



THE PORT
OF LOS ANGELES

A M E R I C A ' S P O R T ®

PLANNING for ZERO EMISSION PORT OPERATIONS

Presented by:

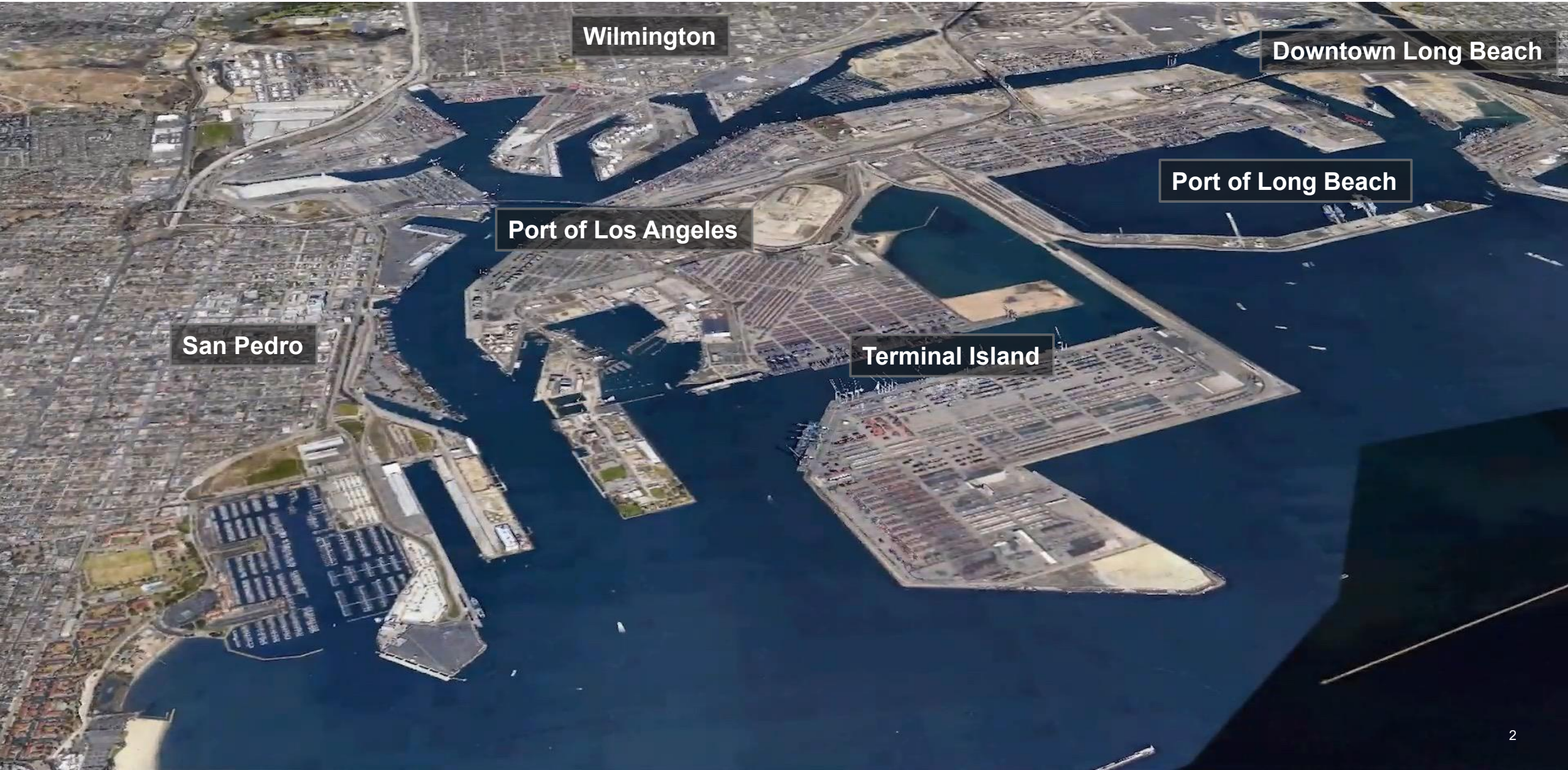
SAL ZAMBRANO, P.E.
ASST. CHIEF HARBOR ENGINEER

Presented to:

