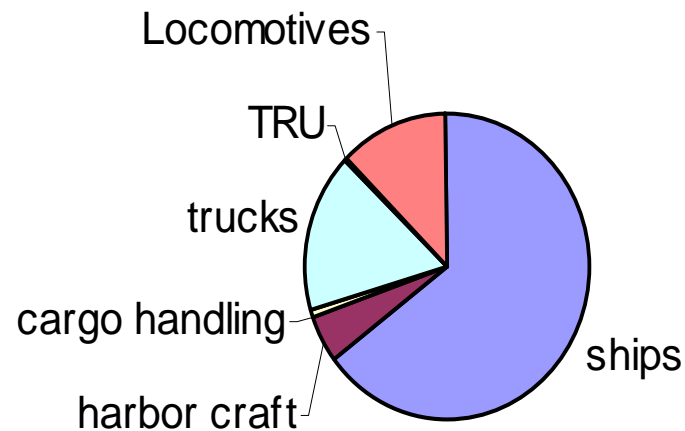
Topics

- ◆ Emissions Resulting from Goods Movement
- ◆ Potential Cancer Risk
- ◆ Efforts to Reduce Emissions at Ports
- ◆ Shore Power Feasibility Report
- ◆ Regulatory Approach

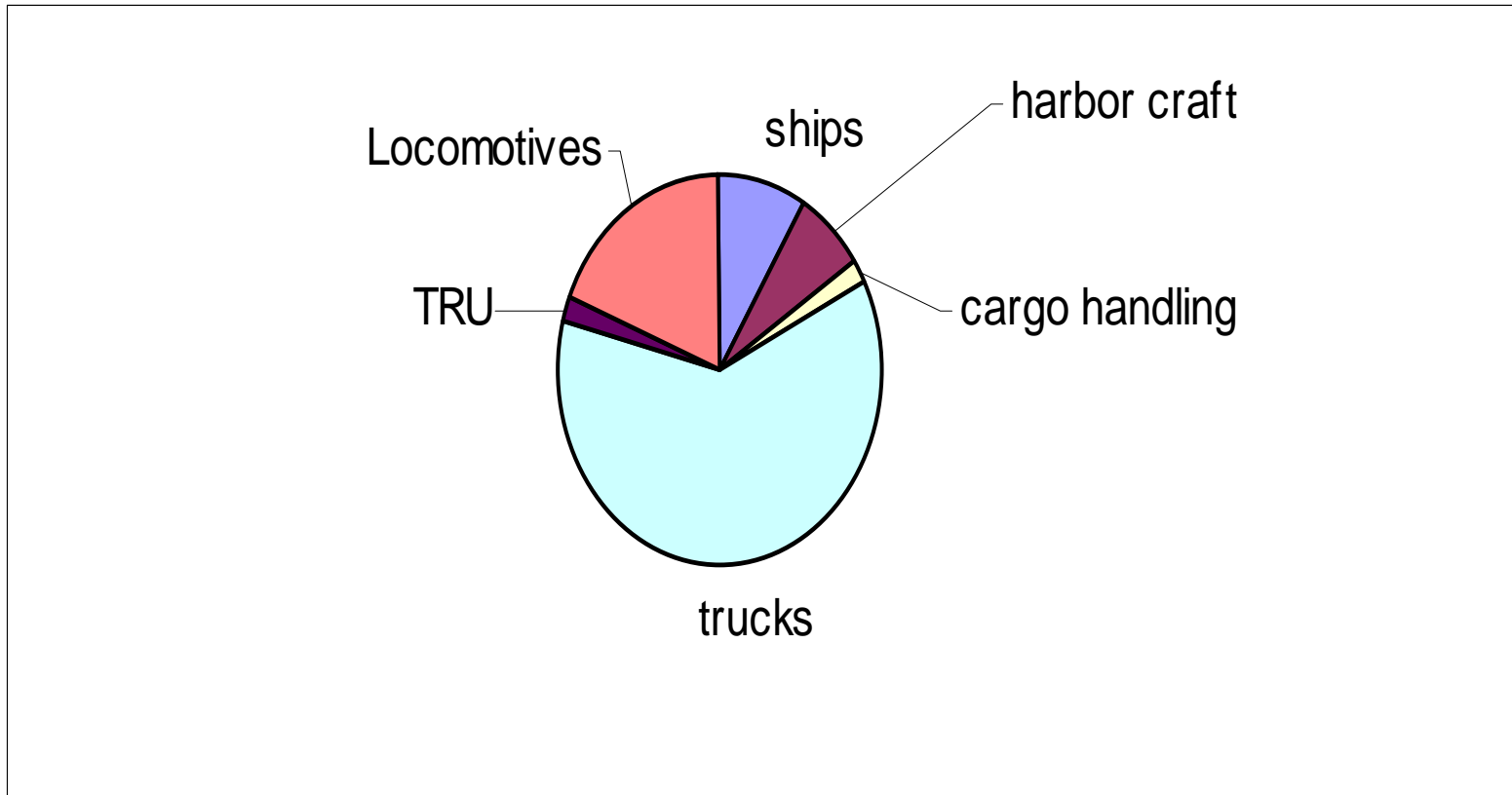
2001 PM Emissions for Goods Movement



