State and Local Climate and Energy Program

Electrifying America's Ports

May 23, 2022| 2 PM Eastern

Three audio options:

1. Listen via computer
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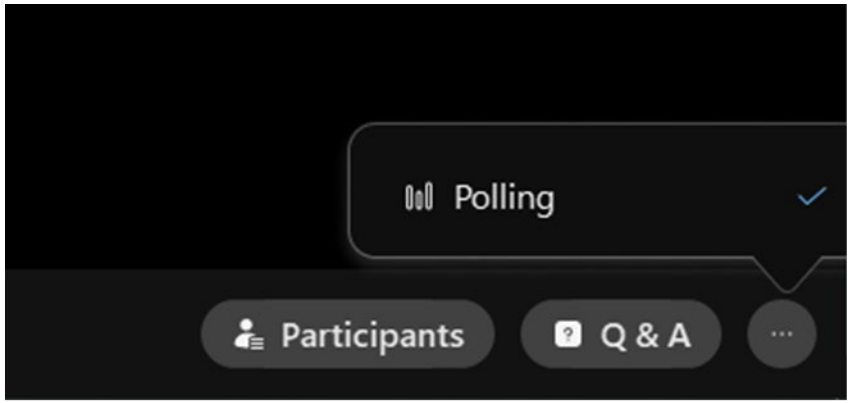
Webinar Panels

We'll use three panels

- Participants, Slido, and question and answer (Q&A)
- Use the arrow to expand or collapse the panels

Adding Panels

- If some panels don't appear, hover over the bottom of the screen and select the desired panels
- Select More Options (…) for additional panels
- Highlighted backgrounds indicate active panels

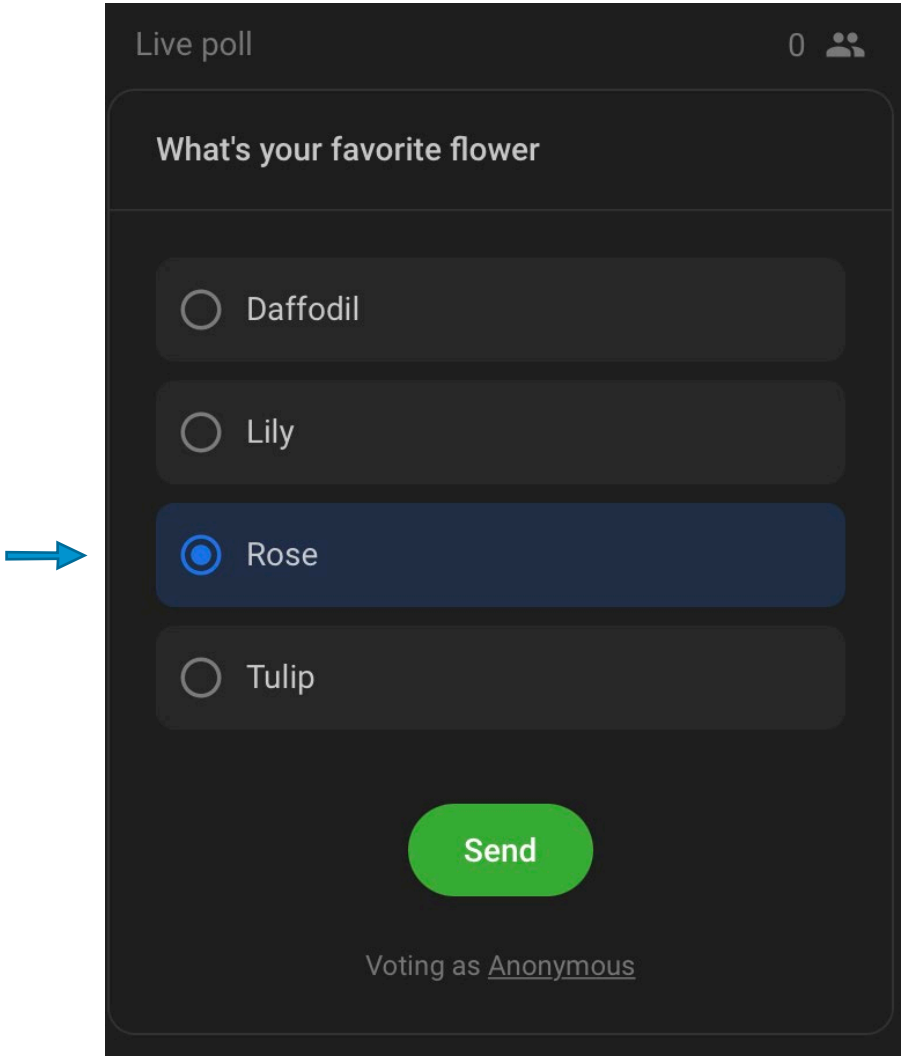


Participants **Q&A** **More polling options**

Polling and Feedback

Polling

- We'll ask several poll questions during the webinar
- The Slido panel will appear when we open the first poll
- Select your desired response and hit "Send"



