

# The Impact of Air Quality Issues on The Cruise Industry

Presented to:

The American Association of  
Port Authorities

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**Starcrest Consulting Group**

# All Pollutants are Not Created Equal



- **Magnitude of Emissions (How Much)**
- **Types of Pollutants (What)**
- **Boundaries of Inventory (Where)**
- **Issues of Exposure (When)**



# Emissions Inventory Estimation



- **Inventory = Emission Rate (g/hp-hr) \* Activity (hours per year) \* Rated Horsepower \* Load Factor \* Correction Factor(s) \* Control Factor(s) \* Adjustment Factor(s)**
- **Basic Emission Rate = Zero Hour Emissions + Cumulative Hours \* Deterioration Rate**



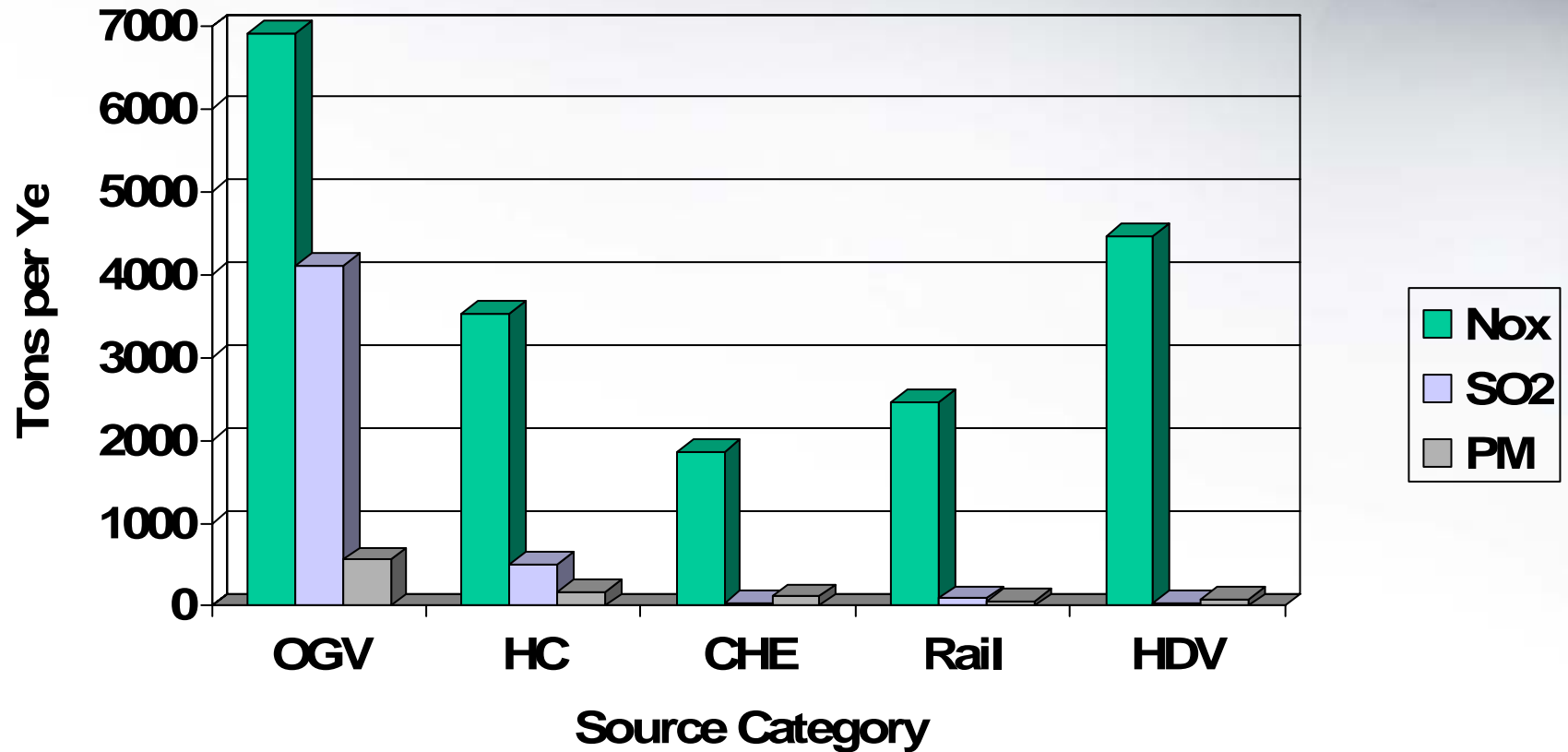
# Port Related Emissions



- Port Operations Almost Exclusively Diesel
- Diesels Emit High Levels of Oxides of Nitrogen (NO<sub>x</sub>), Particulate Matter (PM), and Oxides of Sulfur (SO<sub>x</sub>), Compared to Other Fuels
- NO<sub>x</sub> is Instrumental in the Formation of Ozone
- PM is listed as a Toxic Air Contaminant by the State of California
- SO<sub>x</sub> emissions lead to Secondary PM formation and Impact Visibility

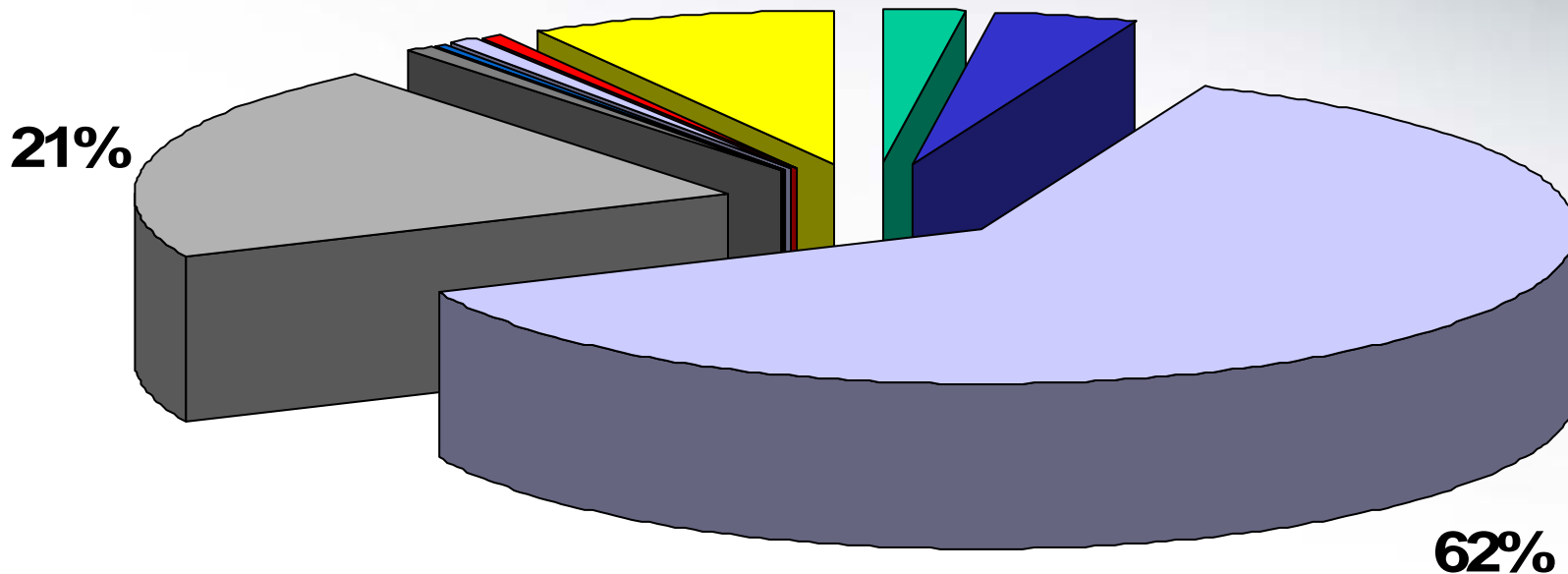
# Emissions by Source Category

(Port of Los Angeles-2001)



