Port of Los Angeles Air Quality and Technology

San Pedro Bay Port Complex

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Emissions and the Clean Air Action Plan

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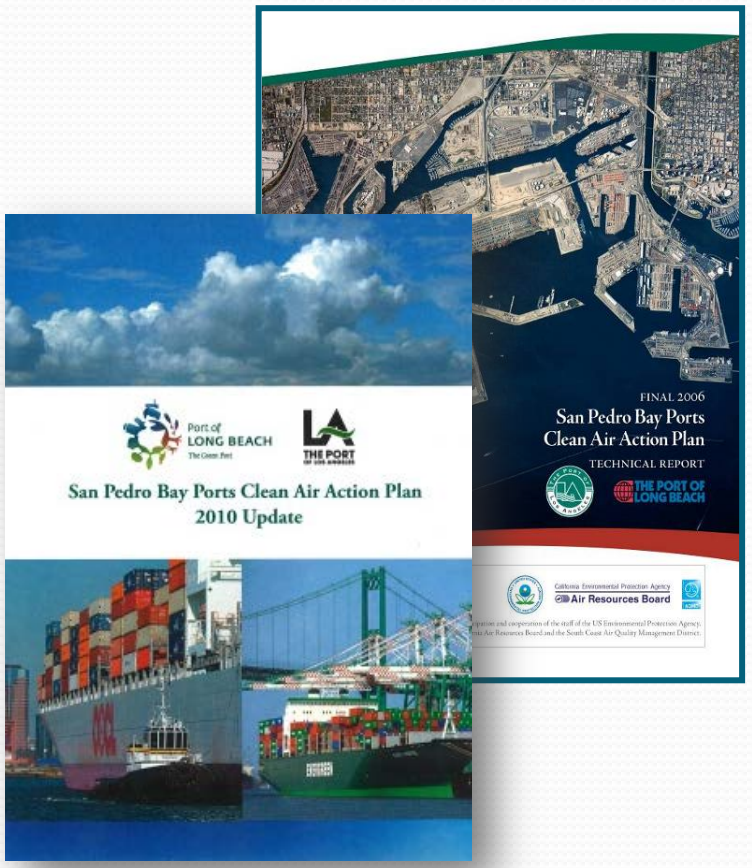
San Pedro Bay Ports Clean Air Action Plan (CAAP)

- **Comprehensive Five Year Action Plan**
  - Focuses/drivers: DPM, NOx, SOx
  - Adopted in 2006 by POLA and POLB
  - Control measures for ships, harbor craft, trucks, cargo handling equipment and locomotives
- **2010 CAAP Update**
  - San Pedro Baywide Standards



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San Pedro Bay Standards

- Emissions Reduction Standards
  - 2005 Baseline
  - By 2014, reduce emissions by:
    - 72% DPM
    - 22% NOx
    - 93% SOx
  - By 2023, reduce emissions by:
    - 77% DPM
    - 59% NOx
    - 93% SOx

