2020 San Pedro Bay Ports Air Emissions Inventory Results

Christine Batikian
Port of Los Angeles

Background

- Annual activity-based
  - 2005 – 2020
- Source categories
  - Ships, harbor craft, cargo handling equipment, trucks, locomotives
- Pollutants/ Greenhouse gases
  - PM10, PM2.5, DPM, NOx, SOx, HC, CO, CO2, CH4, N2O, CO2e
- Annually coordinated with & reviewed by CARB, SCAQMD, & EPA

2020 Snapshot

- More ships at anchorage
- Impacts to shore power usage at berth
- Longer times at berth unloading and loading cargo
- Fewer tanker calls
- Lower harbor craft and rail activity

Container Throughput & Vessel Call Comparison

	2005 vs. 2020	2019 vs. 2020
Container Throughput (TEUs)	↑ 22%	↑ 2%
Containers (TEUs) per call	↑ 76%	↑ 2%
Containership Arrivals	↓ 31%	No change

SPBP 2020 Air Emissions Reductions vs. 2005

Diesel Particulate Matter

DOWN

90%

2023 Goal 77% ✓

Nitrogen Oxides

DOWN

63%

2023 Goal 59% ✓

Sulfur Oxides

DOWN

97%

2023 Goal 93% ✓

Greenhouse Gases

DOWN

11%

UP **22%** TEUs

*Compared to 2005 Levels

**GHG emissions (CO_2e) are reported in metric tons per year; all other pollutants are shown in tons per year.

Port of LONG BEACH THE GREEN PORT | LA THE PORT OF LOS ANGELES

SPBP 2020 Air Emissions Reductions vs. 2019

Diesel Particulate Matter
DOWN
5%

Nitrogen Oxides
DOWN
6%

Sulfur Oxides
DOWN
3%

Greenhouse Gases
UP
3%

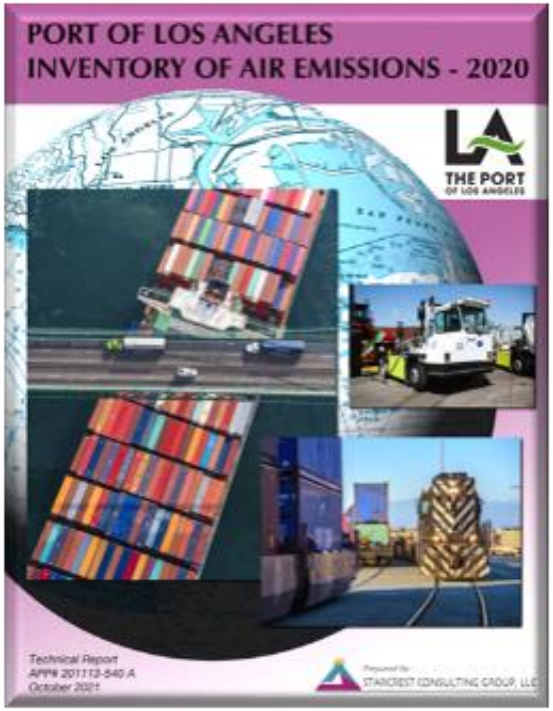
TEUs
UP
2%

*Compared to 2019 Levels
**GHG emissions (CO_2e) are reported in metric tons per year; all other pollutants are shown in tons per year.

Moving Forward

- State and Federal Regulations
- Feasibility Assessments
- Technology Advancement
- Ship Incentive Programs
- Clean Truck Fund Rate

2020 Air Emissions Inventories



https://www.portoflosangeles.org/environment/air-quality/air-emissions-inventory

https://www.polb.com/environment/air/#emissions-inventory


Thank you!