Webinar Feedback

- A feedback form will pop-up in the Slido panel near the end of today's webinar with several questions
- Please make your selections and select "Send"

Q&A

- Participants are muted
- Questions will be moderated at the end
- To ask a question:
  1. Select “All Panelists” from the drop-down menu
  2. Enter your question in the Q&A box
  3. Hit “Enter”

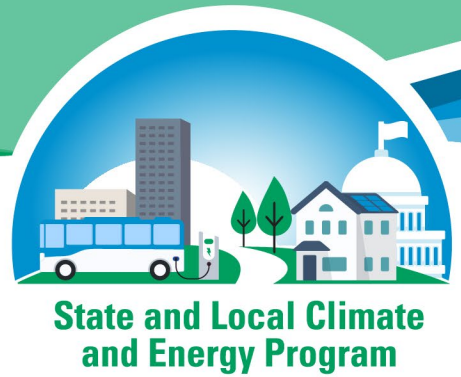
- EPA will post final materials on the Webinar Series page:

www.epa.gov/statelocalenergy/state-local-and-tribal-webinar-series

Today's Agenda

- Introduction – Andrea Denny and Jessica Daniels, U.S. Environmental Protection Agency (EPA)
- EPA Ports Initiative Resources to Support Port Electrification – Sarah Froman, U.S. EPA
- Zero-Emission Trucks and Equipment Thriving in California Ports – Leslie Goodbody and Earl Lanberg, California Air Resources Board (CARB)
- Air Quality Initiatives and Electrification Potential – Mark Messersmith, South Carolina Ports Authority (SCPA)
- Utility-Port Coordination in Tacoma – Jeremy Stewart, Tacoma Power and Graham VanderSchelden, Port of Tacoma
- Question and Answer Session

The views expressed by speakers on this webinar are solely those of the participants and EPA does not endorse any products or commercial services mentioned in this webinar.



INTRODUCTION

Andrea Denny
State and Local Climate and Energy Program
U.S. EPA

Jessica Daniels
Office of Transportation and Air Quality (OTAQ)
U.S. EPA

U.S. EPA's State and Local Climate and Energy Program

- We offer free tools, data and technical expertise about energy strategies, including energy efficiency, renewable energy and other emerging technologies, to help state, local and tribal governments achieve their environmental, energy and economic objectives

- Access these resources at: www.epa.gov/statelocalenergy

- Electrification Webinar Series
  - Get notifications by subscribing to our newsletter: www.epa.gov/statelocalenergy/state-and-local-energy-newsletters
  - Past Webinars: www.epa.gov/statelocalenergy/state-local-and-tribal-webinar-series

Select Electrification Resources

- **Electrification Toolfinder:** screen tools and resources to evaluate environmental and economic benefits of electrification programs
  www.epa.gov/statelocalenergy/tool-finder-local-government-clean-energy-initiatives
- **Avoided Emissions and geneRation Tool (AVERT):** quantifies the emissions benefits of energy efficiency and renewables
  www.epa.gov/avert
- **Co-Benefits Risk Assessment Health Impacts Screening and MappingTool (COBRA):** calculates health impacts of emissions changes and their economic value
  www.epa.gov/cobra
- **ENERGY STAR Electric Vehicle Chargers:** offers guidance on how to identify and procure Energy Star certified charging equipment
  www.energystar.gov/products/other/ev_chargers

U.S. EPA's State, Local, and Tribal Transportation Resources

- EPA's OTAQ protects human health and the environment by reducing air pollution and greenhouse gases from mobile sources and the fuels that power them, advancing clean fuels and technology, and encouraging business practices and travel choices that minimize emissions.