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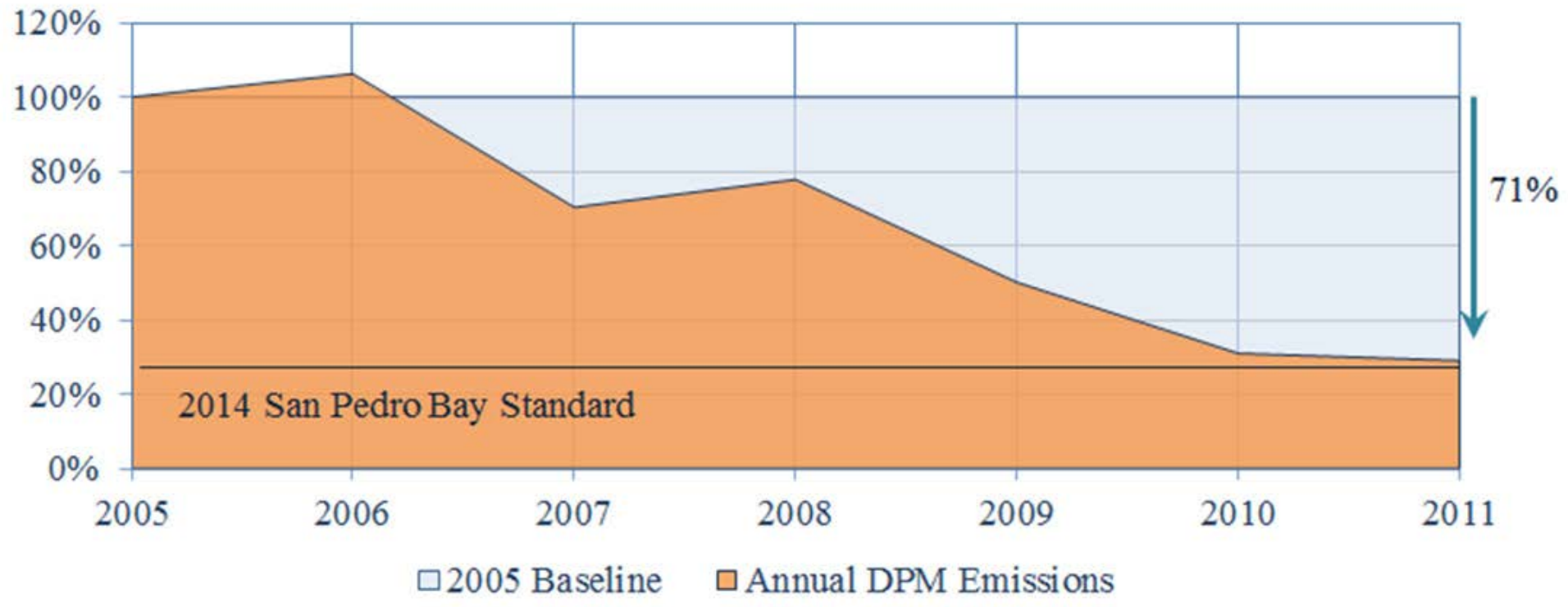
Emissions Benefits

Diesel Particulate Matter (DPM) Reductions 2005 - 2011



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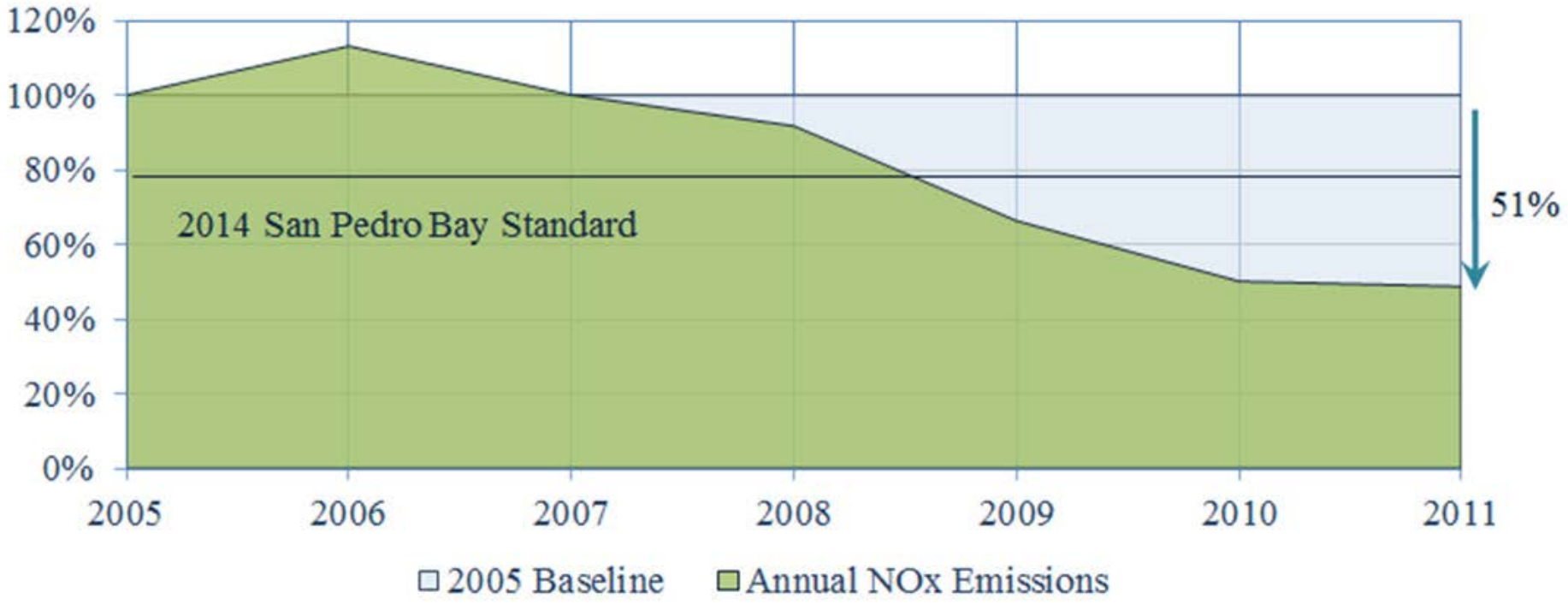
Emissions Benefits

