San Pedro Bay Ports Clean Air Action Plan

Technology Advancement Program

Presented by:
Rose Siengsubcharti, Port of Long Beach
Kevin Maggay, Port of Los Angeles
Overview

• Key to the ports’ Clean Air Action Plan
• Goals and structure of the Technology Advancement Program
• Demonstration Projects
CAAP Drivers

• Community concerns
• Minimize health risk from port operations
• Accelerate existing emissions reduction efforts
• Set consistent project-specific & source-specific standards
• Enable port development

Anticipated TEU throughput growth (million TEUs)
Target Pollutants: DPM, NOx, SOx

- DPM-Diesel Particulate Matter: Microscopic particles that includes soot from diesel exhaust; toxic air contaminant
- NOx -Nitrogen Oxides: An ozone precursor that significantly contributes to smog
- SOx- Sulfur Oxides: A precursor to particulates
- The South Coast Air Basin exceeds federal air quality standards for both ozone and particulate matter
Port-Related Contribution to Basin 2007

DPM

NOx

SOx

San Pedro Bay Ports’ 2007 Emissions Inventory
Projected Port-Related Contribution 2023 Without CAAP Implementation

San Pedro Bay Ports ‘ Emission Forecast 2007
Sources and Challenges

Reducing emissions from all source categories...

- Ocean-going vessels, harbor craft, locomotives, cargo handling equipment and trucks
Pollutant Contribution by Source

- **DPM**
  - Heavy-Duty Vehicles: 40%
  - Ocean-Going Vessels: 43%
  - Cargo Handling Equipment: 5%
  - Rail Locomotives: 8%
  - Harbor Craft: 6%

- **SOx**
  - Heavy-Duty Vehicles: 38%
  - Ocean-Going Vessels: 38%
  - Rail Locomotives: 9%
  - Cargo Handling Equipment: 8%
  - Harbor Craft: 7%

- **NOx**
  - Rail Locomotives: 1%
  - Ocean-Going Vessels: 99%
  - Other: 0%
CAAP Development

• Developed in cooperation with our partners, with stakeholder input

• Comprehensive plan
  - Standards and goals
  - Control measures for all source categories
  - Technology Advancement Program
  - Emission reductions
  - Port budget requirements

• Adopted at joint port Board meeting in late 2006
Technology Advancement Program
Technology Advancement Program

As an integral component to the CAAP...

The ports’ TAP aims to:

• Encourage technology innovation
• Demonstrate effectiveness of new technologies
• Accelerate commercial availability of new technologies
• Improve emissions reductions
• Provide more options for meeting the goals of the CAAP
Purpose of the TAP

Mission Statement:
- to accelerate the verification or commercial availability of new, clean technologies, through evaluation and demonstration, to move towards an emissions free port

Objectives:
- Facilitate the development and implementation of new and emerging technologies to reduce air emissions
- Streamline the process for reaching consensus with the agencies on the emission reductions achieved by various technologies
TAP Advisory Committee

Combining expertise and resources...

- Port of Long Beach
- Port of Los Angeles
- Advisory Committee
  - EPA, CARB, AQMD
  - Serve in an advisory capacity to the ports for screening, evaluating and recommending projects
  - Streamline the process for reaching consensus on the performance of the technology
New/Emerging Technology Demonstrations

Types of Projects

• Port Generated projects
• Solicited proposals
• Unsolicited proposals
Unsolicited Proposal Process

1. Proposal Submittal
2. Initial Screening
3. TAP Advisory Committee
4. Develop Recommendation
5. Route for Management Approval at Each Port
6. Contracts
7. Project
TAP Project Requirements
Screening/Evaluation

- Technology Application
- CARB Verification
- Matching Funds
- Emission Reductions
  - DPM, NOx, SOx
  - GHGs, ultrafines
- Ability to meet the needs of the port industry
- Cost
- Feasibility - development status; qualifications
- Statement of Work - technical approach; schedule
TAP Funding

- Port of Long Beach: $1.5 million per year
- Port of Los Angeles: $1.5 million per year
- Total Funding over 5 years: $15 million
Technology Demonstration Projects
Advanced Marine Emission Control System

• “Sock on a Stack”

• Project partners: ACTI, POLB, POLA, and SCAQMD

• Combined ports’ contribution: $299,054

• Project completed

• Emissions Reductions
  - Up to 98% PM
  - Up to 95% NOx
APL Singapore Vessel Retrofit

- Emulsified fuel for main & auxiliary engines
- Fuel efficient slide valve technology
- Project partners: APL, POLB, POLA, CARB, air districts
- Combined ports’ contribution: $45,000
- Both oxides of nitrogen & particulate matter reduced
Foss Maritime Diesel/Electric Tug Boat