# Relative NOx Emissions (tons/year)

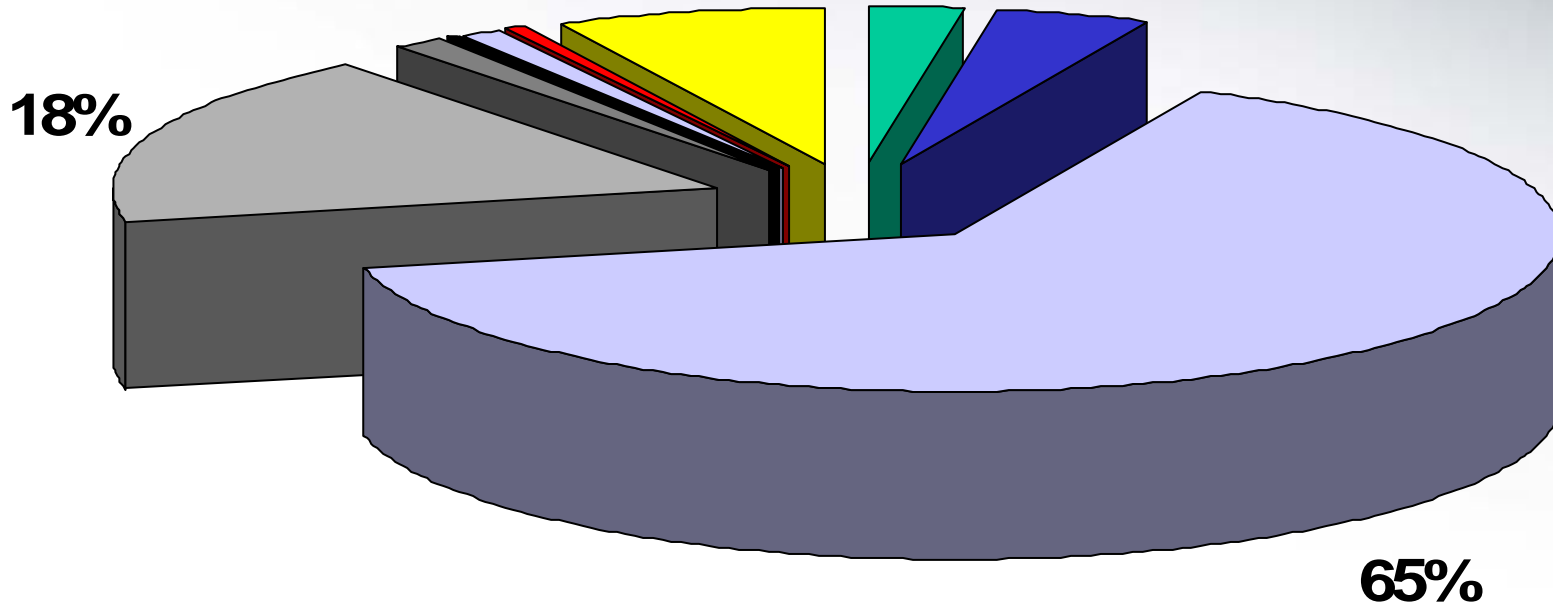
(Port of Los Angeles – 2001)



■ Auto ■ Bulk ■ Container ■ Cruise ■ General Cargo ■ Misc ■ Tug ■ Refer ■ RoRo ■ Tanker

