The Need to Reduce Marine Shipping Emissions: A Santa Barbara County Case Study

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Overview

- 2001 Clean Air Plan
- Emission inventories
- Marine shipping inventory
- Regulatory efforts
- Technologies and challenges
- Partnerships and incentives
- Demonstration project
- Conclusions

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2001 Clean Air Plan

- Federal attainment: 1-hour ozone standard
- Develop emission inventories
- Evaluate emission control measures
- Forecast emissions
- Provide for continued attainment
- Marine shipping contribution: Large and growing

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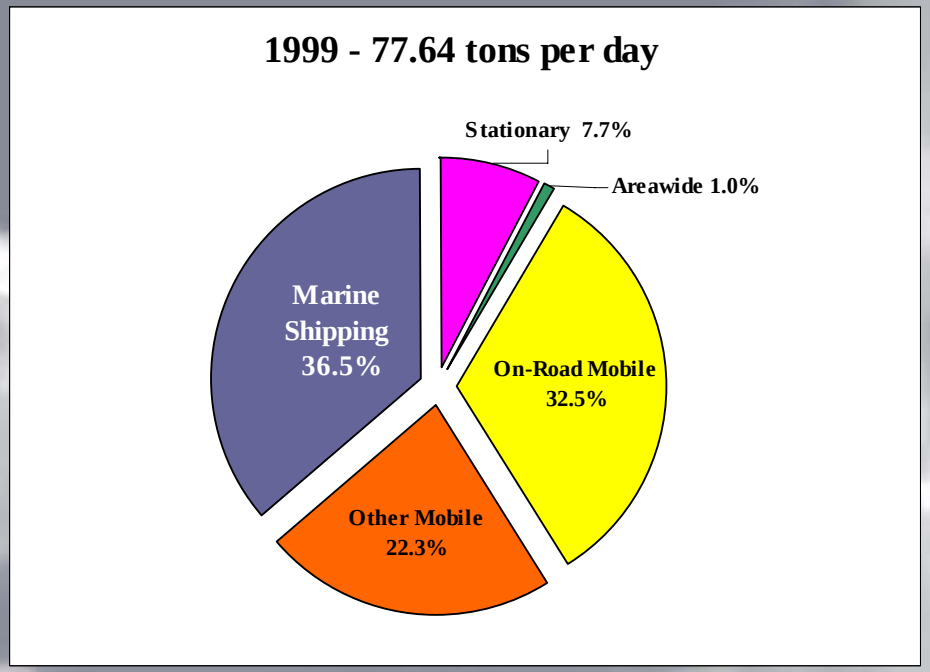
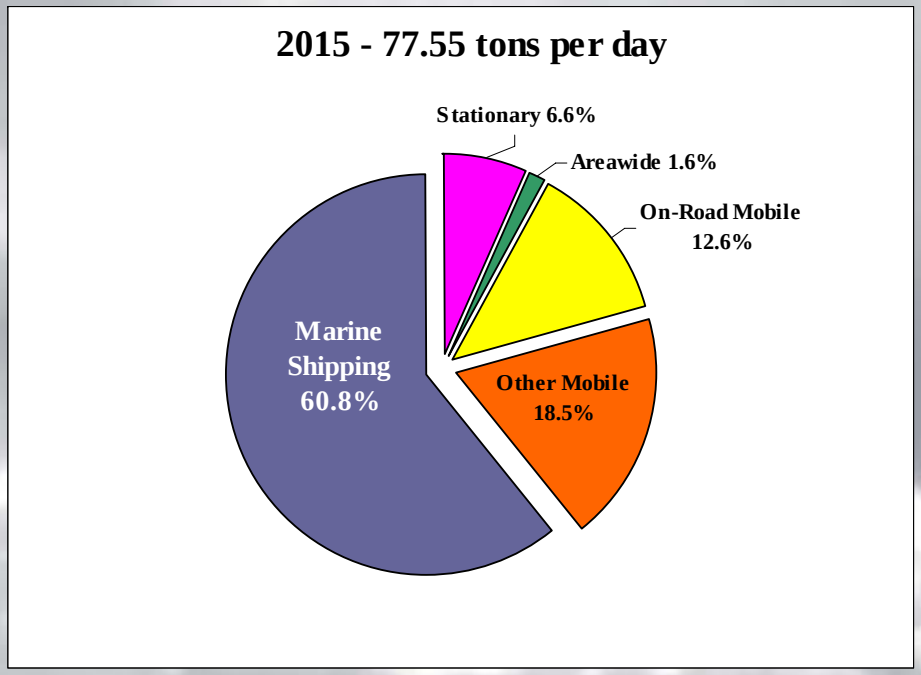
NOx Emissions Comparison