- We help state, local, and tribal governments achieve their environmental and other objectives by providing expertise on:
  - State Implementation Plans
  - Transportation Conformity
  - Vehicle Emissions Inspection & Maintenance and state fuel programs
  - Travel Efficiency and Greenhouse Gas (GHG) Planning
  - MOtor Vehicle Emission Simulator (MOVES), Calculators, and Tools

- Access these resources at the State and Local Transportation Resources page: www.epa.gov/state-and-local-transportation

OTAQ's Voluntary Programs and Initiatives

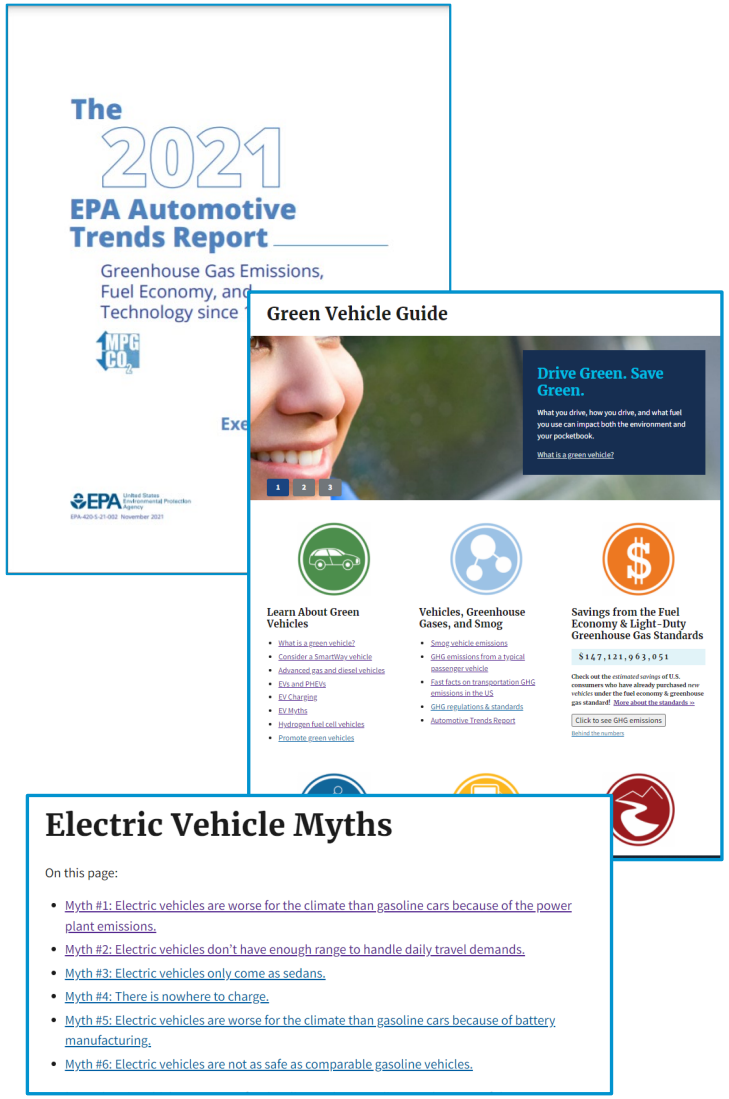
- Diesel Emissions Reduction Act (DERA) – To reduce diesel emissions that impact public health
  - Includes grants and rebates under www.epa.gov/dera
- Ports Initiative – To reduce diesel emissions at ports
  - www.epa.gov/ports-initiative
- SmartWay – To advance sustainable transportation supply chains
  - www.epa.gov/smartway

www.epa.gov/cleanschoolbus

Transportation Trends

- EPA Automotive Trends Report
  - Public information about new light-duty vehicle greenhouse gas emissions, fuel economy data, technology data, and auto manufacturers' performance in meeting the agency's GHG emissions standards
  - www.epa.gov/automotive-trends

- EPA Green Vehicle Guide
  - Learn more about emerging options in transportation like zero emission vehicles (ZEVs), shared mobility, and self-driving cars
  - www.epa.gov/greenvehicles



Contact Information

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Jessica Daniels
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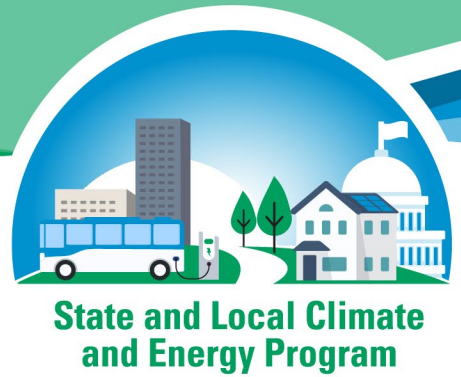
State and Local Climate and Energy Program

Visit Our Website | www.epa.gov/statelocalenergy
Sign Up for Our Newsletter | www.epa.gov/statelocalenergy/state-and-local-energy-newsletters
Follow Us on LinkedIn | https://linkedin.com/showcase/epa-state-and-local-climate-and-energy-program

Which best describes your organization's experience with port electrification?