Nitrogen Oxides (NOx) Reductions 2005 - 2011



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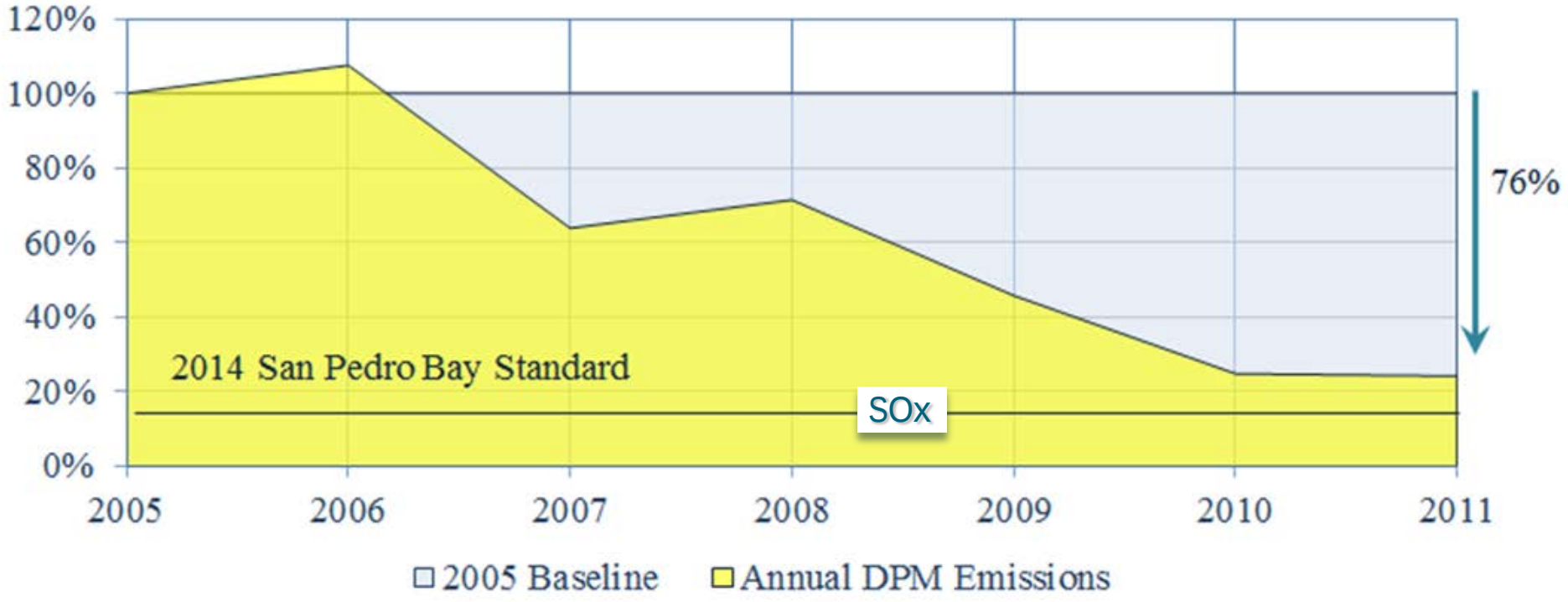
Emissions Benefits