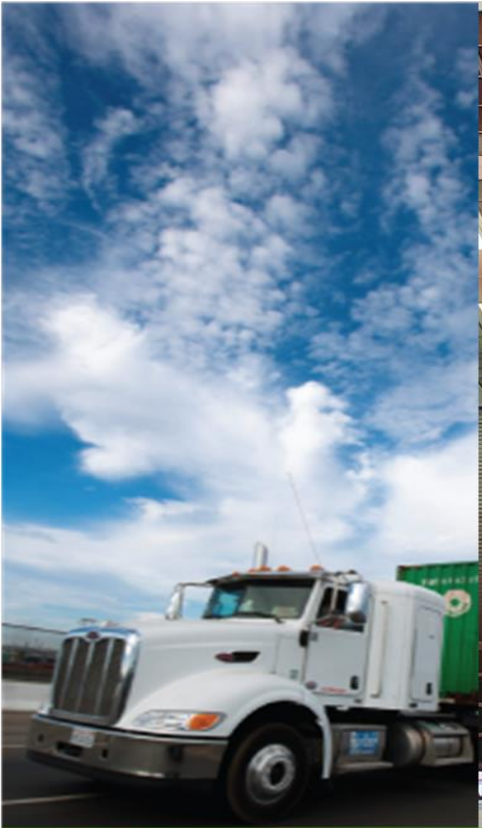
CONSTRUCTION NETWORK

10.2.2024

San Pedro Bay Ports



POLA's Clean Air Action Plan (CAAP)



San Pedro Bay Ports are Working Together to Reduce Environmental Impacts

**Clean Truck Program
Phase Out Combustion
Engine Trucks and
Transition Fleets to
Near-Zero and Zero-
Emission Trucks**

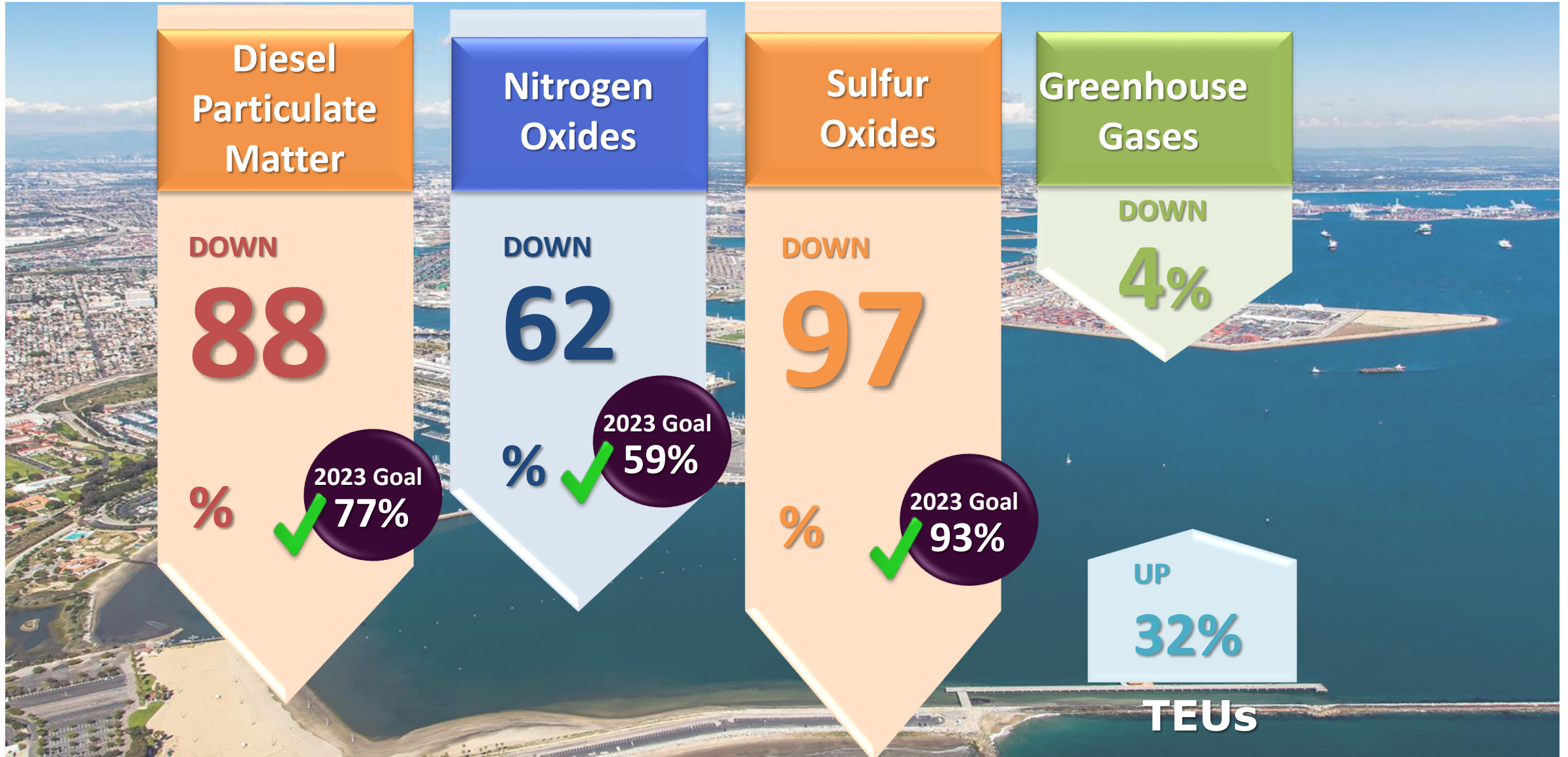
**Transitioning to
Zero-Emission
Terminal Equipment
by 2030**