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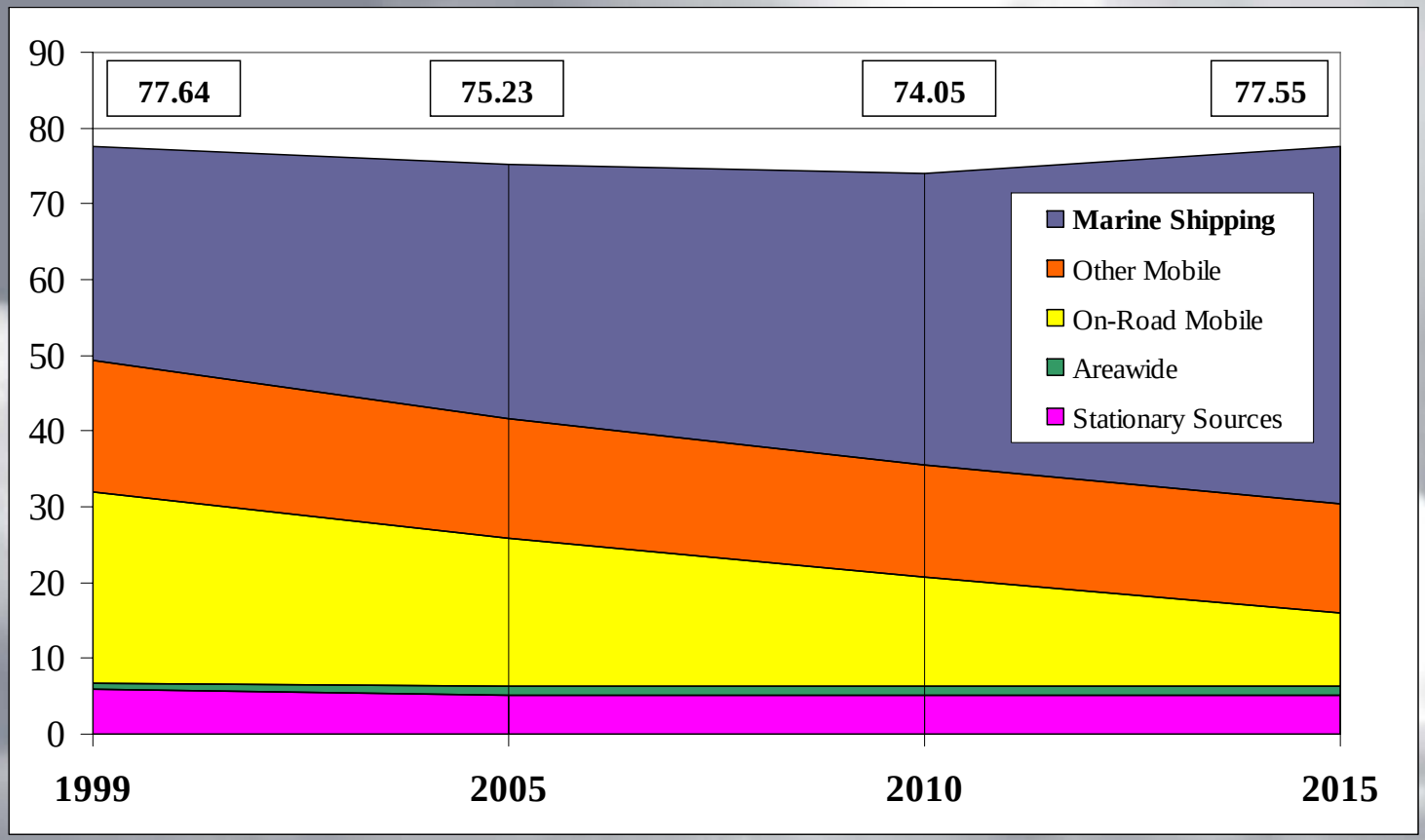
NOx Emission Forecast
(Tons Per Day)



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Marine Shipping Inventory

- Over 6,700 traverses
- 130 miles of coastline
- Large 2-stroke engines
- 9% of vessels = 50% NOx emissions
- 56 vessels over 50 tons per year NOx
- 94% of NOx from foreign flagged vessels

