San Pedro Bay Ports
Clean Air Action Plan and Emission Inventories
Overview

- Port Background
- CAAP Drivers
- CAAP Programs
- Emissions Inventory
- Progress
- Looking Ahead
Port of Los Angeles - Background

- Founded in 1907
- Non-Taxpayer Supported
- Landlord Business Model
- 7,500 Acres Land & Water
- 43 Miles of Waterfront
- 75 Gantry Cranes
- 27 Terminals & 270 Berths
  - Automobile (1)
  - Break-bulk (3)
  - Container (8)
  - Dry Bulk (2)
  - Liquid Bulk (7)
  - Cruise (2)
  - Warehouses (4)
Diversity at the Port of Los Angeles

- Containerized Cargo
- Non-Containerized Cargo
- Commercial/Retail
- Cruise
- Fishing
- Marinas
San Pedro Bay Port Complex

Approximately 43% of Containerized Imports Arrive via the San Pedro Bay Port Complex
CAAP Drivers

- Diesel Particulate Matter Identified as Air Toxic by California Air Resources Board
- SCAQMD’s MATES II & III Studies
- Health risks to surrounding communities
CAAP Overview

• CAAP - First comprehensive port emission reduction plan
• Coordinated with regulatory agencies & stakeholders
• Sets future emission & health risk reduction goals
• Consists of a series of source category measures
• Progress is tracked through activity-based annual inventories
Standards

SAN PEDRO BAY STANDARDS

- The San Pedro Bay Standards establish the long-term emissions-reduction and health risk-reduction goals for the ports of Los Angeles and Long Beach.
- Emission Reduction Standard for DPM, NOx, and SOx have target years of 2014 and 2023 to support state ambient air quality goals.

<table>
<thead>
<tr>
<th>Clean Air Action Plan (CAAP) Goals</th>
<th>2014</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPM</td>
<td>72%</td>
<td>77%</td>
</tr>
<tr>
<td>NOx</td>
<td>22%</td>
<td>59%</td>
</tr>
<tr>
<td>SOx</td>
<td>93%</td>
<td>93%</td>
</tr>
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<table>
<thead>
<tr>
<th>Health Risk Reduction Standard</th>
<th>2020</th>
<th>85%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(% reduction in residential cancer risk compared to 2005)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Emission Reduction Measures

- Source Categories
  - Heavy Duty Vehicles
    - Progressive Truck Bans
  - Ocean-Going Vessels
    - Vessel Speed Reduction to 20nm and 40 nm
    - Alternative Maritime Power
    - Low Sulfur Fuels
    - Incentivize Clean Ships/Environmental Ship Index Program
    - Incentivize New Technology Development
  - Locomotives, Cargo Handling Equipment, Harbor Craft
    - Set standards
2016 CAAP “3.0” Considerations

- Mobile Sources
- Stationary Sources
- Terminal Efficiency
- Energy
- 2030 Goals
  - Criteria Pollutants & GHGs
Considerations prior to conducting an EI

- What are your drivers?
- What is your geographical domain?
- How are you going to use your inventory?
- How often will you update?
- What type of inventory best meets your drivers?
  - Activity-based
  - Surrogate
  - Hybrid
- Design inventory to meet your needs
POLA Annual Emissions Inventories

• Annual Activity-based
  ✓ 2001, 2005 - 2013

• Source categories
  ✓ Ships, harbor craft, cargo handling equipment, trucks, locomotives

• Pollutants
  ✓ PM • PM$_{10}$ • PM$_{2.5}$ • DPM • NO$_x$ • SO$_x$ • HC • CO

• Greenhouse gases
  ✓ CO$_2$ • CH$_4$ • N$_2$O • CO$_2$e

• Coordinated w/CARB, SCAQMD, & EPA
Emissions Inventories

- Intensive local data
  - Vessel boarding program
  - Terminal data
  - Truck program data
- Many uses
  - CAAP measure development & implementation
  - CAAP progress reporting – comparing activity on apples-apples basis
  - Stakeholder outreach
Geographical Domain
2014 Emission Inventory Results

Contributions by source category

- CO$_2$e
- HC
- CO
- SO$_x$
- NO$_x$
- DPM
- PM$_{2.5}$
- PM$_{10}$

Legend:
- Ocean-going vessels
- Heavy-duty vehicles
- Locomotives
- Harbor craft
- Cargo handling equipment
2014 Emission Inventory Results

Contributions of OGV emissions by mode

- CO$_2$e
- HC
- CO
- SO$_x$
- NO$_x$
- DPM
- PM$_{2.5}$
- PM$_{10}$

Legend:
- Transit
- Maneuvering
- Hotelling - Berth
- Hotelling - Anchorage
2014 Emission Inventory Results

Contributions of CHE emissions by equipment type
2014 Emission Inventory Results

- **DPM**
  - Total: 134 tons
  - 59 tons (Ocean-Going Vessels)
  - 29 tons (Harbor Craft)
  - 10 tons (Cargo Handling Equipment)
  - 7 tons (Locomotives)
  - 30 tons (Heavy-Duty Vehicles)

- **NO\textsubscript{x}**
  - Total: 7,717 tons
  - 3,607 tons (Ocean-Going Vessels)
  - 1,811 tons (Harbor Craft)
  - 819 tons (Cargo Handling Equipment)
  - 678 tons (Locomotives)
  - 802 tons (Heavy-Duty Vehicles)

- **SO\textsubscript{x}**
  - Total: 128 tons
  - 120 tons (Ocean-Going Vessels)
  - 2 tons (Harbor Craft)
  - 4 tons (Cargo Handling Equipment)

- **CO\textsubscript{2}e**
  - Total: 868,062 mtons
  - 214,949 mtons (Ocean-Going Vessels)
  - 358,162 mtons (Harbor Craft)
  - 68,317 mtons (Cargo Handling Equipment)
  - 170,741 mtons (Locomotives)