SAN PEDRO BAY PORTS

CLEAN AIR ACTION PLAN

San Pedro Bay Ports 2021 Accomplishments & 2022 Priorities

Teresa Pisano
Port of Los Angeles

Morgan Caswell
Port of Long Beach

Joint Ports' 2021 Accomplishments

- ✓ Adopted the Clean Truck Fund Rate
  - Held public workshops related to exemptions and driver equity
  - Contracted and began work on Collection Mechanism
- ✓ Prepared and released each Port's respective:
  - Air Monitoring Report (2020)
  - Emissions Inventory (2020)
- ✓ Prepared and released the 2020 TAP Annual Report
- ✓ Commenced the 2021 CHE and Truck Feasibility Assessments
- ✓ Submitted Respective Port Plans under the At Berth Regulation
- ✓ Held a Grants Workshop for terminal and harbor craft operators

Port of Long Beach

- ✓ Implemented the $1 million Kickstart Program for trucks
- ✓ Adopted a new Green Ship Incentive Program, focused on Tier III vessels
- ✓ Secured $2.5 million in CEC funding to support ZE terminal infrastructure master planning, ZEV infrastructure, and workforce development
- ✓ Completed the $5.2 million C-Port project
  - Deployed 1 battery-electric yard tractor, 3 battery-electric top handlers and associated infrastructure
- ✓ Completed the $0.5 million DERA Project
  - Repowered 3 diesel-electric Tier 1 engines of 3 RTGs to grid-connected eRTGs
- ✓ Released the Public Charging and Fueling Study for Drayage Trucks

Port of Los Angeles

- ✓ Completed the $8.9 million Everport Advanced Yard Tractor Deployment and ECO-FRATIS Project
  - Deployed 20 Low NO_x and 5 Zero Emission Yard Tractors
- ✓ Secured ~$2 million in DERA funds for Zero Emission Switcher Locomotive
- ✓ Released RFP for ZE 25 Truck Deployment offering $3 million for at least 10 trucks
- ✓ Approved new trucking concession terms and agreements with over 1,000 Licensed Motor Carriers
- ✓ Continued to implement major grant funded projects
  - Pasha Green Omni-Terminal (anticipated completion in 2023)
  - Everport Advanced Cargo Handling Equipment Project (anticipated completion in 2023)
    - >$2 M infrastructure for terminal development and electrical upgrades complete
  - WBCT Advanced Infrastructure Demonstration
  - Shore to Store Project

2022 Priorities

Truck Priorities

- Clean Truck Fund Rate Implementation
- Clean Truck Fund Rate Incentive Program(s) Development
- AQMD JETSI 100 Truck Pilot
- POLB Public Charging RFI
- POLA Public Charging Study
- Continue Truck Demonstration Projects
- Complete Drayage Truck 2021 Feasibility Assessment

CHE Priorities

- Zero Emission Infrastructure Planning
- Continue Implementing CHE Demonstration Projects
- TAP focus on CHE
  - Evaluating several proposed Hydrogen Infrastructure and/or Equipment Projects
- Complete CHE 2021 Feasibility Assessment

OGV Priorities

- Continue Evaluation of Vessel Incentive Programs
- Support Implementation of At Berth Terminal Plans
- Continue Outreach to National & International Ports
- Continue to Implement OGV Demonstration Projects