- We have a program in place
- We are launching a program
- We are considering a program
- We are not considering a program
- We do not have a port in our community but are working on electrification in other sectors
- Other (enter in Q&A box)

Poll 1



EPA Ports Initiative Resources to Support Port Electrification

Sarah Froman
U.S. EPA

EPA Ports Initiative Resources to Support Port Electrification

Sarah Froman
EPA Ports Initiative Team Lead
EPA Office of Transportation and Air Quality

Webinar on Electrifying America's Ports
May 23, 2022

Promoting best practices to reduce diesel emissions at ports

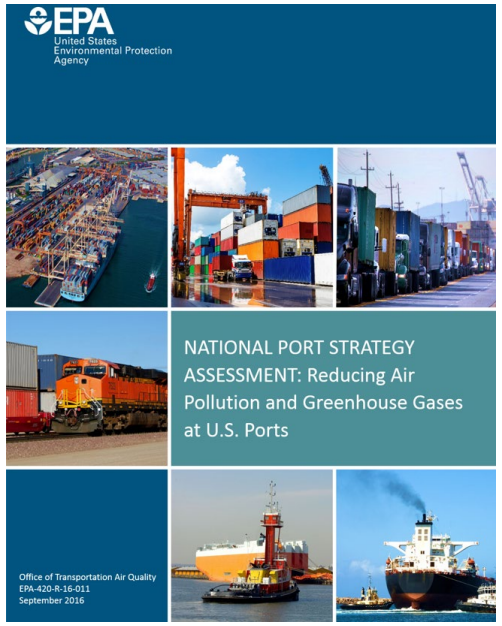
EPA PORTS INITIATIVE

Through EPA tools and assistance in the five program areas, we aim to accelerate adoption of:

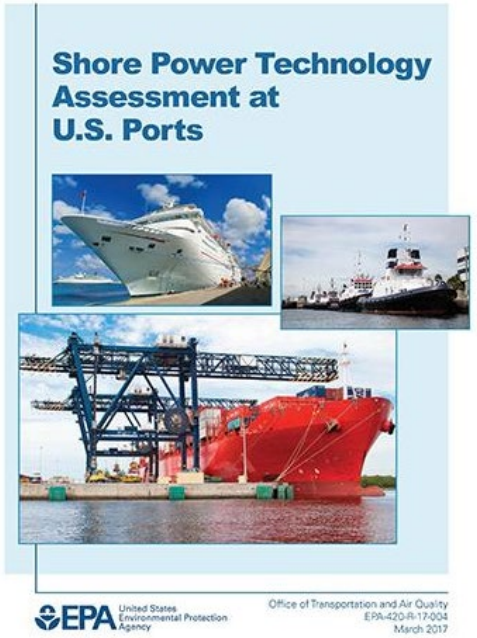
- **Cleaner technologies and other strategies**
- **Clean air planning practices** (emissions inventories, clean air plans, community engagement) that inform strategic clean air investments

Providing tools to help identify smart infrastructure investments

Technical Resources

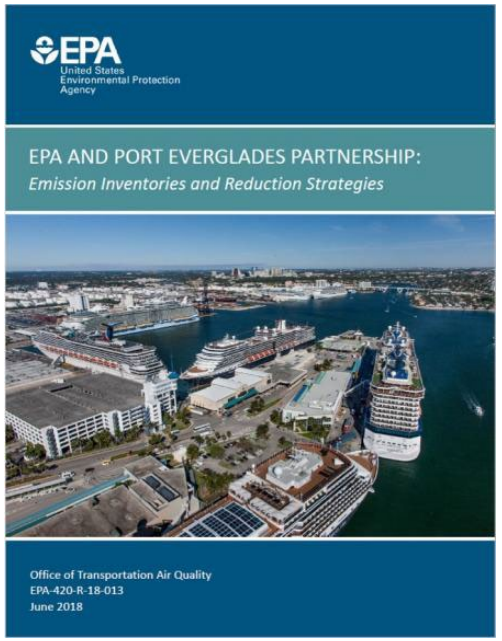


National Port Strategy Assessment: Reducing Air Pollution and Greenhouse Gases at U.S. Ports
September 2016
www.epa.gov/ports-initiative/national-port-strategy-assessment-reducing-air-pollution-and-greenhouse-gases-us