**Developing a Clean
Ship Program to
Attract the Cleanest
Ships Servicing the
Pacific Rim Trade**

**Deployment of Cleaner
Harbor Craft Engines
and Operational
Strategies to Reduce
Harbor Craft Emissions**

**Cleanest Available
Switching Locomotives
and Limit Idling to
15-Minutes**

Air Emissions Reduced (2005-2022)



Container Handling Equipment (CHE) Opportunity

Zero Emission (ZE) CHE: Battery Electric Yard Tractor



CHE: Yard Tractors, Top Handlers, RTG Cranes, etc.

- **15% of CO₂ Emissions**
- **5% NO_x Emissions**
- **38% CO Emissions**
- **5% of all diesel-related pollutants**

Electric Grid Analysis for ZE CHE at POLA

Project Objective (s)

To assess the extent of current electrification efforts

- To identify electrification opportunities at the Port of Los Angeles (POLA) that assist in achieving emission reduction goals
- To identify improvements required to meet the new electrification loads
- To develop a 5 to 15 year roadmap for LADWP, POLA & Port Operators

Project Team

- EPRI & LADWP working with POLA Staff to understand the Electrification Planning for the next 5-15 years

The EPRI study was jointly funded by the Los Angeles Department of Water and Power (LADWP) and the Port of Los Angeles (POLA)

CHE Inventory (from Air Emissions Inventory)

- **Top five CHE types (non-electric)**
 - **Terminal tractors (or UTRs): 859 (52%)**
 - **Top handlers: 223 (14%)**
 - **Forklifts: 130 (8%)**
 - **RTG/hybrid RTGs: 116 (7%)**
 - **Straddle carriers: 110 (7%)**

- **Collectively, the top five CHE account for 1,438 pieces of equipment by count or 88% of the total inventory for the six container terminal operators.**