Harbor Craft

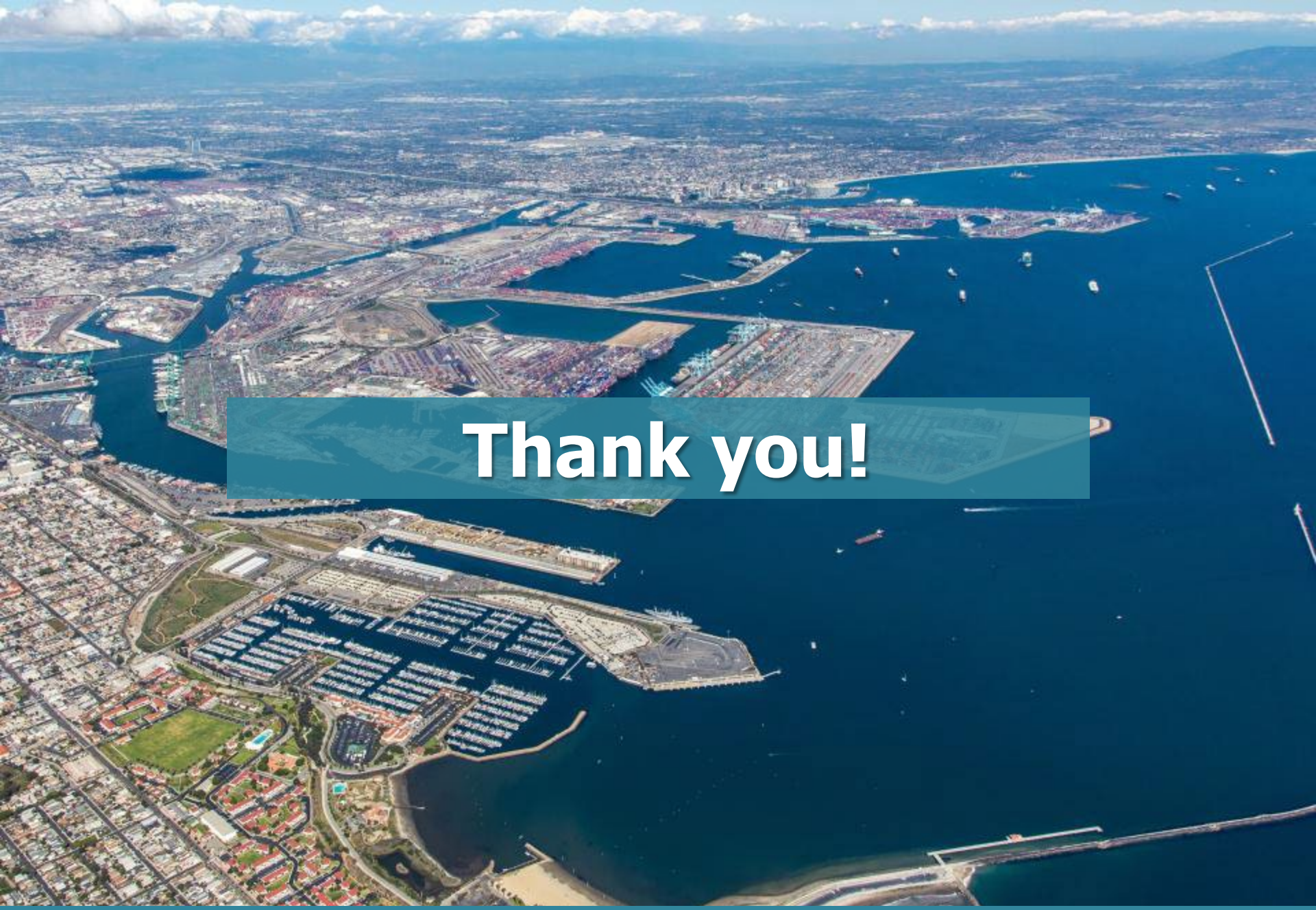
- Participate in CARB Harbor Craft Rule Development
- Continue to Implement Harbor Craft Demonstration Projects
- Explore ZE Harbor Craft Infrastructure
- Funding Advocacy

Locomotives

- Implement Clean Locomotive Demonstration Projects
- TAP focus on Locomotives
  - Evaluating a ZE locomotive charging infrastructure project
- Monitor CARB Locomotive In-Use Rule Development
- Funding Advocacy

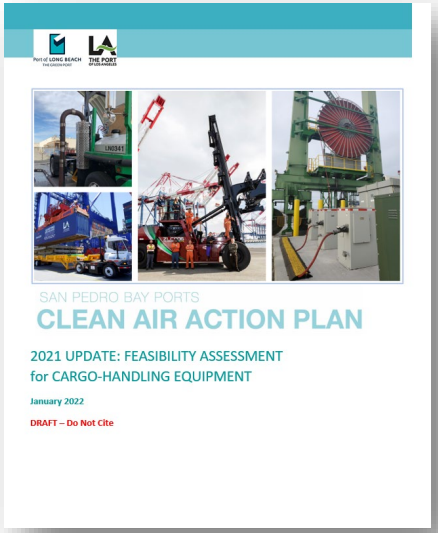
Emission Inventories and Air Monitoring

- 2021 Emission Inventories
- 2021 Air Monitoring Reports


Thank you!