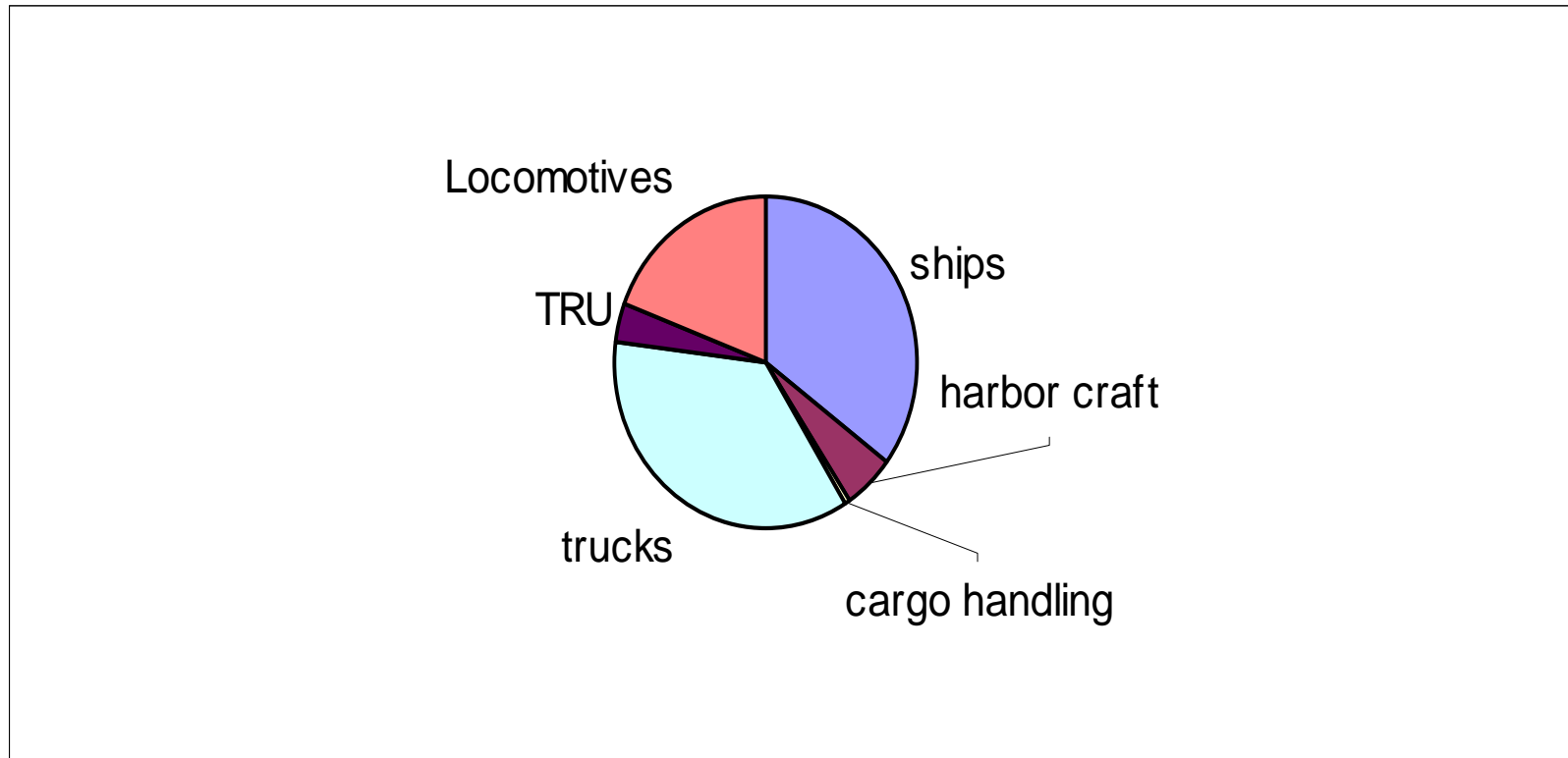
2020 PM Emissions for Goods Movement



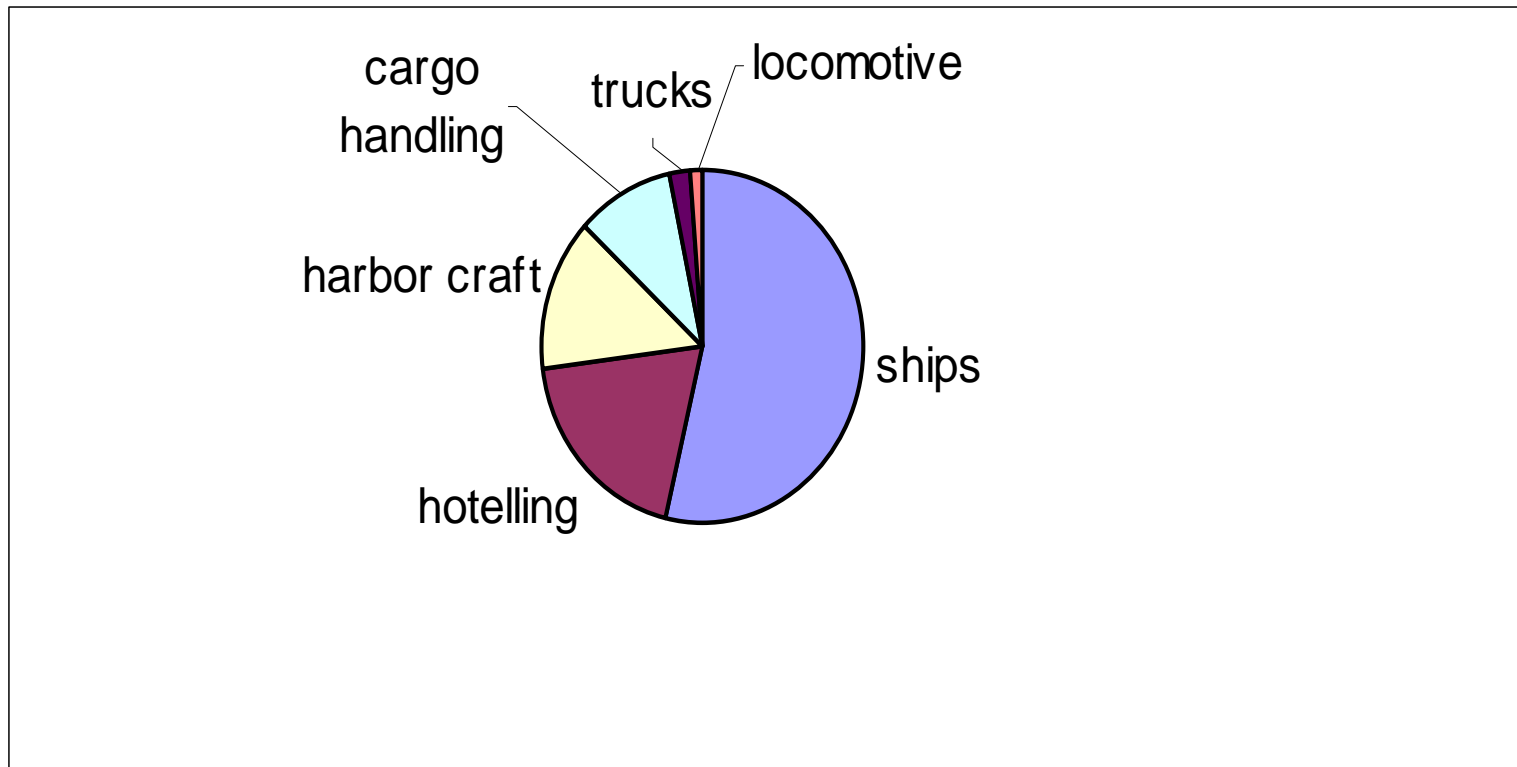
2001 NOx Emissions for Goods Movement



