



San Pedro Bay Ports Clean Air Action Plan



Technology Advancement Program

Presented by:

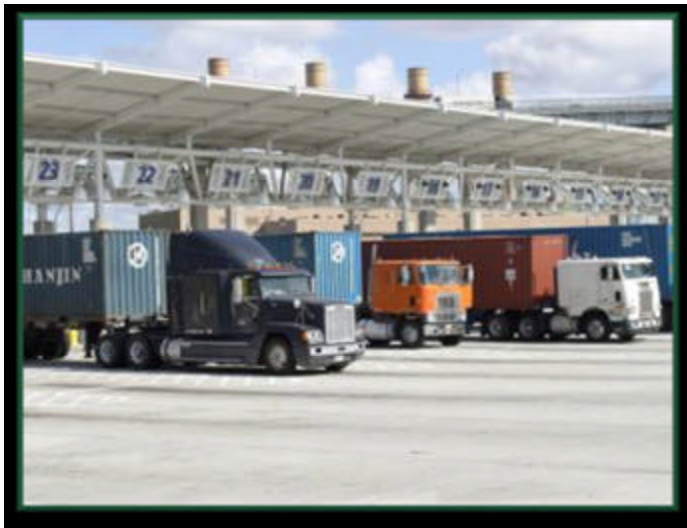
Rose Siengsubcharti, Port of Long Beach

Kevin Maggay, Port of Los Angeles



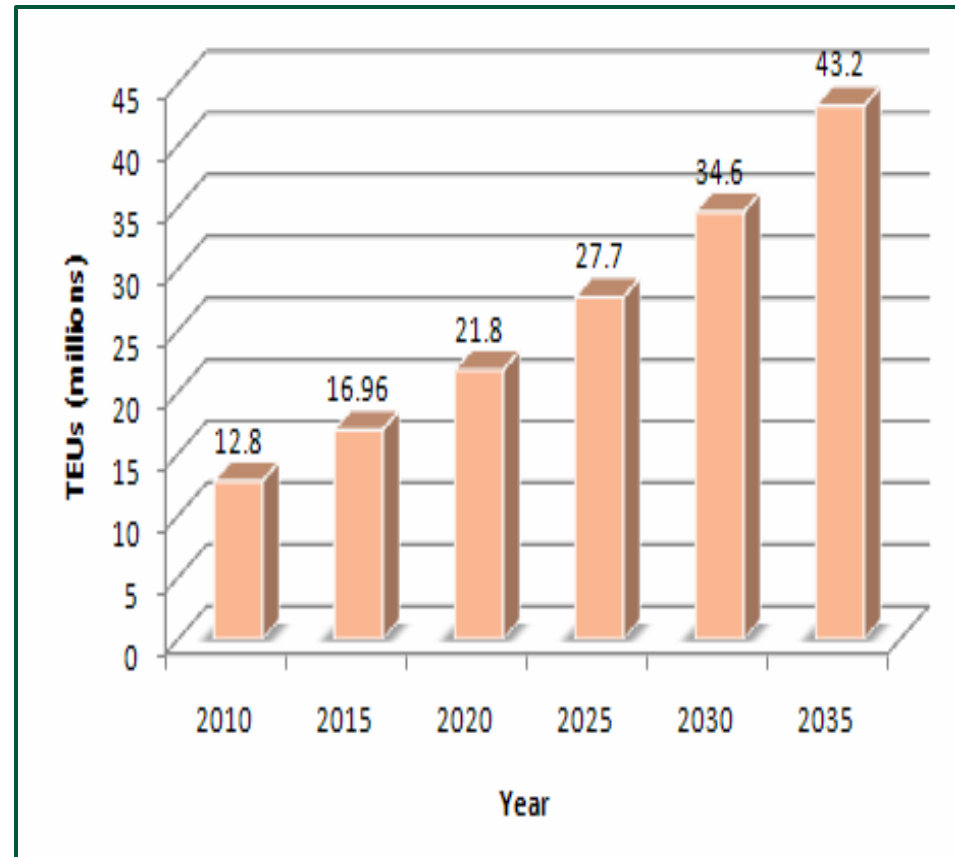