Equipment Category	Fuel Type	Count	Percentage
UTR (Yard Tractors)	Diesel/ LNG/ LPG	859	52%
	Electric	26	2%
Top Handlers	Diesel	223	14%
	Electric	2	0.1%
Forklifts	Diesel/ LPG	130	8%
	Electric	2	0.1%
Rubber Tired Gantry (RTG) Cranes	Diesel	116	7%
Straddle/ Hybrid Straddle Carrier	Diesel	110	7%
Wharf Cranes (STS)	Electric	79	5%
Other Vehicles (Cone Vehicle, Man Lift, Sweeper, Loader etc.)	Diesel	55	3%
Automatic Stacking Cranes	Electric	29	2%
Rail Mount Gantry Crane (RMG)	Electric	3	0.2%
Non-Electric CHE Total		1493	91%
Electric CHE Total		141	9%
Total CHE Inventory Count @the 6 Terminals		1634*	

**Note: The total count does not include the yard trucks, as they are not considered as a CHE type*

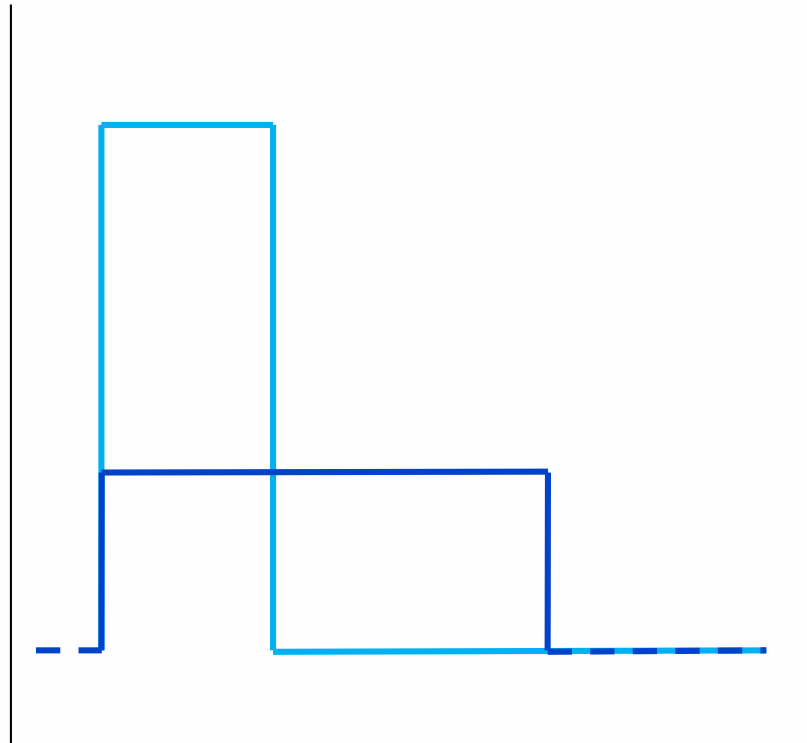
Managed and Unmanaged Charging

Unmanaged Charging

Vehicle chargers consume full power as soon as they are plugged in

Rigid shift schedule means many chargers will be active concurrently, resulting in a high peak load

Charging Power



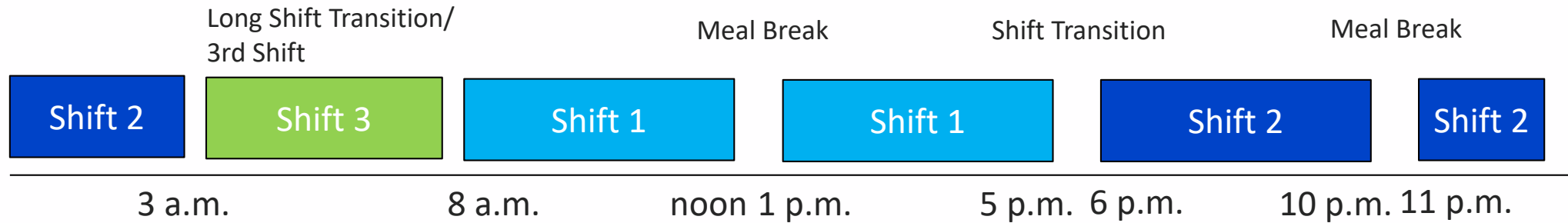
Time

Managed Charging

Vehicle charging power is reduced to lower peaks and extend charging time

Optimized charging schedule results in peaks that are as low as possible, but unachievable by a real controller