# Relative PM Emissions (tons/year)

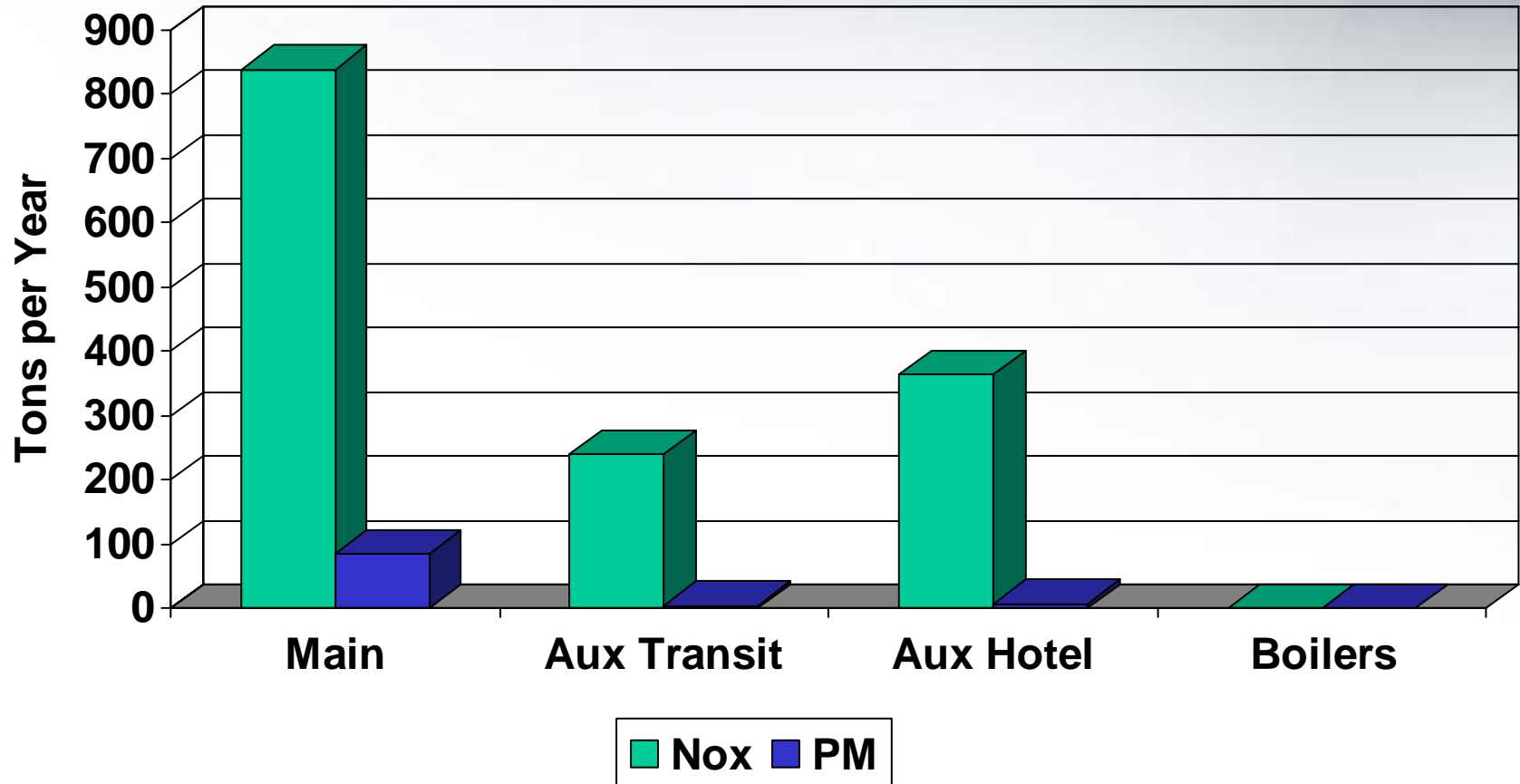
(Port of Los Angeles – 2001)



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# Contribution by Engine and Activity

(Cruise Ships – Port of Los Angeles – 2001)