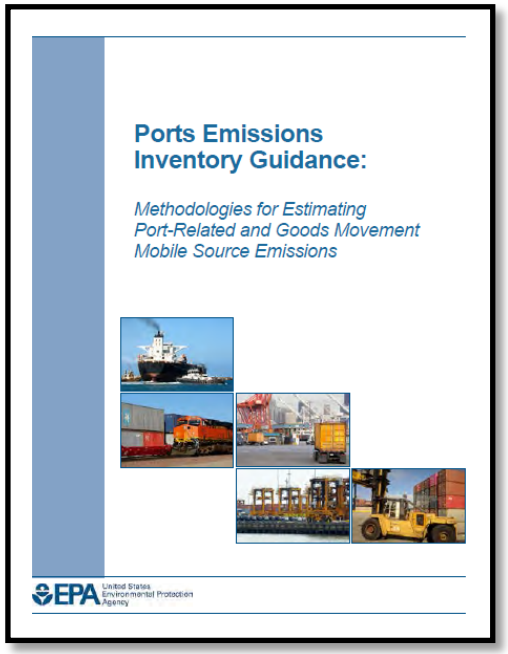


Shore Power Technology Assessment at U.S. Ports*
April 2017
www.epa.gov/ports-initiative/shore-power-technology-assessment-us-ports

***Update planned for later this year**



EPA, Port Everglades Report Shines Light on New Methods for Analyzing Potential Air Pollution Reductions
June 2018
www.epa.gov/ports-initiative/epa-and-port-everglades-partnership-emission-inventories-and-reduction-strategies



Port Emissions Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions,
September 2020 & April 2022 updates
www.epa.gov/ports-initiative/port-and-goods-movement-emission-inventories

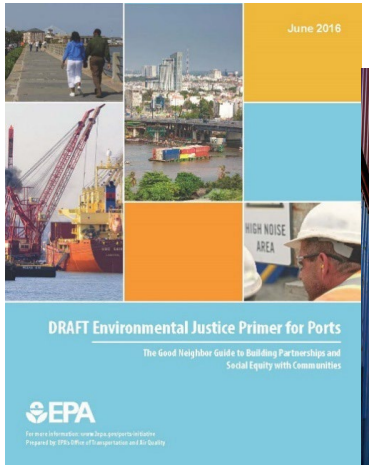
Promoting community-port collaboration for effective planning

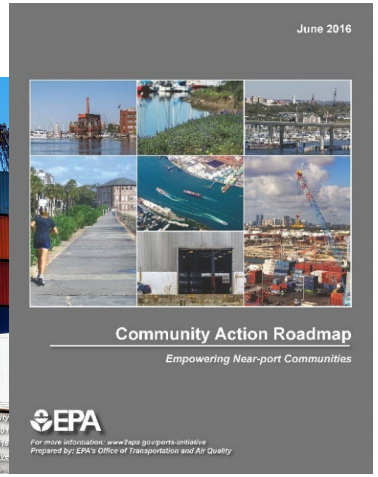
Collaboration

Port of Savannah Tour

Collaboration Training

- Tools and training:
  - ***Ports Primer for Communities***
  - ***Community Action Roadmap***
  - ***EJ Primer for Ports***, including Good Neighbor Roadmap





- Case studies on pilot projects in Providence, Savannah, New Orleans, Seattle

www.epa.gov/community-port-collaboration

Stay Tuned: Upcoming Update to Shore Power Technology Assessment

Technical Resources

Overlay of Installed and Planned Shore Power Installations and eGRID Subregions.

- *Available now* – updated calculator with new emission factors and expanded options for vessel and fuel types
- *Coming later this year* – updated report:
  - Updated information on projects, regulations, vessel readiness, costs
  - Lessons learned in Los Angeles (LA), Hueneme, Seattle, and New York (NY)/New Jersey (NJ)