- **DPM**
  - Port of Los Angeles: 4.6%
  - Stationary & Area: 4.4%
  - On-Road w/o POLA: 36.7%

- **NO\textsubscript{x}**
  - Port of Los Angeles: 4.2%
  - Stationary & Area: 15.3%
  - On-Road w/o POLA: 52.7%

- **SO\textsubscript{x}**
  - Port of Los Angeles: 1.0%

- **CO\textsubscript{2}e**
  - Stationary & Area: 65.1%
  - On-Road: 11.4%
2014 Emission Inventory Results - DPM

- 2014 San Pedro Bay Standard
- 2023 San Pedro Bay Standard

- 2005 Baseline
- TEUs
- Annual DPM Emissions

The graph shows the percentage reduction in DPM emissions from 2005 to 2014, with targets set for 2014 and 2023.
2014 Emission Inventory Results - NOx

![Graph showing emission inventory results from 2005 to 2014. The graph indicates a significant decrease in NOx emissions by 2014 compared to the baseline. The graph includes the following data points:

- **2014 San Pedro Bay Standard**
- **2023 San Pedro Bay Standard**

The graph shows a 52% decrease in NOx emissions from 2005 to 2014.]
2014 Emission Inventory Results - SOx
### CAAP Report Card

#### 2005-2014 AIR QUALITY REPORT CARD

**SAN PEDRO BAY STANDARDS**

The San Pedro Bay Standards establish long-term emissions-reduction and health risk-reduction goals for the ports of Los Angeles and Long Beach.

- Emission Reduction Standard for DPM, NOx, and SOx have target years of 2014 and 2023 to support state ambient air quality goals.

#### HARBOR CRAFT EMISSIONS REDUCTIONS

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CY 2005-2014</th>
<th>%</th>
<th>tons</th>
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<tbody>
<tr>
<td>DPM</td>
<td>9%</td>
<td>241</td>
<td></td>
</tr>
<tr>
<td>PM2.5</td>
<td>9%</td>
<td>7230</td>
<td></td>
</tr>
<tr>
<td>PM10</td>
<td>9%</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>NOx</td>
<td>71%</td>
<td>4,496</td>
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<tr>
<td>SO2</td>
<td>91%</td>
<td>41</td>
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#### RAIL EMissions REDUCTIONS

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CY 2005-2014</th>
<th>%</th>
<th>tons</th>
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</thead>
<tbody>
<tr>
<td>DPM</td>
<td>47%</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>PM0.25</td>
<td>47%</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>PM10</td>
<td>47%</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>NOx</td>
<td>30%</td>
<td>1,517</td>
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</tr>
<tr>
<td>SO2</td>
<td>90%</td>
<td>6</td>
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#### CARGO HANDLING EQUIPMENT EMISSIONS REDUCTIONS

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CY 2005-2014</th>
<th>%</th>
<th>tons</th>
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<tbody>
<tr>
<td>DPM</td>
<td>49%</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>PM2.5</td>
<td>51%</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>PM0.25</td>
<td>49%</td>
<td>28</td>
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</tr>
<tr>
<td>PM10</td>
<td>52%</td>
<td>852</td>
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</tr>
<tr>
<td>NOx</td>
<td>95%</td>
<td>107</td>
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</tr>
<tr>
<td>SO2</td>
<td>95%</td>
<td>77</td>
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#### OCEAN-GOING VESSEL EMISSIONS REDUCTIONS

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CY 2005-2014</th>
<th>%</th>
<th>tons</th>
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<tbody>
<tr>
<td>DPM</td>
<td>87%</td>
<td>412</td>
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<tr>
<td>PM2.5</td>
<td>88%</td>
<td>372</td>
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<tr>
<td>PM10</td>
<td>87%</td>
<td>474</td>
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<tr>
<td>NOx</td>
<td>81%</td>
<td>1,641</td>
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<tr>
<td>SO2</td>
<td>97%</td>
<td>4,668</td>
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#### CO2 EQUIVALENT EMISSIONS BY SOURCE TYPE

<table>
<thead>
<tr>
<th>Source Type</th>
<th>CY 2005-2014</th>
<th>%</th>
<th>tons</th>
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</thead>
<tbody>
<tr>
<td>Ocean-Going Vessels</td>
<td>25%</td>
<td>71,489</td>
<td></td>
</tr>
<tr>
<td>Harbor Craft</td>
<td>2%</td>
<td>1,033</td>
<td></td>
</tr>
<tr>
<td>Cargo Handling Equipment</td>
<td>-27%</td>
<td>36,120</td>
<td></td>
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<tr>
<td>Rail</td>
<td>17%</td>
<td>13,884</td>
<td></td>
</tr>
<tr>
<td>Heavy-Duty Vehicles</td>
<td>24%</td>
<td>11,098</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16%</td>
<td>161,383</td>
<td></td>
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</tbody>
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**Primary Pollutants Defined:**

- DPM = Diesel Particulate Matter
- PM0.1 = Particulate Matter less than 0.1 microns in diameter
- NOx = Oxides of Nitrogen
- SO2 = Sulfur Dioxide
- CO2 = Carbon Dioxide

(Aaron House Cobb contribution)
Summary

• A strong emissions inventory is essential
  ✓ Understand emission sources
  ✓ Identify & evaluate reduction opportunities
  ✓ Evaluate effectiveness of emission control programs
  ✓ Communicate with stakeholders

• Port of Los Angeles continues to move forward
  ✓ 2015 Zero Emission White Paper
  ✓ 2016 CAAP Update
Lisa Wunder

Marine Environmental Manager

Port of Los Angeles

310.732.7688

lwunder@portla.org