SAN PEDRO BAY PORTS

CLEAN AIR ACTION PLAN



Port of LONG BEACH
THE GREEN PORT

THE PORT OF LOS ANGELES

Status Update:

2021 FEASIBILITY ASSESSMENTS for CARGO-HANDLING EQUIPMENT and DRAYAGE TRUCKS

February 2022

Presented at the CAAP Stakeholder Implementation Meeting

Patrick Couch / Jon Leonard
Gladstein, Neandross & Associates

February 1, 2022

GLADSTEIN, NEANDROSS & ASSOCIATES

TETRA TECH

Feasibility Assessment: Structure

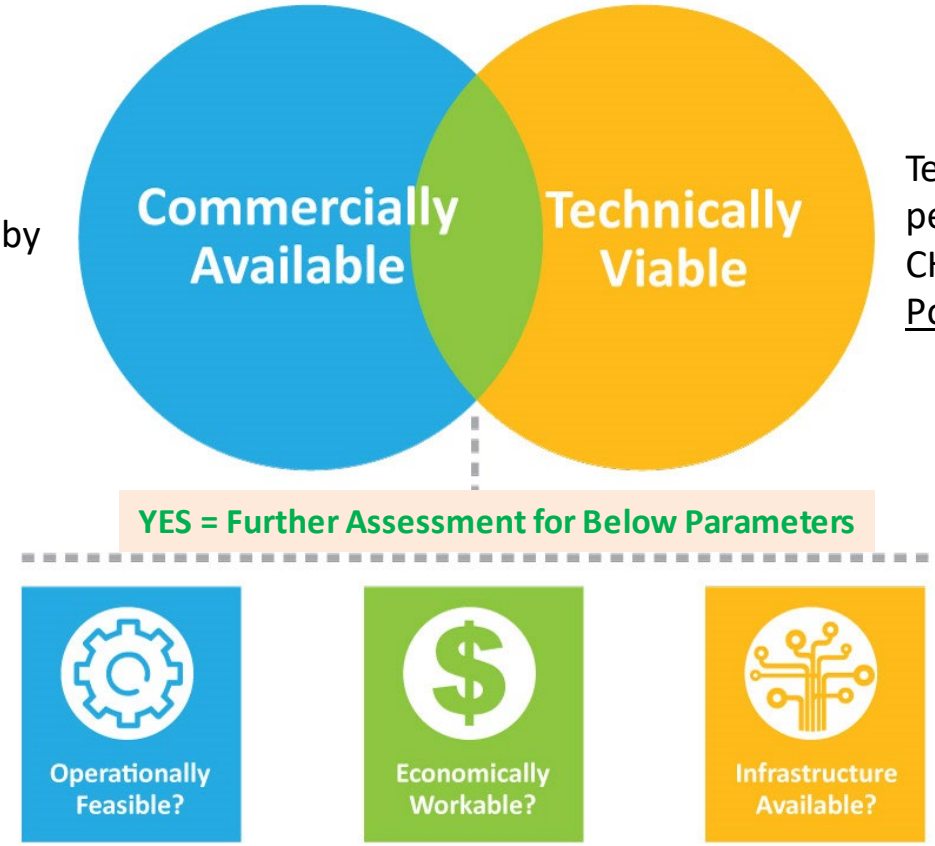
- 2021 Assessments **build upon and update** original (2018) Feasibility Assessments
- Continue to follow Ports' November 2017 "Framework" document
- Emerging **ZE** and **NZE** fuel-technology platforms are evaluated according to the following five basic parameters:
  1. Technical Viability
  2. Commercial Availability
  3. Operational Feasibility
  4. Availability of Infrastructure and Fuel
  5. Economic Workability

Feasibility Assessment: Structure (continued)

- **Breadth of Application** – Capability for widespread deployment
- **Timeframe** - 2021 to 2024
- **Fuel-Technology Platforms**
  1) Advanced diesel combustion
  2) Natural gas combustion
  3) Other combustion (e.g., propane)
  4) Hybrid-electric platforms (may include combustion)
  5) Pure battery-electric (or grid-electric) systems
  6) Hydrogen fuel cell
- **Sources of Information Used**
  - ✓Technical reports, papers and literature resources
  - ✓Key agencies (ARB, CEC, AQMD, Ports)
  - ✓Surveys

Basic Screening Methodology:

Currently available for commercial sale by capable OEM(s)?



Technically capable of performing service (drayage or CHE) specifically at the SPB Ports?