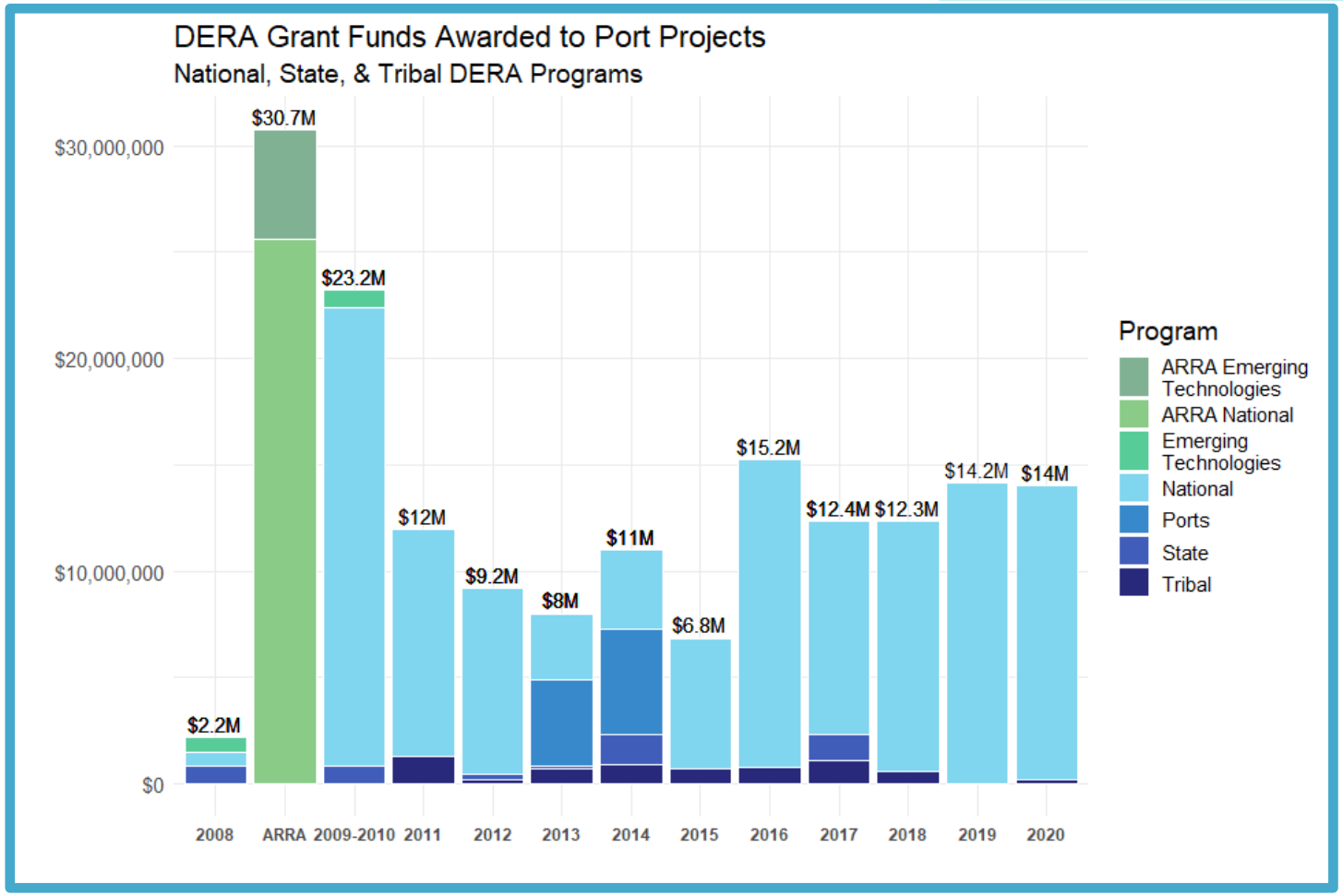
LVSC: Low voltage shore connection
HVSC: High voltage shore connection
eGRID: Emissions & Generation Resource Integrated Database

Helping ports capitalize on funding for clean technologies

Funding

- DERA Grant Program
  - Priority for port and other goods movement projects.
  - Extra points for inventories, clean air plans, community engagement.

- EPA Regional staff helping to make connections to other funding sources.