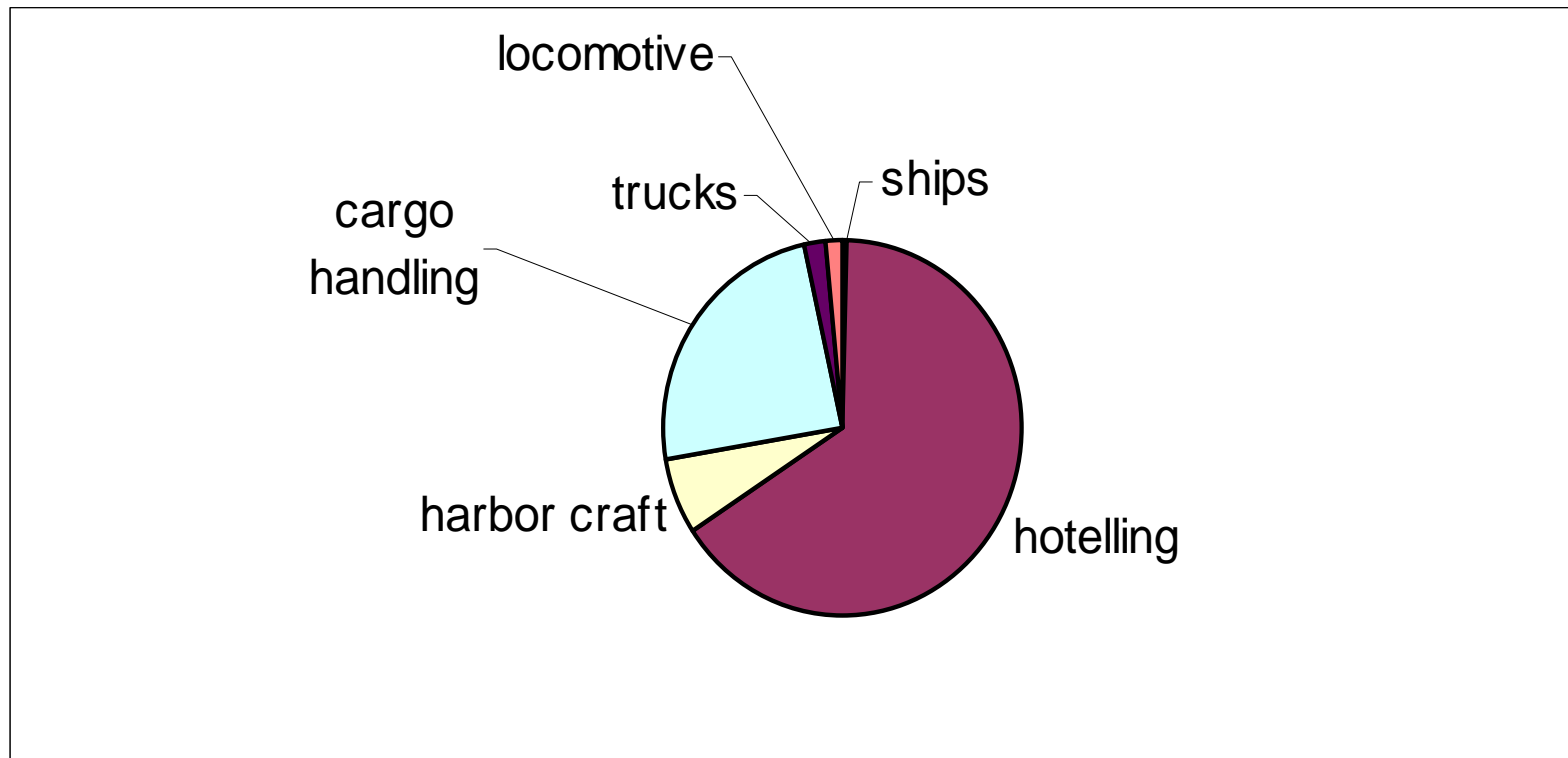
2020 NOx Emissions for Goods Movement



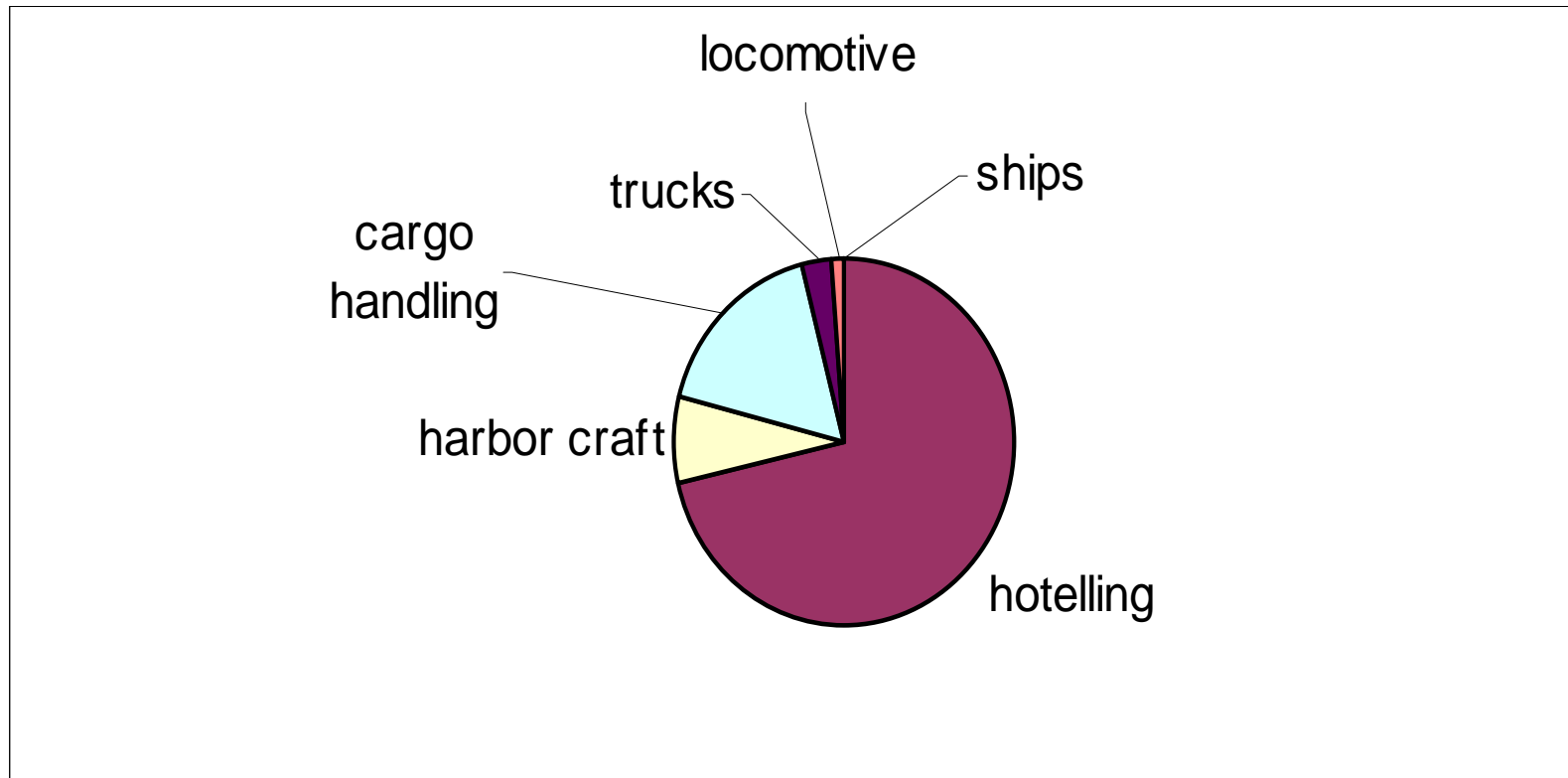
Diesel PM Emissions at San Pedro Ports



Population Affected by Cancer Risk Levels (Risk > 100)



Population Affected by Cancer Risk Levels (Risk >200)