Overall Status / Schedule
(Both 2021 Assessments)

- **Completed:** extensive info gathering / interviews with dozens of stakeholders to **capture verifiable updates**
  - ✓ Manufacturers and Technology Partners (CHE and Class 8 Drayage Truck)
  - ✓ End Users (MTOs and Drayage Fleets, Trade Associations, etc.)
  - ✓ Fuel / Energy / Infrastructure Providers
  - ✓ Regulators (CARB, SCAQMD, etc.)
  - ✓ Public Information and Literature
- **Completed:** documentation of important advancements and milestones since 2018
- **Status:** majority of drafting is complete for both Assessments
  - CHE Assessment has completed 3rd party review. Release for public comment soon.
  - Drayage Assessment has completed initial drafting. 3rd party review underway. Public release will follow.

2021 **CHE** Assessment Update

- 4 CHE types (diesel / ~70% of Ports inventory):
  - ❖ Yard Tractors
  - ❖ RTG Cranes (RTG)
  - ❖ Top Handlers
  - ❖ Large-Capacity Forklifts

Yard Tractors

- ZE **Battery Electric**: emerging from pre-commercial into early commercial products
- ZE **H2 Fuel Cell**: proof-of-concept demos underway by OEMs with tech partners
- NZE **Natural Gas ICE**: multiple OEMs offer commercial units as option (special order)

RTG Cranes

- ZE **Grid-Electric**: multiple deployments of commercial conversions underway
- NZE **Diesel Hybrid**: dozens of deployments; OEMs have further improved emissions

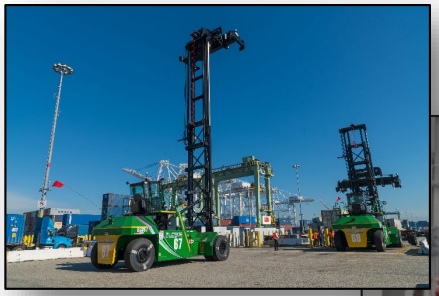
Top Handlers and Large-Capacity Forklifts

- ZE **Battery-Electric**: pre- and early commercial demonstrations underway
- ZE **H2 Fuel Cell**: proof-of-concept development by OEMs (with tech partners)

ZE battery-electric yard tractor

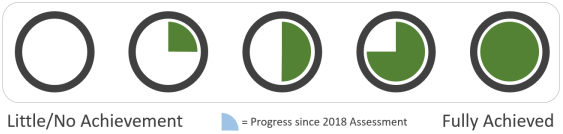
ZE H2 fuel cell yard tractor

ZE grid-electric rubber-tired gantry crane



ZE battery-electric top handler

ZE H2 battery-electric large-capacity forklift



CHE Assessment Update

Cargo Handling Equipment Progress Since 2018

2021 Updates:

- Progress toward *overall feasibility,* particularly of **ZE** platforms
- Both ZE and NZE yard tractors increased TRL from 7 to 8. Anticipated TRL 9 by 2024.
- **Blue pie wedges** identify progress from 2018

Preliminary Results

Feasibility Parameter	Yard Tractors		RTG Cranes	
	ZE Battery-Electric	NZE NG ICE	ZE Grid-Electric	NZE Diesel Hybrid-Electric
Commercial Availability				
Technical Viability (TRL Rating out of 9)	TRL 8 (2024: TRL 9)	TRL 8 (2024: TRL 9)	TRL 9	TRL 9
Operational Feasibility				
Infrastructure Availability				
Economic Workability				

Legend: **Achievement of Each Noted Parameter / Criteria (2021)**

*These ratings for overall achievement of each five feasibility parameter are based on the analysis of several criteria within that parameter. Because each criterion is important for the success of a given fuel-technology platform in CHE operations, the overall achievement ratings are based on the lowest criterion rating for each feasibility parameter.

2021 **CHE** Assessment Update

Yard Tractors

- ZE **Battery Electric**:
  - Additional OEMs entering the market with battery-electric options.
  - Current demonstrations have mixed results, but newer generation platforms are being developed.
  - 2-shift operations, infrastructure, and incremental costs remain challenges.
- NZE **Natural Gas ICE**:
  - Multiple OEMs offer commercial units as option (special order).
  - 2-shift operation is possible for LNG systems, but lack of wet-fueling options remains a challenge.
  - LNG units still entail increased capital and total costs.