- Searchable table of local, state, federal, and other funding opportunities on our website: www.epa.gov/ports-initiative/funding-opportunities-ports-and-near-port-communities

Examples of DERA-Funded Zero Emission Projects at Ports

Funding

- All-Electric crane in Los Angeles
- All-Electric terminal tractors in Philadelphia, Long Beach, and Tacoma
- All-Electric engine replacements of marine vessels, including a ferry and tugboat
- Shore Power installations in Boston, New Bedford, Brooklyn, Los Angeles, Seattle, San Francisco, Tacoma and Hueneme
- New in Fiscal Year (FY) 2021: all-electric dray truck replacements in Baltimore and Charleston

Port of Los Angeles Electric Crane Project
www.epa.gov/ports-initiative/port-los-angeles-road-heavy-duty-equipment-and-infrastructure-enhancements

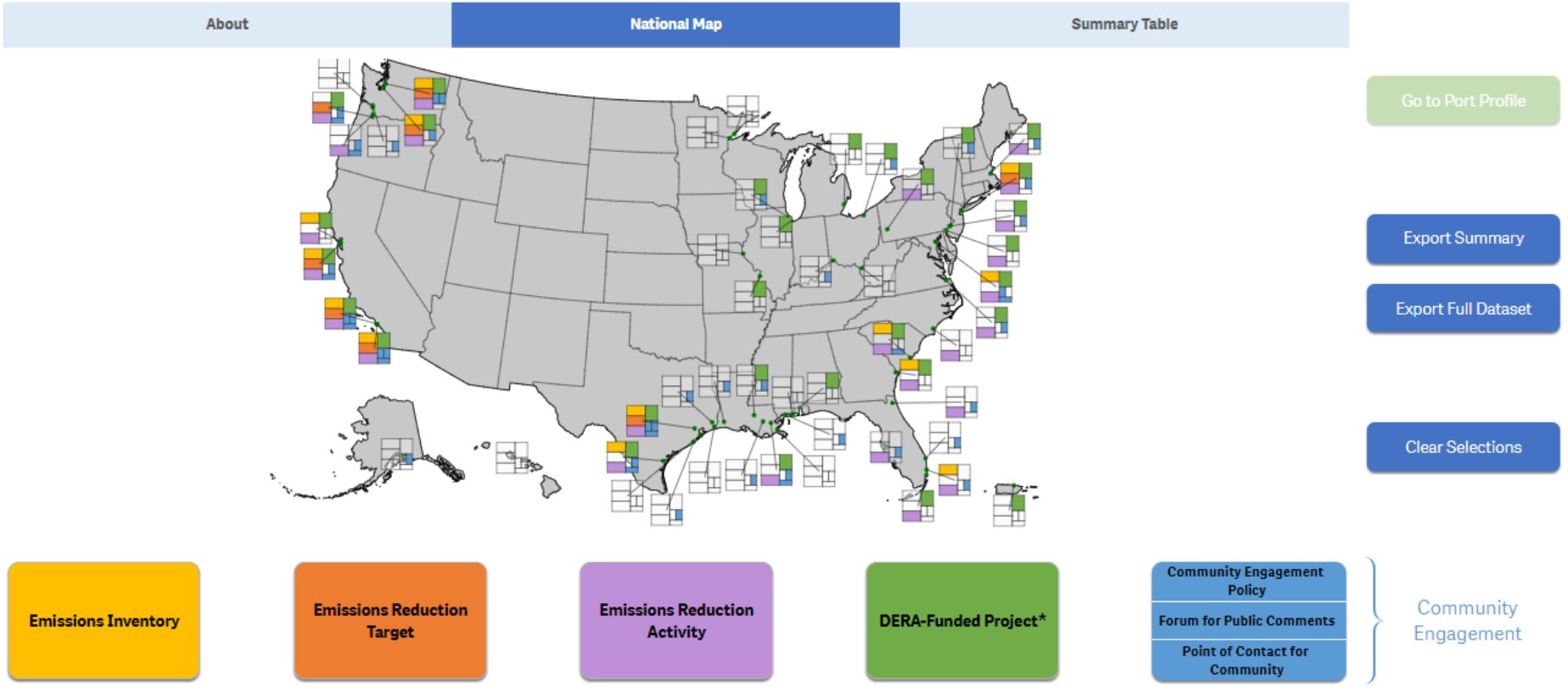
REAL-WORLD EXAMPLES

Interactive Map Highlighting Clean Air Practices at Ports

Communications

Clean Air Practices at Ports

This EPA Ports Initiative tool brings together real-world examples of emissions reduction activities as well as key practices highlighted in the Best Port-Wide Planning Practices to Improve Air Quality webpage. These data were gathered from a review of public websites and EPA's Diesel Emissions Reduction Act (DERA) grant funding for the ports featured in the Bureau of Transportation Statistics' Port Performance Freight Statistics: Annual Report to Congress from 2018 and 2019. To see examples of where each practice is in place, select a button below the map. To learn details about a specific port's practices, select a port on the map and then click on the "Go to Port Profile" button.
Questions or comments? Contact us at talkaboutports@epa.gov.