Overview

- 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)*

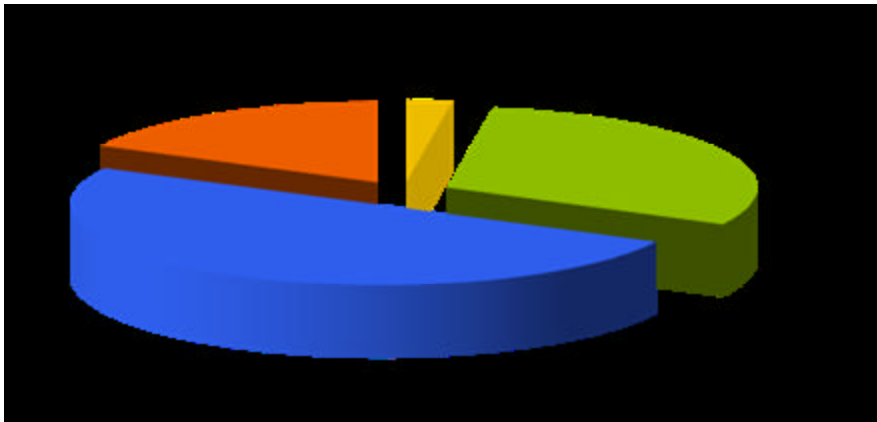
Target Pollutants: DPM, NO_x, SO_x

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

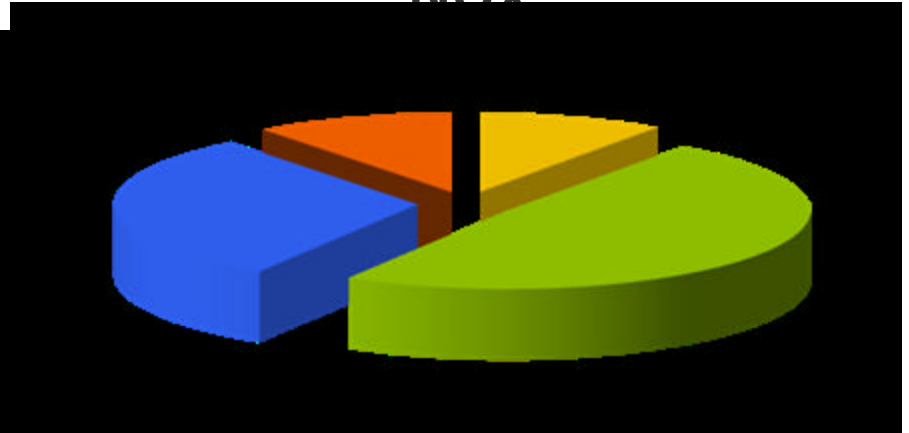