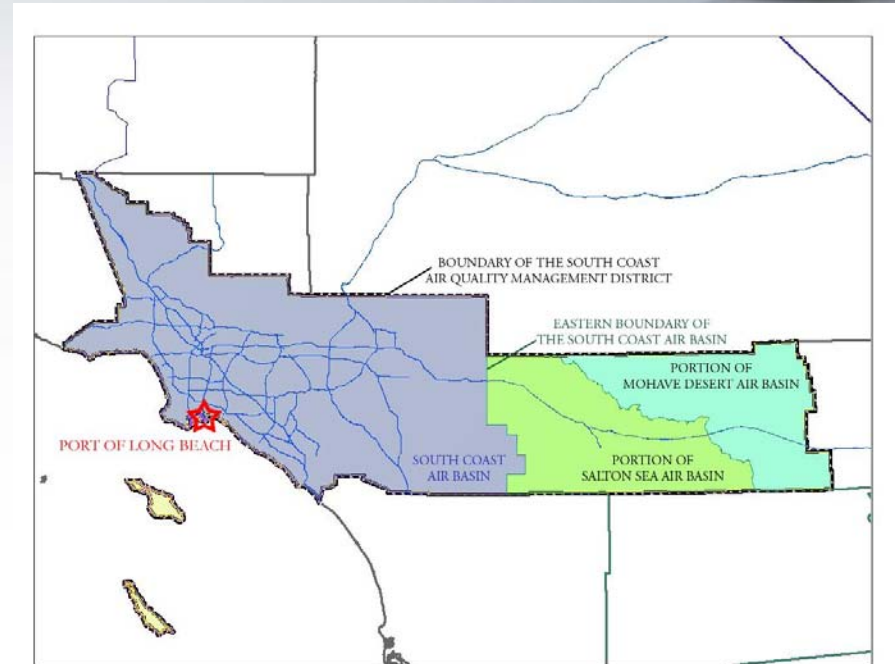


# Boundaries of The Emissions Inventory

(Port of Long Beach – South Coast Air Basin)