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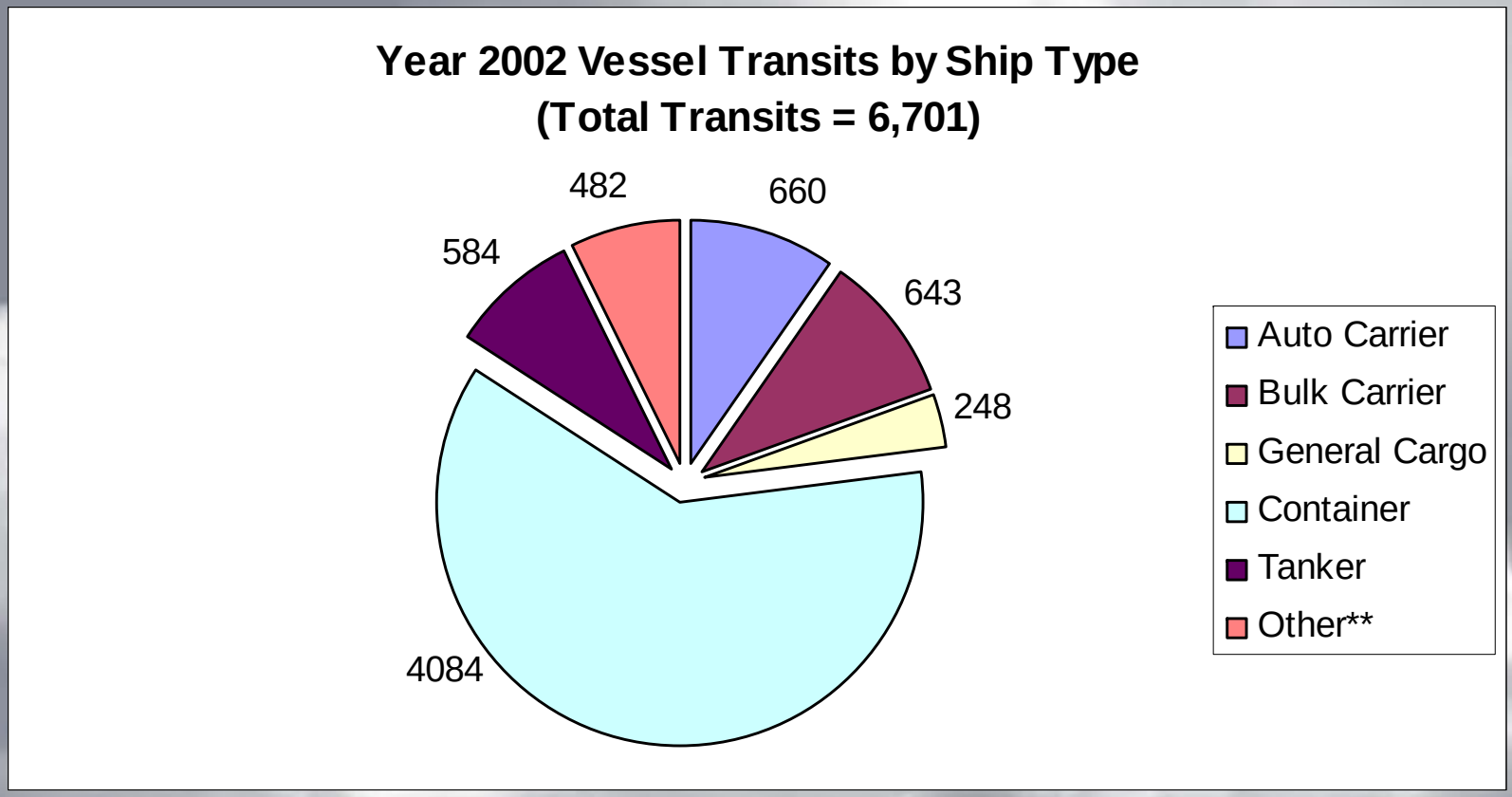
Vessel Transits by Ship Type