Port-Related Contribution to Basin 2007

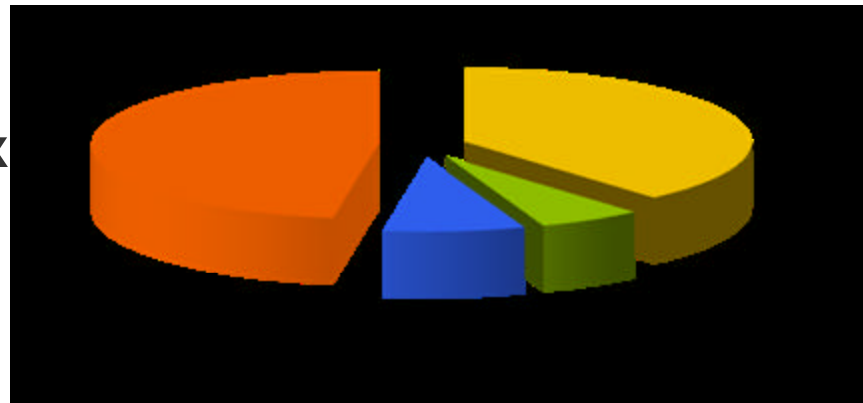
DPM



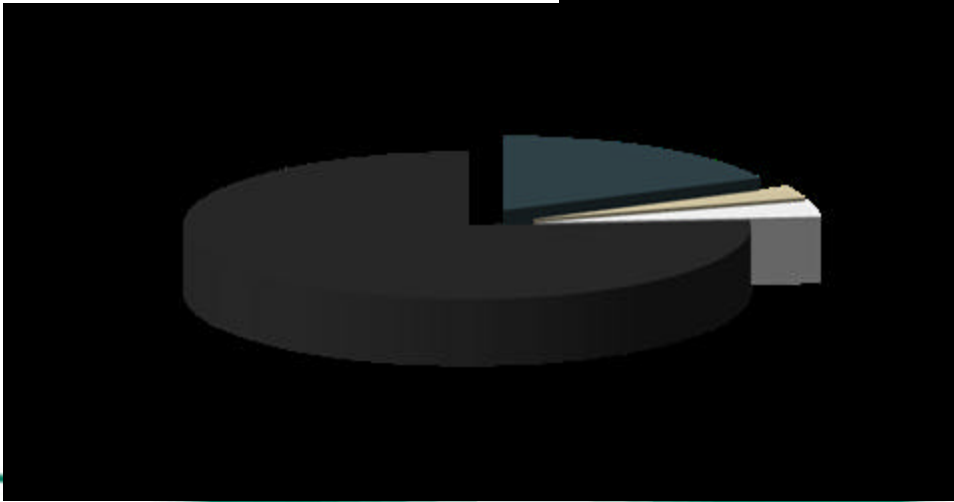
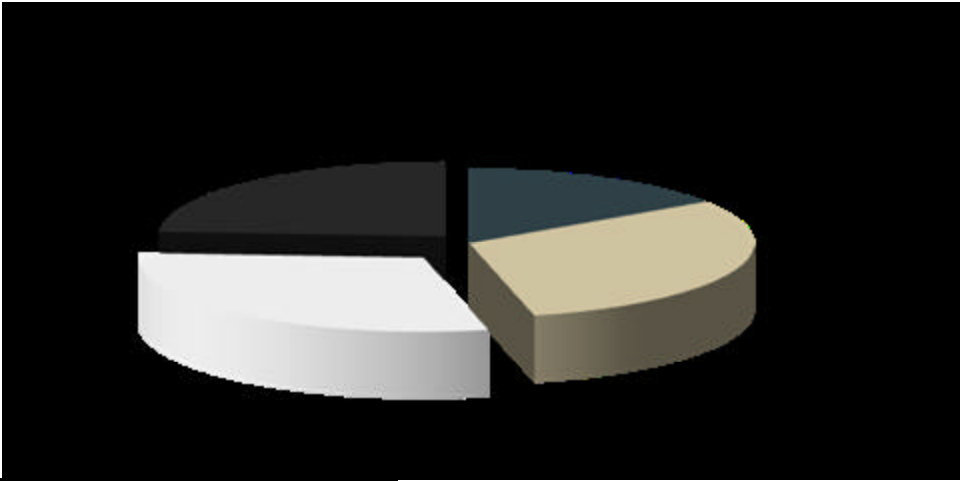
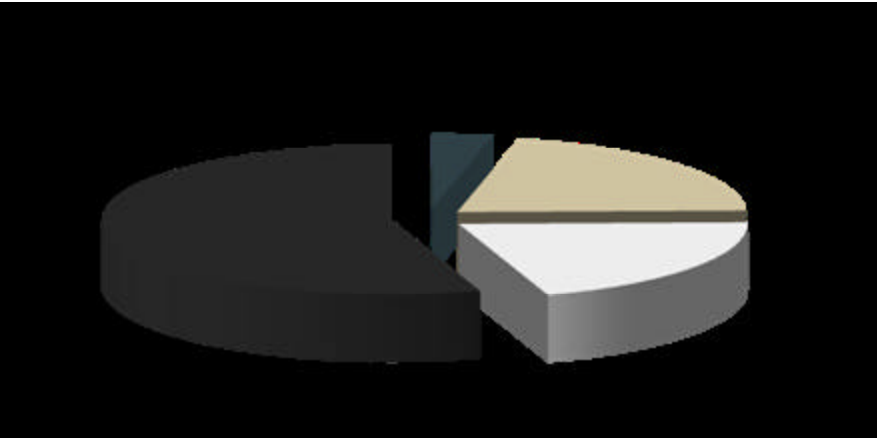
NO_x