Sulfur Oxides (SOx) Reductions 2005 - 2011



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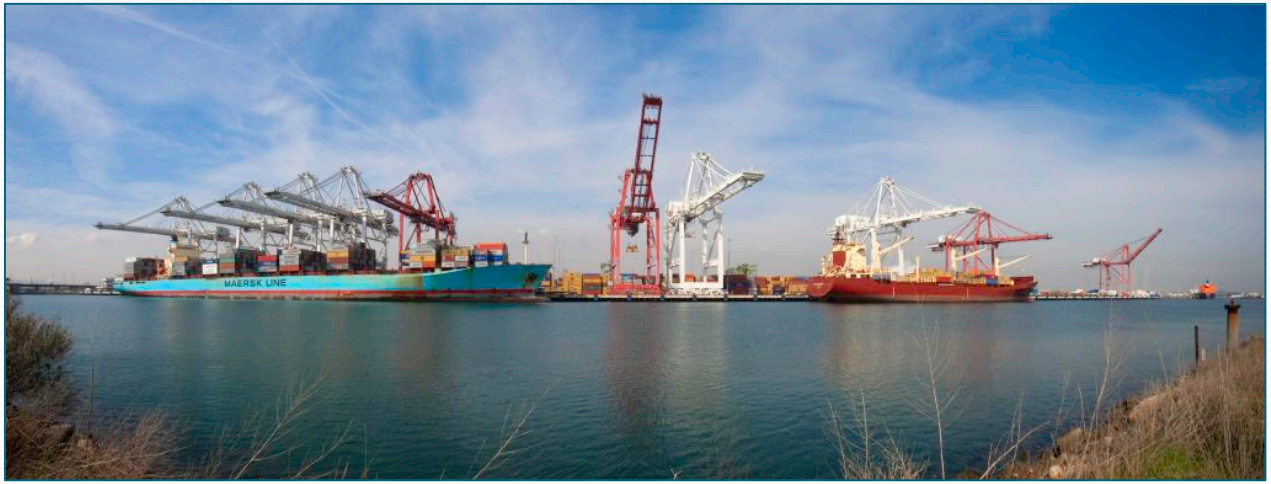
San Pedro Bay Standards

- Health Risk Reduction Standard
  - By 2020, reduce the population-weighted residential cancer risk from port-related DPM emissions by 85%, in communities adjacent to the ports and throughout the port region



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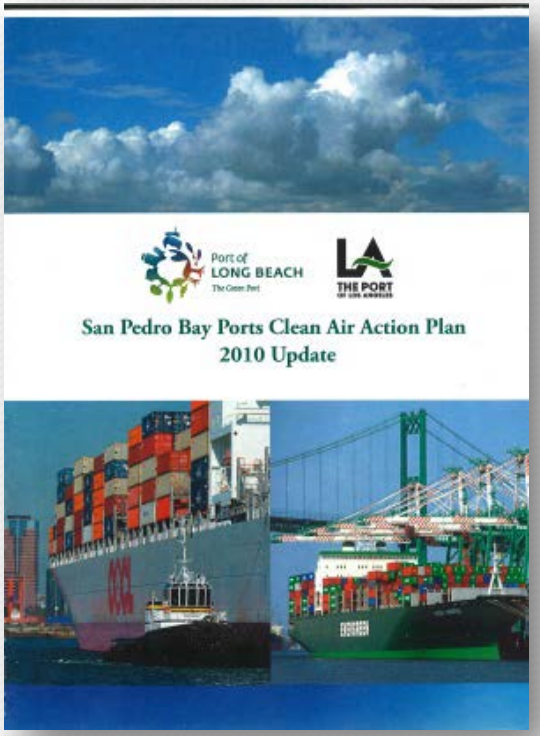
Selected CAAP Programs