Work Shift Schedules and Charging Schedules



Shift schedules influence timing of electricity use

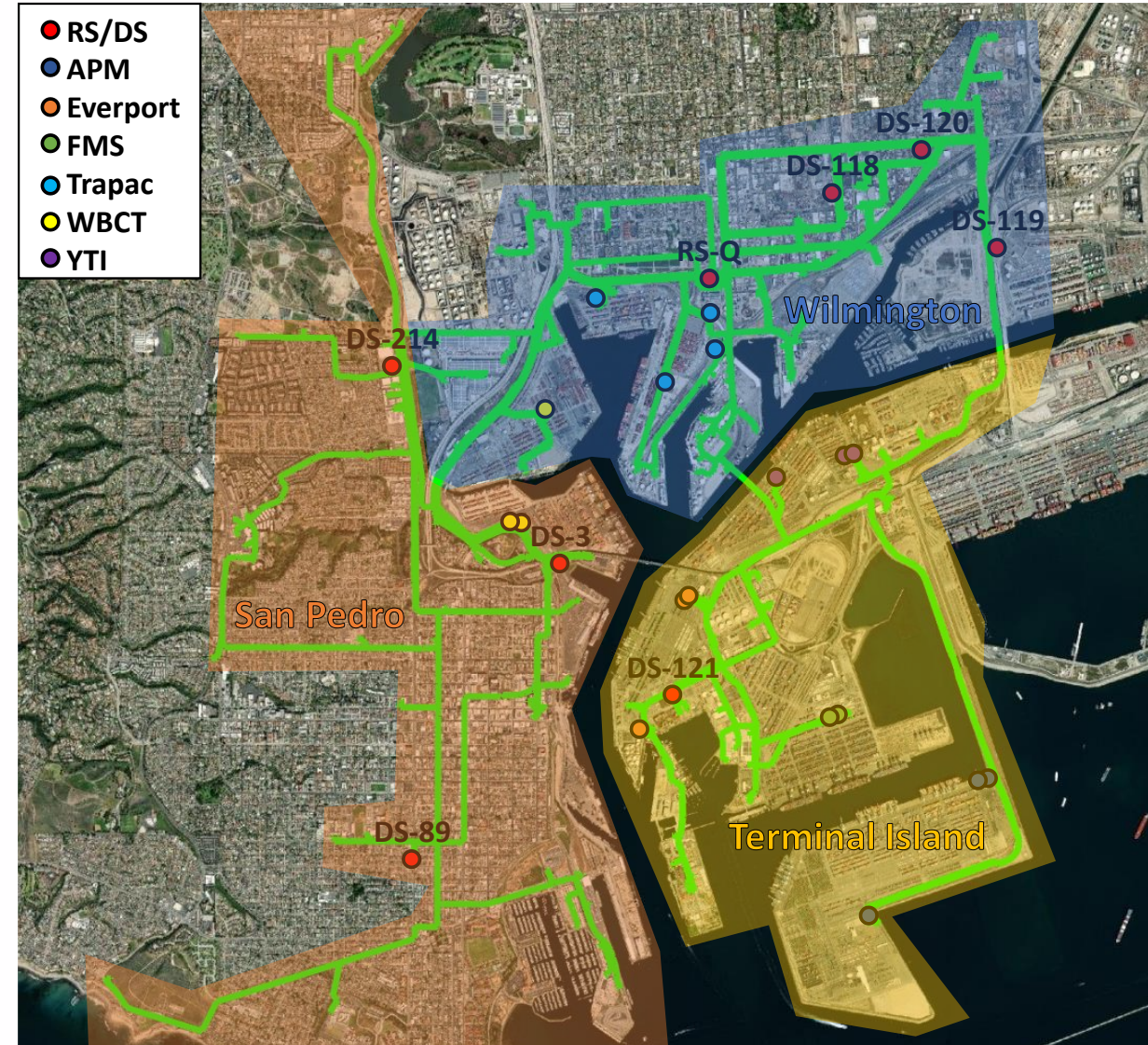
- EPRI developed a model of LADWP's Electrical Grid to estimate Peak Power Demand at POLA based on
 - Air Emissions Inventory;
 - Managed and Unmanaged Charging Scenarios;
 - LADWP data;