SO_x



Projected Port-Related Contribution 2023 Without CAAP Implementation



Sources and Challenges

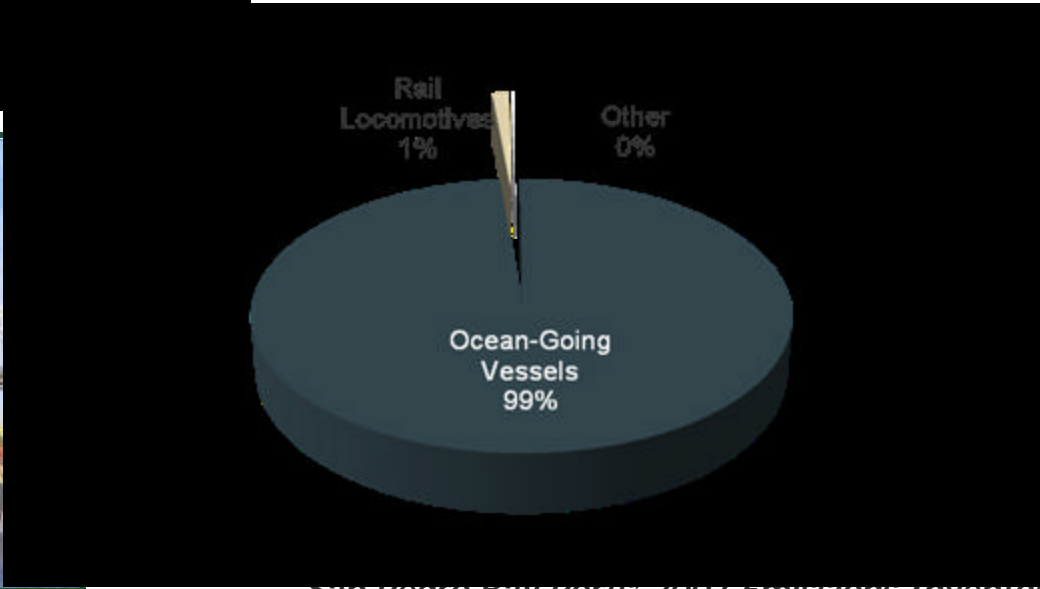
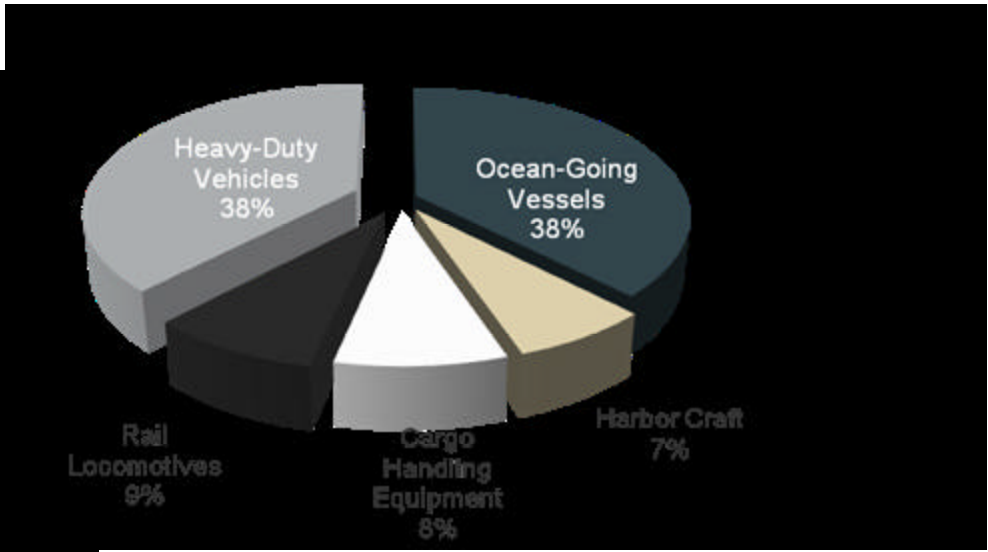
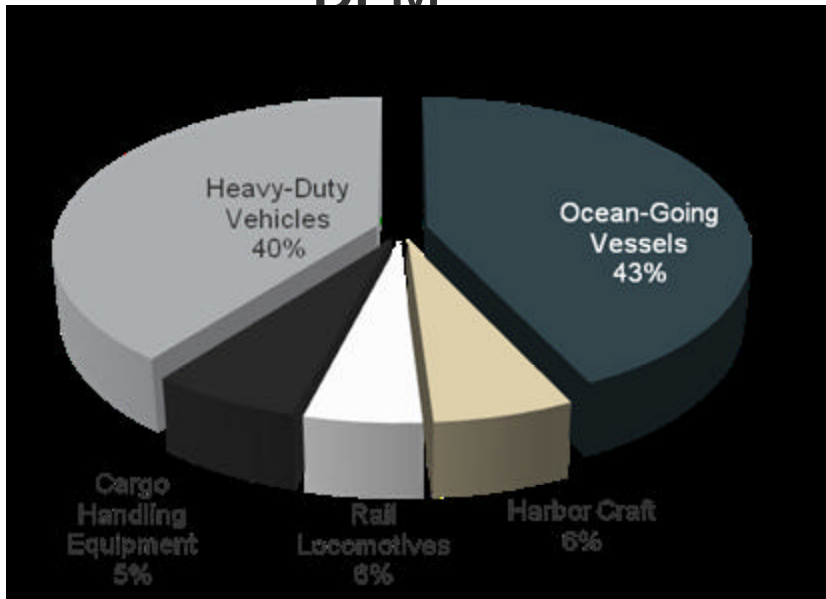
Reducing emissions from all source categories...