Hotelling

- ◆ In Port
 - Ship's main engine shut down
 - Auxiliary engines operating
- ◆ Auxiliary Engines Provide Power for Lights, Pumps, Refrigeration, and Ventilation

Hotelling

(Continued)

- ◆ Power needs vary by ship category
- ◆ Ship visitation schedule and hotelling times highly variable

Reducing Emissions at Ports

- ◆ Goods Movement Emission Reduction Plan
- ◆ Adopted Regulations
 - Auxiliary engines
 - Cargo handling equipment
- ◆ San Pedro Bay Ports Clean Air Plan
- ◆ Climate Change Program (AB 32)
- ◆ Shore Power Feasibility Report

Goods Movement Emission Reduction Plan

- ◆ Approved by Board April 2006
- ◆ Emission Reduction Strategies Identified for:
 - Ships
 - Commercial harbor craft
 - Cargo handling equipment
 - Trucks
 - Locomotives

Goods Movement Emission Reduction Plan (Continued)

- ◆ Strategies for Ships
 - Ship auxiliary engine fuel (adopted)
 - Cleaner fuels for main engines
 - Expanded vessel speed reduction program
 - Clean engines
 - Clean ships dedicated to California service
 - Shore power

Goods Movement Emission Reduction Plan (Continued)

- ◆ Goals of Shore-Based Electrical Power Measure for Ocean-Going Vessels
 - Shore power for 20% of visits by 2010
 - Shore power for 60% of visits by 2015
 - Shore power for 80% of visits by 2020

Shore Power Feasibility Report

- ◆ Analyzed Cost-Effectiveness, by Ship Category and Port
- ◆ Draft Released March 2006
- ◆ 30-Day Comment Period

Shore Power Feasibility Report: Conclusions

- ◆ Most Cost-Effective for Container, Passenger, and Refrigerated Cargo Ships
- ◆ Prime Candidate Ports: Los Angeles, Long Beach, Oakland, San Diego, San Francisco, and Hueneme
- ◆ 2/3 of Capital Costs & Benefits at Los Angeles / Long Beach

Shore Power Feasibility Report: Conclusions (Continued)

- ◆ Will Require Significant Infrastructure Investments



Regulatory Approach

- ◆ Eighty Percent Reduction in Hotelling Emissions
- ◆ Hotelling Emissions
 - Diesel PM
 - NO_x

Ocean-Going Vessel Categories Considered for Shore Power

- ◆ Container Ships
- ◆ Passenger Ships
- ◆ Refrigerated Cargo Ships
- ◆ Potentially Some Bulk Ships



Ocean-Going Vessel Categories Considered for Alternative Techniques

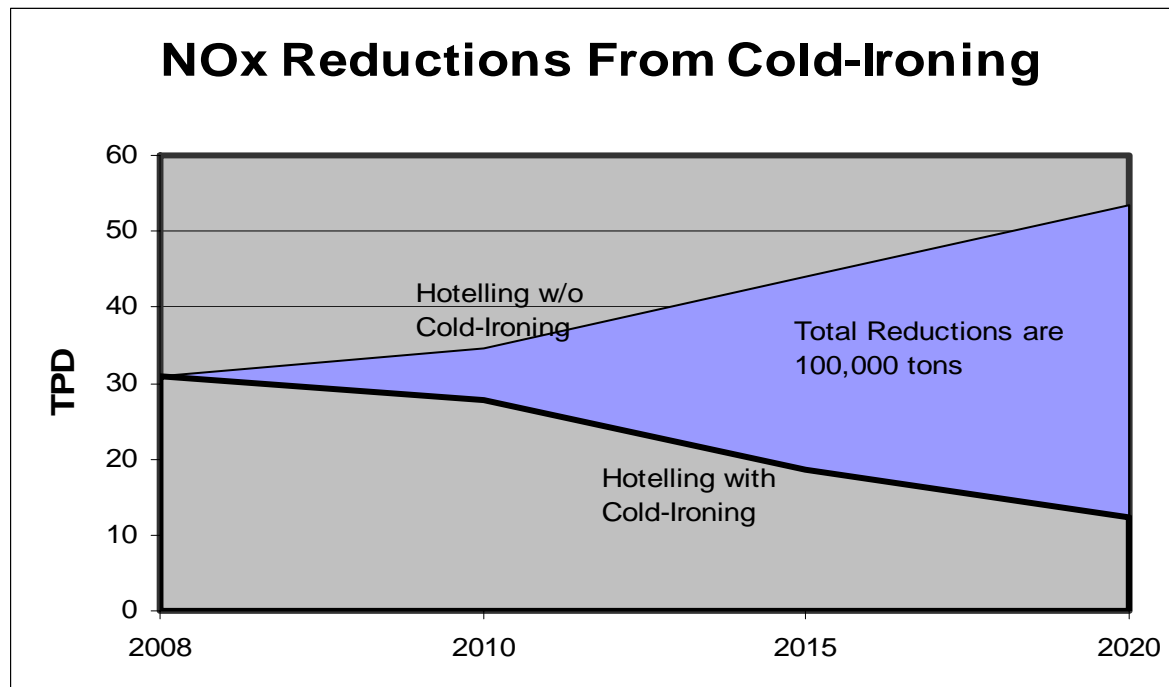
- ◆ Bulk Vessels
- ◆ General Cargo Vessels
- ◆ Ro-Ro Vessels
- ◆ Tankers