Key Findings:

2021 Peak Power Demand at Bank B: 119MW

Add. Power Demand (Managed Charging): 133MW

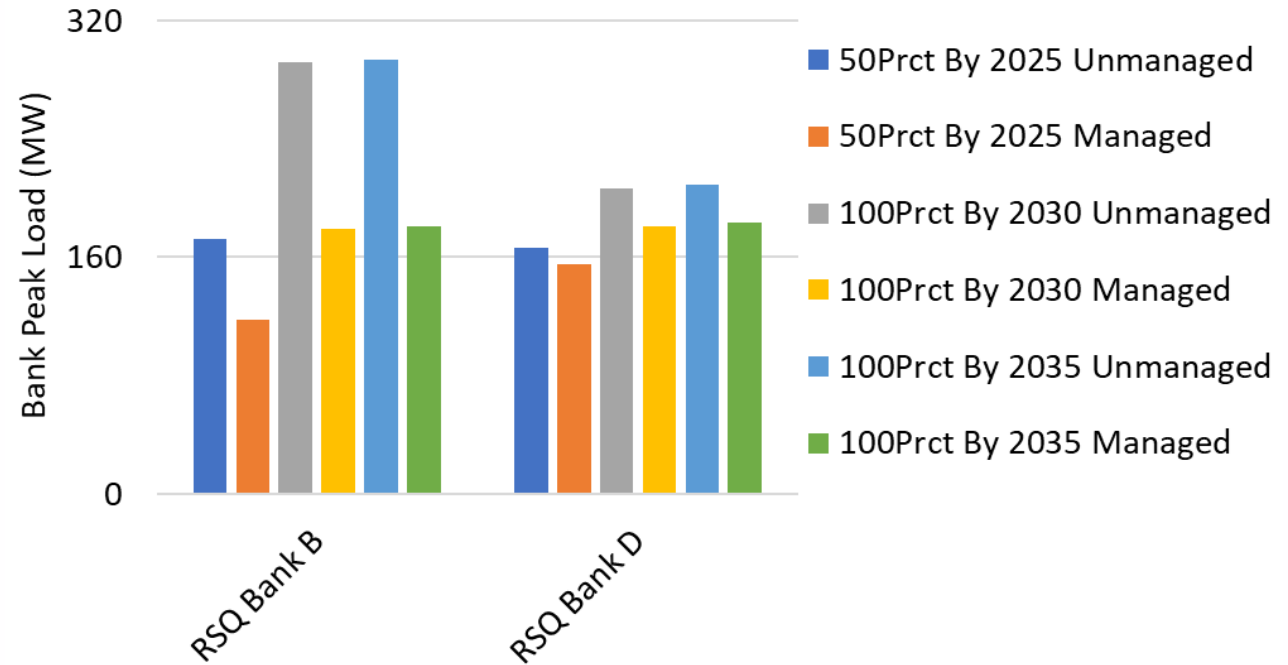
Add. Power Demand (Unmanaged Charging): 277MW



Add 160MW Bank D to RS-Q

- **New Bank D provides enough capacity for the**
 - **50% electrification with managed charging**
 - **50% electrification with unmanaged charging (if circuits balanced well between banks B & D)**

- **The 100% electrification scenarios require a new RS (1-2 additional banks beyond Bank D that RS-Q cannot accommodate)**



Expand RS-Q:

1. add 160MW Rack D to RS-Q;
2. construct new distribution lines to each container terminal;
3. construct network stations to each container terminal.

Investigate how managed charging, technology advancements, and customer ZE CHE deployments can help reduce Peak Power Demand and improve resiliency...



AMERICA'S PORT®

THANK YOU



portoflosangeles.org

[@PortofLA](https://www.instagram.com/PortofLA)