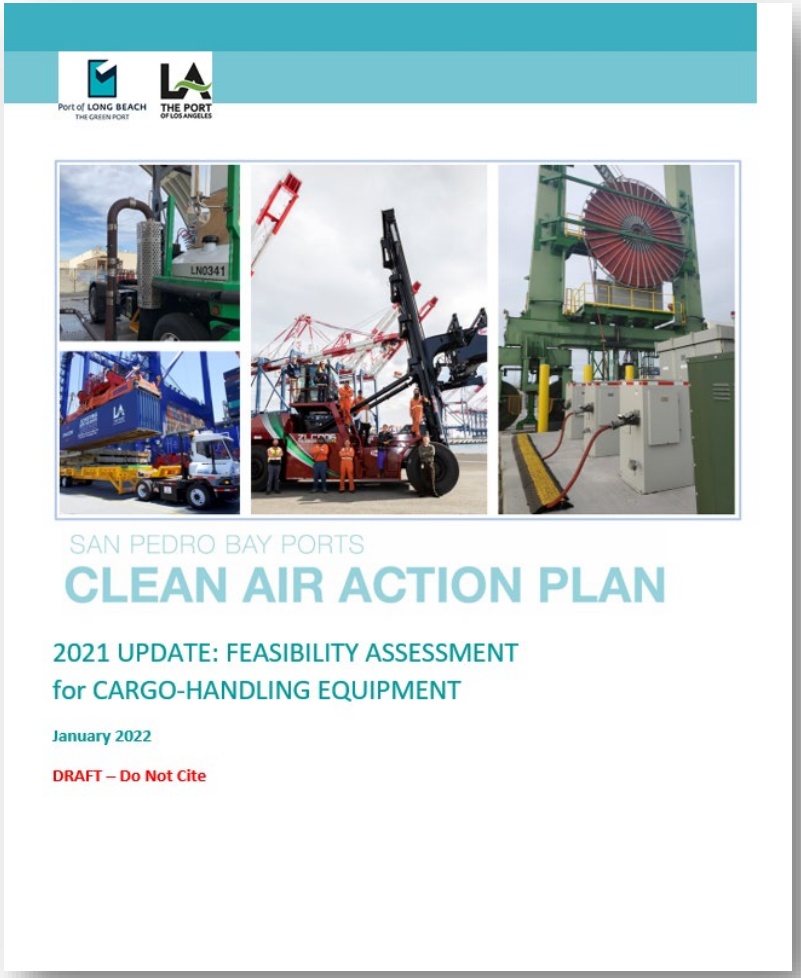
RTG Cranes

- ZE **Grid-Electric**:
  - Multiple deployments of commercial conversions underway
  - Considered commercially available and TRL 9
  - Significant incremental capital costs, total costs, and infrastructure requirements remain challenges.
- NZE **Diesel Hybrid**: dozens of deployments; OEMs have further improved emissions. Diesel hybrids are considered feasible (no change form 2018)

SAN PEDRO BAY PORTS

CLEAN AIR ACTION PLAN

Thank You!



Clean Truck Fund Rate Update

Stakeholder Meeting

February 1, 2022

Clean Trucks Program

CAAP Goal of 100% Zero Emission Trucks by 2035

Objectives:

- Reduce emissions to improve community health, meet criteria pollutant and greenhouse gas reduction goals
- Minimize economic impacts and disruption
- Utilize Port's authority within our jurisdiction

Joint Port Trucks Today*

- 20,344 trucks are in the Port Drayage Truck Registry (PDTR)
- 8,339 2014+ trucks registered in the PDTR and make 53% of moves
- 71% of trucks in the PDTR have engines meeting 2010 EPA standards
- 29% of trucks in the PDTR are engine year 2007-2009
- 725 LNG/CNG trucks are in the PDTR and perform 5% of moves
- 312 trucks with the Cummins natural gas fueled 0.02g/bhp-hr NOx engines are in the PDTR
- 28 Zero Emission (25 battery-electric, 3 Hydrogen Fuel Cell) trucks in the PDTR