- Ocean-going vessels, harbor craft, locomotives, cargo handling equipment and trucks



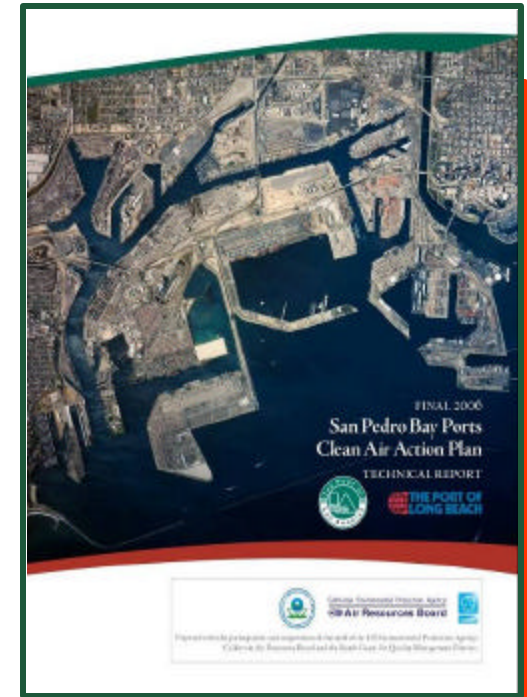
Pollutant Contribution by Source

DPM



CAAP Development

- Developed in cooperation with our
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