Over-Water Boundaries



Over-Land Boundaries

# Emission Reduction Strategies

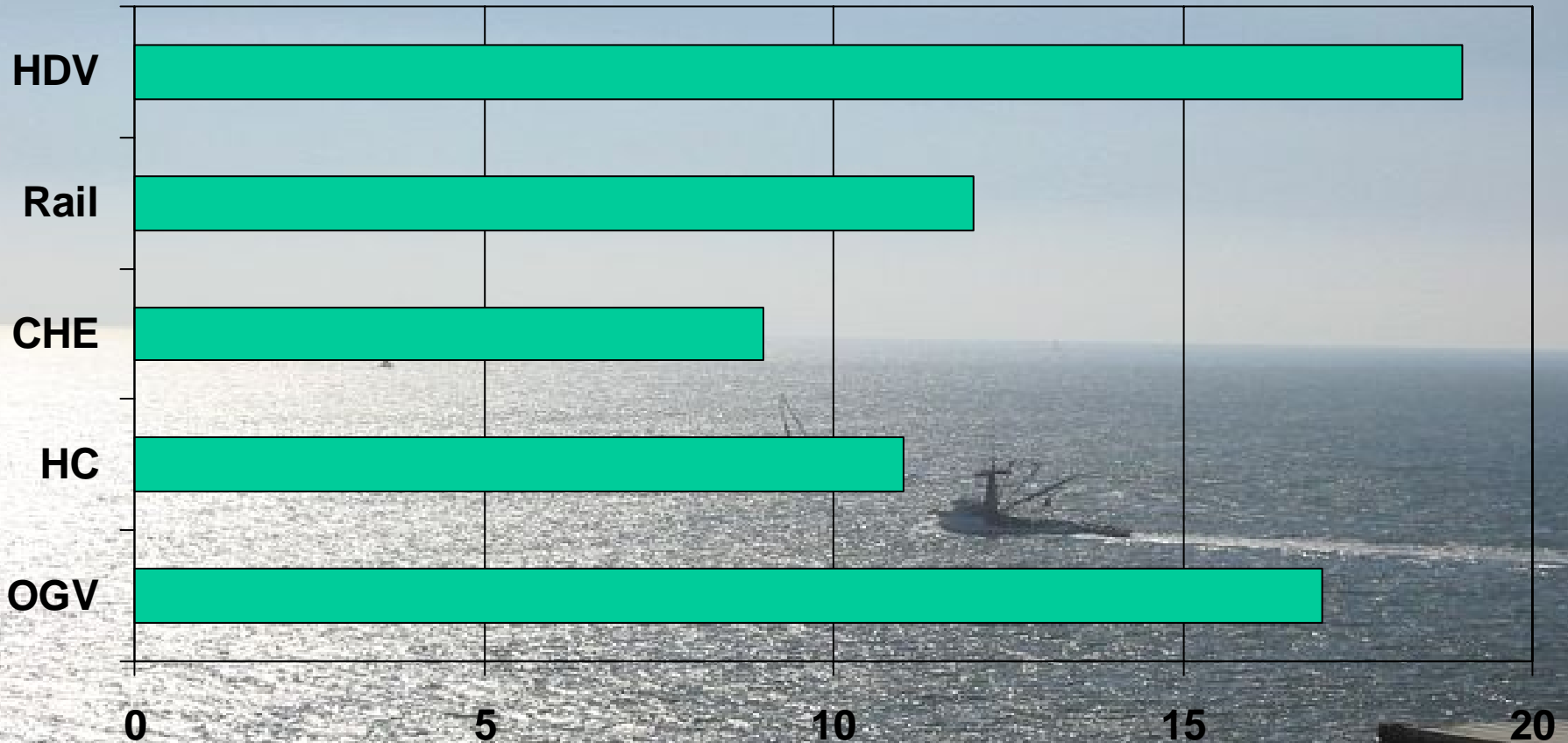


- Lower Engine Out Emissions
  - Fuel Reformulation / Alternative Fuels
  - Improvement in Engine Technology
  - Use of After-treatment
- Lower Activity
  - Fewer Calls
  - Improved Efficiency
- Lower Loads
  - Reduced Speeds



# “NNI” No Net Increase Process

Included a Total of 68 Different Measures



# Regulatory Measures for OGVs



- OGV 1- New Engine Standards for Ships
- OGV 5- New Cat3 Engine Standards (U.S. Flagged)
- OGV 8- Cleaner Fuels for Ship Auxiliary Engines
- OGV10- SECA
- OGV13- Additional Aux. Eng. Reductions  
(Frequent Callers)
- OGV17- Additional In-Use Measures for Ships

# Proposed POLA CAP Measures



- CAP OGV1- Vessel Speed Reduction
- CAP OGV2- Alternative Maritime Power
- CAP OGV3- Auxiliary Engine Fuel Improvement
- CAP OGV4- Main Engine Fuel Improvement
- CAP OGV5- Low Emission Main Engines
- CAP OGV6- Reroute Cleanest Ships

# Proposed POLB Metrics Approach



- Separately Tracking Growth in Emission and Growth in Activity
- Pounds of Emissions per Passenger Moved
- Measure of Efficiency Recognizing the need for Growth



# Future Efforts



- Establish new 2005 Emissions Inventory Baselines
- Compare Pervious and Current Baselines for Growth and Progress Toward Goals
- Investigate Key Factors Impacting Estimates of Emissions and Exposure
- Promote Cleaner Technologies as They Become Viable
- As Emissions are Reduced from Containerships – The contribution from the Cruise Industry will Increase

# Ongoing OGV Related Activities



- Goods Movement Plan
- POLA Clean Air Plan
- POLB Green Ports Initiative