* Snapshot from December 2021

Current Status

- Respective Boards of Harbor Commissioners adopted Tariff amendment to collect CTF Rate
- Starting April 1, 2022
- Charge $10 per loaded TEU or $20 per loaded FEU
  - Charged to BCOs for loaded containers hauled by truck
  - Zero emission trucks exempt
  - Exemption for low NOx trucks

POLA Low NOx Exemptions

- Any low NOx truck registered in the Port Drayage Truck Registry (PDTR) and placed into service at POLA by December 31, 2022 are exempt until December 31, 2027
- Low NOx trucks registered January 1, 2023 and beyond will not receive an exemption

POLB Low NOx Exemptions

- Exemption through **December 31, 2034** for low-NOx drayage trucks servicing the Ports and purchased before November 8, 2021, provided that the truck is owned by the original purchaser
- Exemption through **December 31, 2031** for low-NOx trucks:
  - Registered in the PDTR by December 31, 2022, OR
  - Purchased by July 31, 2022 and registered in the PDTR within 30 days of receipt of the truck from the manufacturer

How will the CTF Rate funds be used?

- Potential to generate approximately $90 million per year initially (both Ports combined)
- 2017 CAAP Update commitment to use the funding for truck initiatives
- Small amount to cover administrative expenses
- Both Ports will go to their respective Boards with a Spending Plan

Proposed Incentive Approach

- Ports will develop incentive programs (e.g. grants and/or lease subsidies) and spending priorities with input from stakeholders and direction from their Boards
- Consistent funding amounts as other agency grants (e.g. HVIP, Prop 1B, etc.)
- Must be registered in the PDTR
- Ports will explore trade down replacement option
- Priority selection of replacement trucks that will achieve the greatest emission reductions, for example:
  - History of more frequent calls
  - Replacement of oldest, dirtiest trucks

POLA Proposed Funding Priorities

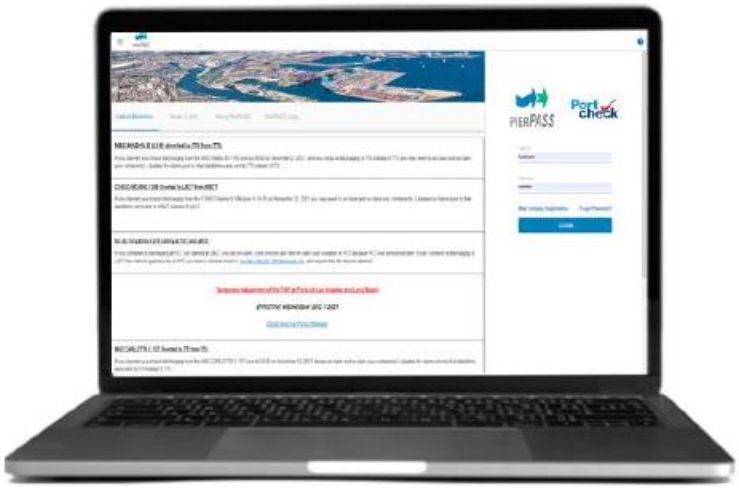
- 100% of net revenues from CTF Rate will be used in support of ZE trucks and associated infrastructure
- Annual review of rate efficacy and spending plan

POLB Proposed Funding Priorities

- Prioritize early emission reductions
  - Allow funding from program launch through end of 2023 to provide up to 90% of funds to Low NOx trucks and at least 10% for ZE trucks
- Board to review ongoing priorities
  - Anticipate transition by 2024 to focus on incentives for ZE trucks
  - Future prioritization review to include consideration of Truck Feasibility Assessment, incentive demand and allocations, and review of regulatory requirements

PortCheck Collection Mechanism

User Experience | CTP Fee Management



Single sign-on in one location for both PierPASS & PortCheck

CTF Rate Next Steps

- Port Check User Manual Release - March 2022
- User Informational Workshops – Initial Workshop held January 25, 2022, Future Workshops TBD
- Board Spending Plans – end of 1Q 2022
- CTF Rate Collection Start – April 1, 2022
- Post CTF Rate Collection Customer Service between PortCheck and Users after April 1, 2022 go live
- Future Board updates will be provided by each Port on collection amount and spending plans


Thank you!