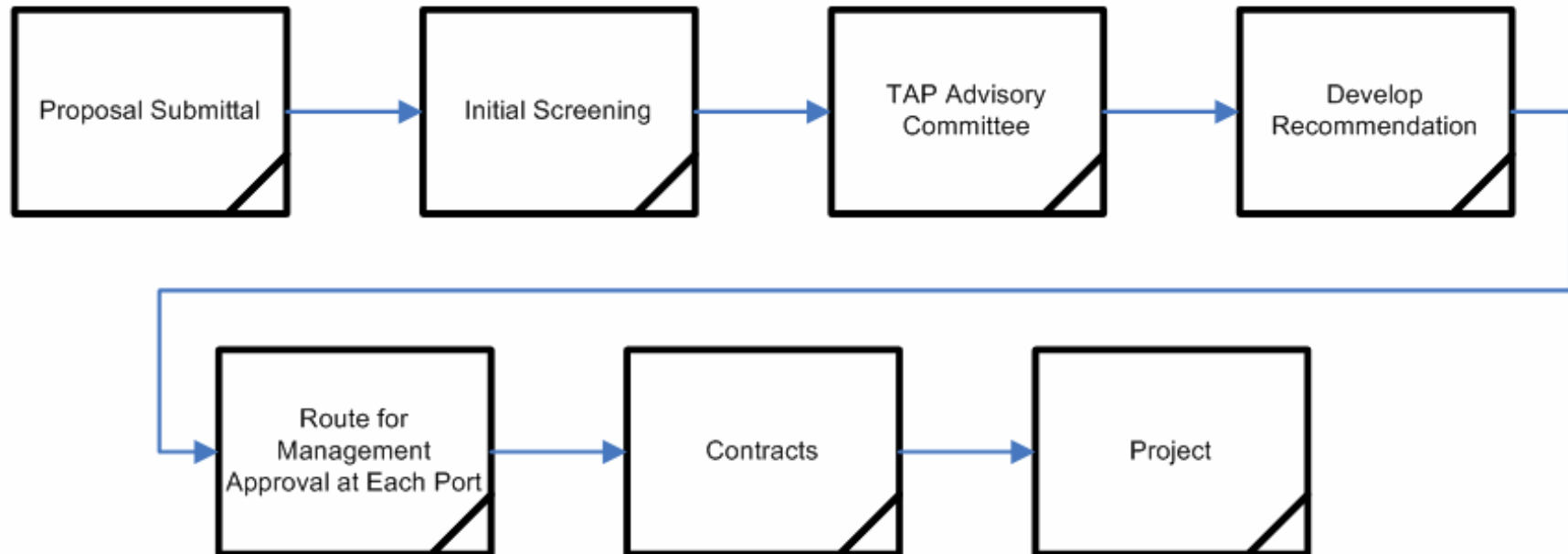
New/Emerging Technology Demonstrations

Types of Projects


- Port Generated projects
- Solicited proposals
- Unsolicited proposals



Unsolicited Proposal Process



TAP Project Requirements Screening/Evaluation

- Technology Application
 - CARB Verification
 - Matching Funds
 - Emission Reductions
 - DPM, NO_x, SO_x
 - 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



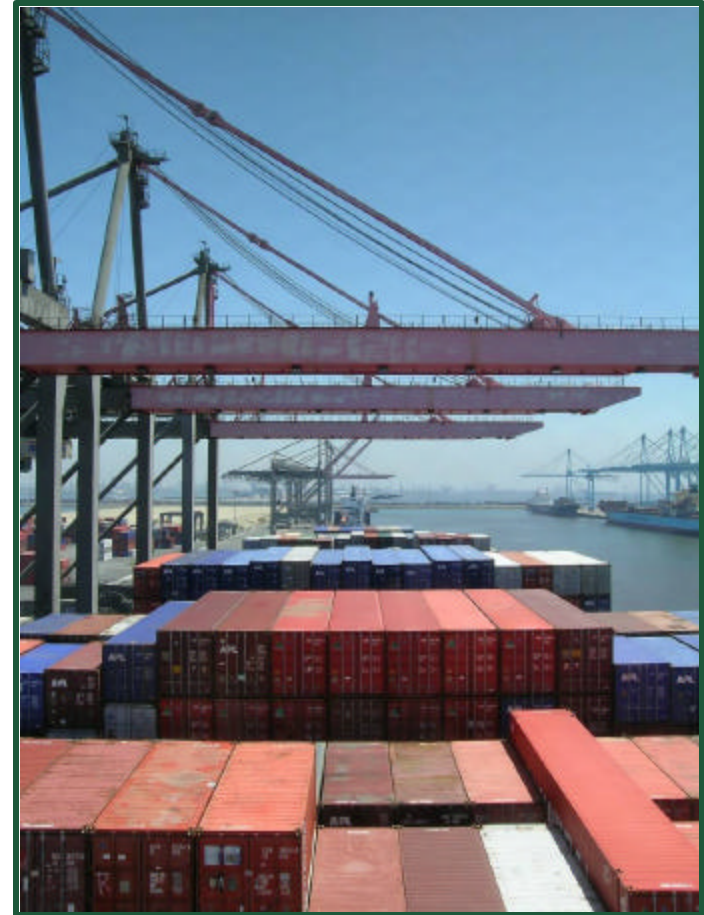
Advanced Marine Emission Control System

- " 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% NO_x



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 NO_x
 - 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