Regulatory Timetable

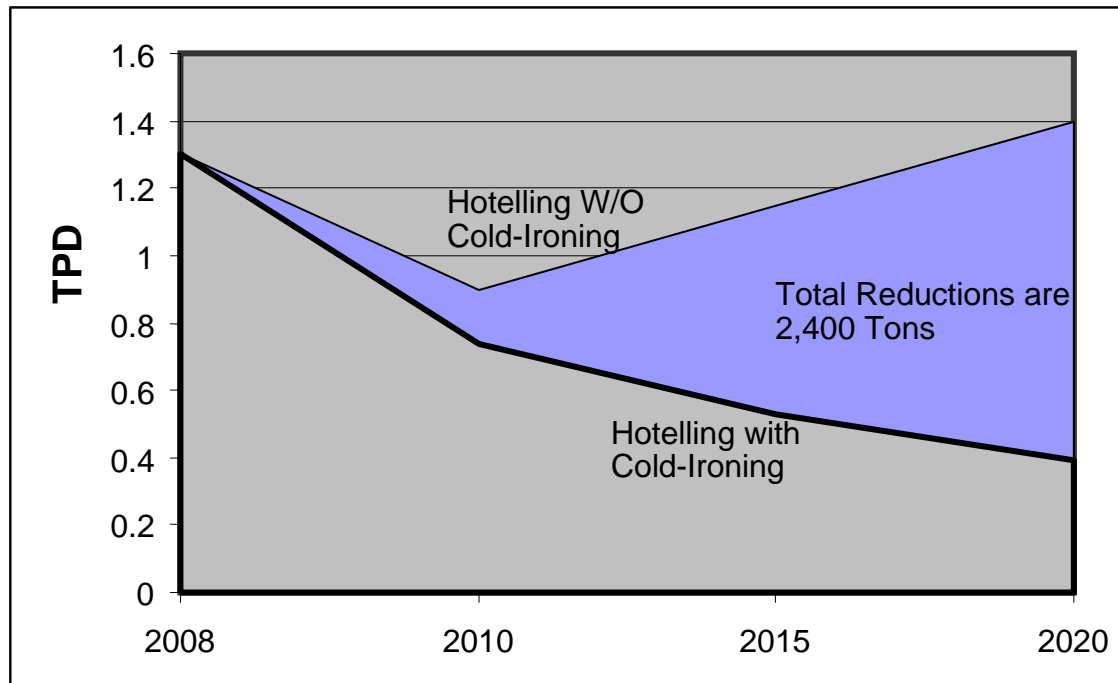
- ◆ Present Regulation to Board for Consideration in November 2007
 - Workshop late summer 2007
 - Proposed regulation and staff report released late September 2007

NOx Emission Benefits from Shore Power



* Based on 20%, 60%, and 80% shore power targets

PM Emission Benefits from Shore Power



* Based on 20%, 60%, and 80% shore power targets

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- ◆ **Webpages:**

- Shore Power:

- www.arb.ca.gov/ports/shorepower/shorepower.htm

- Goods Movement Emission Reduction Plan:

- www.arb.ca.gov/planning/gmerp/gmerp.htm