• 1st hybrid technology in a tug boat
• Delivered January 23, 2009
• Equipped with diesel-electric hybrid engine
• Project partners: Foss, POLB, and POLA
• Combined ports’ contribution: $1.4 million
• Anticipated benefits:
  - Over 70% of engine time saved!
  - 20 – 30% fuel savings
  - 44% reduction of oxides of nitrogen and particulate matter
OceanAir Eco Tug

• Tier II retrofit of Electro-Motive Diesel Engines
• Project Partner: OceanAir Environmental, Millennium Maritime, Inc., POLA, POLB
• Addition of a center engine equipped with SCR
• Ports’ contribution: $700K
• Anticipated benefits:
  - Up to 14 tons per year of NOx
  - Up to 1.73 tons per year of PM
LNG Yard Hostler

• First application of LNG in cargo handling equipment
• Demonstrated in both POLB and POLA terminals
• Performance Evaluation Study
• Business Case Assessment
• Project partners: POLB, USEPA
• POLB Contribution: $350K
• Results:
  - Good operational performance
  - DPM reductions
  - NOx emissions increased compared to diesel
Hybrid Yard Hostler

- Hybrid yard hostler project developed by POLB
- Develop and demonstrate performance of hybrid technology in yard hostler application
- Project partners: U.S. Hybrid, Kalmar, LBCT, POLB, POLA, USEPA
- Combined ports’ contribution: $600K
- Anticipated benefits:
  - 93% NOx and PM emissions reductions
Vycon REGEN System

- Flywheel energy storage system
- Installed on Rubber Tired Gantry Cranes (RTGs)
- CARB verification achieved
- Project partners: Vycon, POLB, POLA, AQMD
- Combined ports’ contribution:  $23K
- Benefits:
  - Verified as Level 1 technology
  - 25% PM reductions
  - 30% NOx reductions
  - 30% CO2 reductions
  - 35% fuel savings
LBCT Eco Crane

- Replace 680 brake horse power with a hybrid system
- Project partners: LBCT, POLB, POLA
- Combined ports’ contribution: $350k
- Anticipated benefits:
  - 85 – 90% total emissions reductions
EcoEnergy Solutions Emulsified B20

- Low water (8-10%) content emulsification blended with 20% biodiesel
- Elimination of NOx increase associated with biodiesel
- Combined ports’ contribution: $88K
- Anticipated benefits:
  - 57% PM
  - 8-10% NOx
  - 12.6% CO₂
Balqon Electric Terminal Tractor and On-Road Truck

- Development of a prototype low-speed full-electric on-road truck and terminal yard tractor.
- Project Partners: Balqon, POLA, SCAQMD
- Potential future option for short-haul drayage/intermodal
- Anticipated benefits:
  - Nearly 100% emission reductions
Balqon Advanced Battery Demonstration

• Evaluation and demonstration of a lithium-ion battery in an electric truck and yard tractor

• Project Partners: Balqon, POLA

• Anticipated benefits:
  - Threefold increase in range
Johnson Matthey

- SCRT retrofit system for on-road truck with diesel particulate filter (DPF)
- Project partners: JM, POLB, POLA
- Combined ports’ contribution: $261,232
- Anticipated benefits:
  - 85% PM, hydrocarbons, and CO emissions reductions
  - Between 60 – 80% NOx emission reductions
  - Clean Truck Program compliance
Westport LNG Engine

- Development of LNG Heavy Duty Truck
- Early compliance with the 2010 Emission Standard
- Project partners: Westport Power, Clean Energy, CEC, POLB, POLA, AQMD
- Combined ports’ contribution: $500K
- Benefits:
  - NOx emissions reduced by 0.45 tpy
  - GHG emissions reduced by 15-20%
SoCalGas CNG Port Truck

- Compressed Natural Gas class 8 tractor truck
- Equipped with Cummins ISL G engine
- Meets CARB 2010 NOx standards of 0.2 g/bhp-hr
- Launch Date: Dec. 2, 2008
- Project Partners: The Gas Company, POLA, POLB, SCAQMD, Autocar, Cal Cartage
- Ports’ contribution: $223K
- Emission reductions:
  - 83% reduction in NOx
Pacific Harbor Line Locomotive Retrofit

- 1st time in the United States
- Tier 2 switch locomotive engines
- Retrofit with MobiClean™ Diesel Particulate Filters
- Anticipated benefit:
  - Over 90% of particulate matter reduced
Next Steps

• Proposal Template
• TAP Database
• Increased Outreach
• Identifying Areas of Improvement
and BEYOND...

• Encourage Conceptual Ideas
• Work with Additional Partners
• TAP Expansion
San Pedro Bay Ports Clean Air Action Plan

Learn more about the Clean Air Action Plan - www.cleanairactionplan.org

CONTACTS

Rose Siengsubcharti
Port of Long Beach
Environmental Specialist
Associate
562.590.4160
sieng@polb.com

Kevin Maggay
Port of Los Angeles
Environmental Specialist
310.732.3947
kmaggay@portla.org