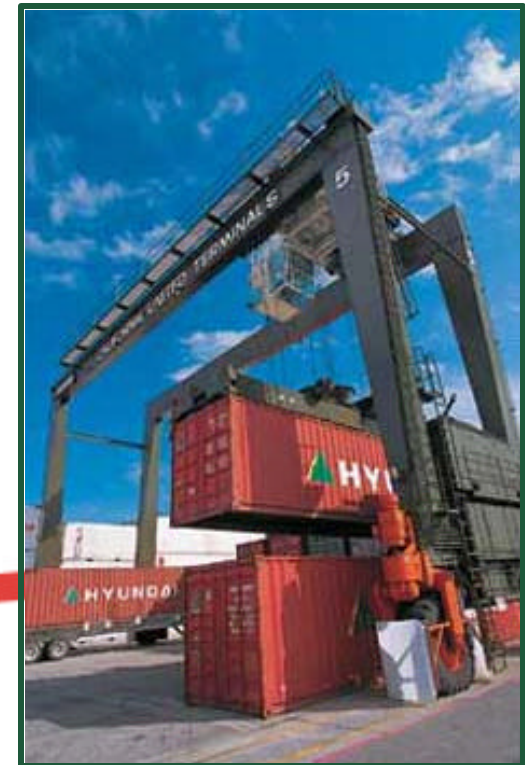
Hybrid Yard Hostler

- 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



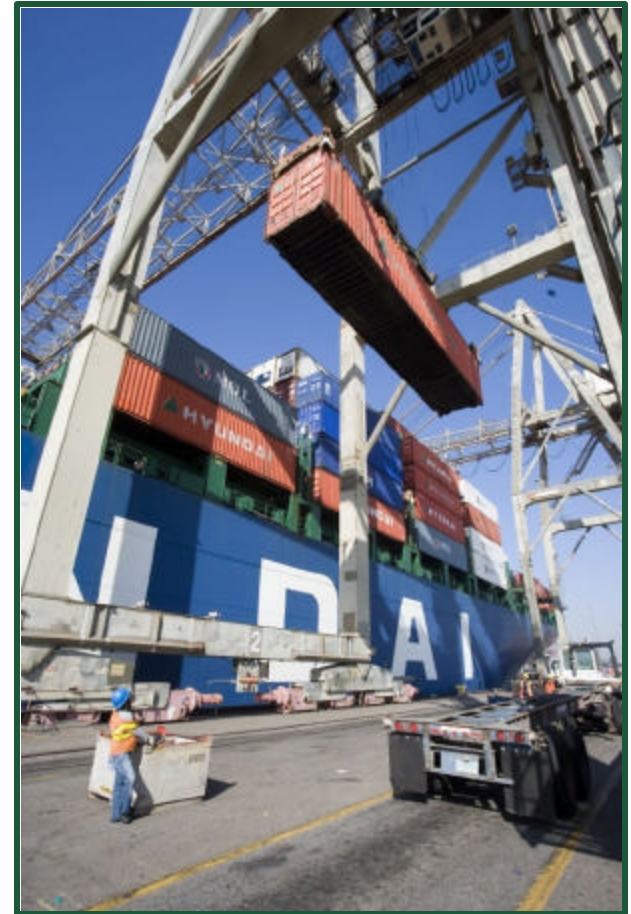
Vycon REGEN System

- 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 NO_x increase associated with biodiesel
- Combined ports' contribution: \$88K
- Anticipated benefits:
 - 57% PM
 - 8-10% NO_x
 - 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 Cummings 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

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