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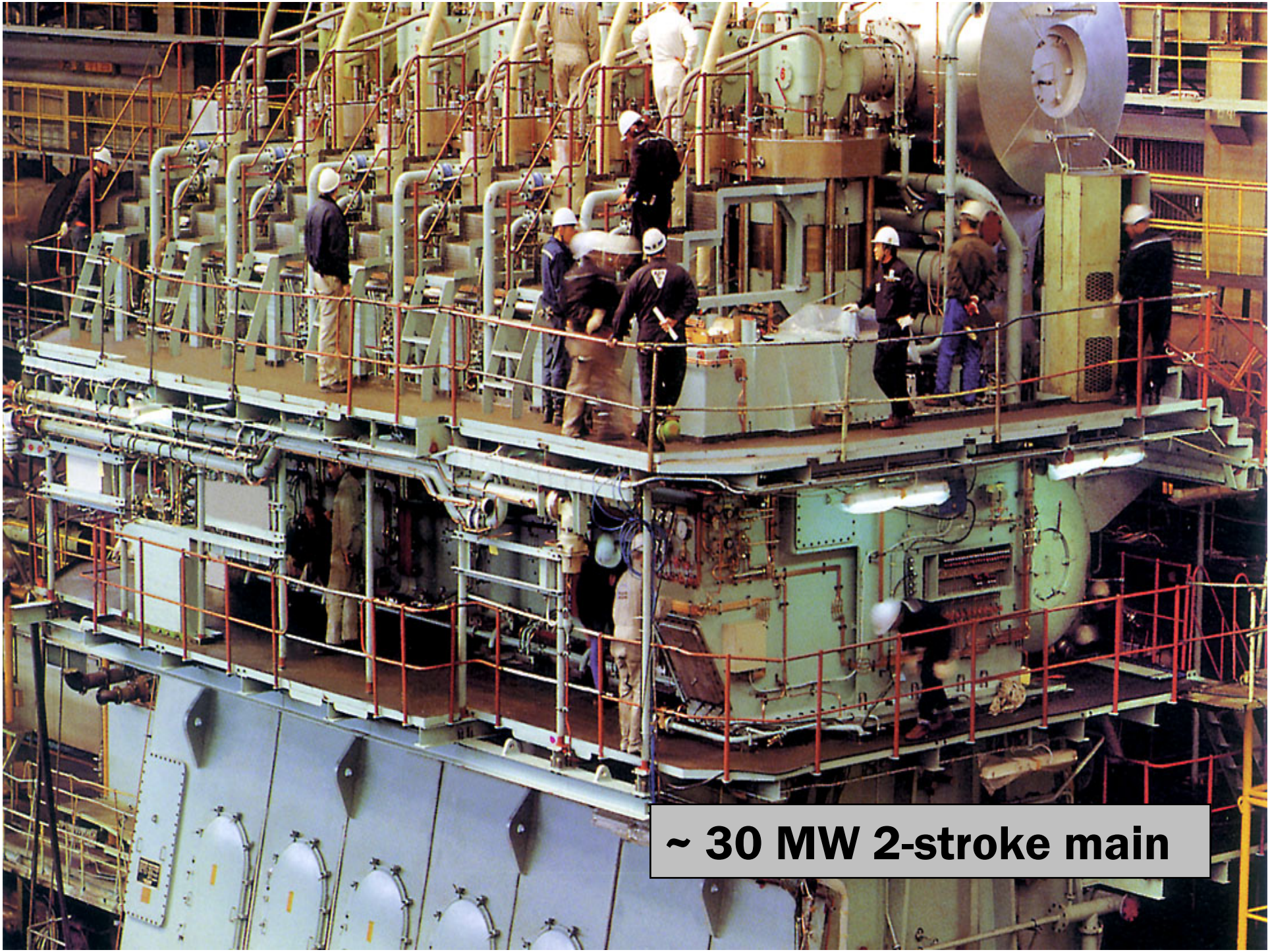
Container ship


~ 30 MW 2-stroke main

Regulatory Efforts

- MARPOL Annex VI
- USEPA Category 3 Rulemaking
- California Air Resources Board
  - More Stringent Standards
  - Clean-up existing fleets/fuels
  - Reduce land-based port emissions

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Potential Control Technologies

- Emulsified fuels
- Water injection
- Humidification
- Exhaust gas recirculation
- Selective catalytic reduction
- Cleaner fuels, oxidation catalysts

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Technology Challenges

- Quick installation
- Reliability
- Low maintenance
- Safety
- Pollutant trade-offs
- Fuel consumption
- Industry buy-in

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Partnerships and Incentives

- CARB Maritime Working Group
- Maritime Administration
- BSR
- Potential incentives
  - Credits
  - Fees
  - Cost-sharing
  - Awards

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Demonstration Project

Objectives-

- **Demonstrate emission controls**
- **Develop support for potential economic incentive programs**
- **Develop in-use testing protocol**

Participants-

- **U.S. EPA, MARAD, California air pollution control agencies, Ports, and ship operators**

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Challenges

- Ship owner participation
- Funding sponsors
- Project scope
- Cooperative agreements
- Assignment of reductions
- Vessel routes
- Project life

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Conclusions

- Marine shipping emissions are significant and growing
- Regulatory efforts largely ineffective to date
- Control technologies available and cost effective
- Significant capital expenditure
- Technology & implementation challenges
- Pursuing a partnership approach
- Once proven, additional partnerships and incentives programs needed

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