- Fuel Switching Program
- Shorepower
- Switcher Improvements
- Technology Advancement Program
- Clean Truck Program
- OGV 5 – Environmental Ship Index



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Environmental Ship Index (ESI) Overview

- ESI International Scoring System
- Case for International Collaboration
- Outperform IMO regulations
- 16 Port incentive providers, 2 clean vessel certification societies
- 1081 ships enrolled in ESI
    - 200% increase since program inception
- 9% of world containership fleet is registered with ESI as of 07/01/12

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Technology Advancement and Zero Emission Technologies

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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

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TAP Highlights

- $1.5 million per port per year made available ($3 million total) for demonstration projects and emissions testing
- 28 projects including:
  - World's first hybrid tug boat
  - Hybrid yard tractors
  - Hybrid RTGs
  - CNG drayage truck
  - Tier 4 retrofits for harbor craft
  - DPFs

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Zero Emission Technologies

- “Zero emission technologies” have been defined by the California Air Resources Board (CARB) as technologies that do not directly emit criteria pollutants, such as hydrocarbons, carbon monoxide, nitrogen oxides (NOx) or particulate matter (PM).

- Zero emission technologies may indirectly produce small amounts of emissions, for example, when an electric vehicle plugs into grid power to recharge the on-board batteries, therefore contributing in small part to emissions at the power plant source.

Zero Emission Roadmap

- Port as a Catalyst
- Cant Do It Alone
- No Silver Bullet
- Fit into Operations
- Cost Effectiveness
- Business Case


Roadmap for Moving Forward with
Zero Emission Technologies
at the Ports of Long Beach and Los Angeles

Technical Report

Updated August 2011

FINAL

Target Sources

- Focus on technologically feasible and economically viable options:
  - Drayage (11% DPM, 12% NOx)
    - 300k+ trips per month
    - 11,228 trucks registered in PDTR
    - Near Dock Rail Yard can have 2 million trips per year
  - Terminal Equipment (7% DPM, 10% NOx)
    - Approx 1,000 yard tractors at each port
  - Locomotives (10% DPM, 19% NOx)
    - Near Dock Rail Yard can have 8 trains per day

Current Zero Emission Projects

- Balqon Yard Tractor
  - Battery Plug-in
  - Lithium Ion Batteries (700 Ahr)
  - 230 kwh battery
  - Over 750 hours of testing complete at port facility
  - 12 hour run times on single charge
  - Port owns 14 units, goal is to deploy all of them by June 30, 2012 into demonstration testing.

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Current Zero Emission Projects

- Balqon On-Road
  - Battery Plug-in
  - Lithium Ion Batteries (700 Ahr)
  - Expecting 100 mile range
  - 2-3 hour charge time
  - Expected Delivery March 2012

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Current Zero Emission Projects

- Vision On-Road
  - Hydrogen Fuel cell
  - 200 or 400 mile range
  - 20 or 40 kg hydrogen storage
  - 400-536 HP
  - 3,200 lbs-ft torque
  - One unit undergoing initial testing

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Current Zero Emission Projects

- Electric RTGs
  - Retrofit
  - Above ground trench for cables
  - Cable Reel Carrier (CRC) Design
  - Third Rail

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PortTech LA

- Non-Profit, Port-Focused Technology Incubator
- Future Manufacturing Center
- Located at the Port of LA
- City of LA, Port of LA, Local Chambers of Commerce

PortTechLA is designed to incubate or accelerate technology company growth through assistance with the development, testing, commercialization, manufacture and marketing of the products and solutions required to ensure the sustainability of the ports of the future.

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