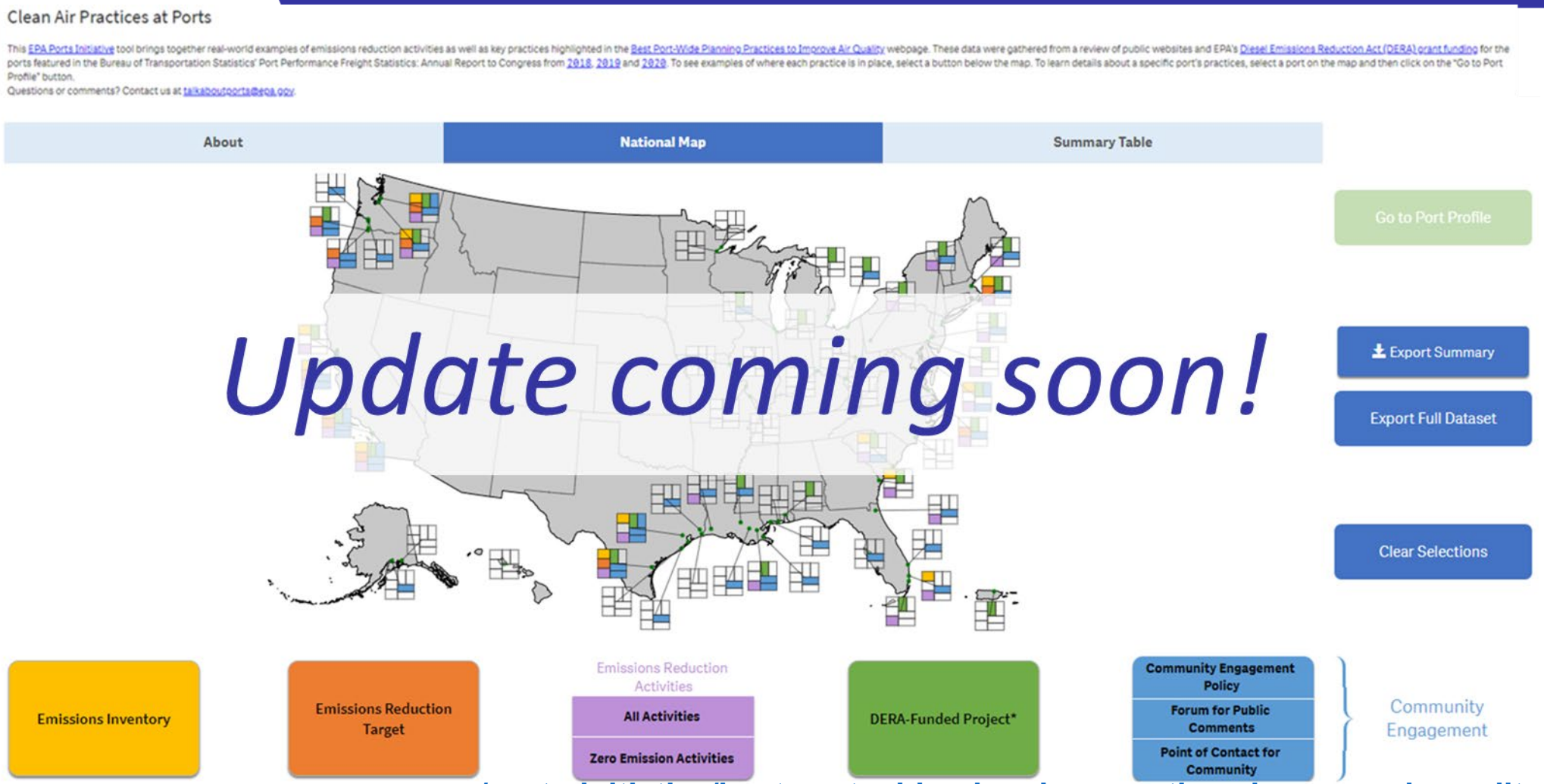


www.epa.gov/ports-initiative/best-port-wide-planning-practices-improve-air-quality

REAL-WORLD EXAMPLES

DRAFT Interactive Map Highlighting Clean Air Practices at Ports

Communications



What's new?

- 5 new ports
- Updated data for all practices
- More information about identified Emissions Reduction Activities
  - Including info on Zero Emissions Activities at Ports

www.epa.gov/ports-initiative/best-port-wide-planning-practices-improve-air-quality

Keep in touch

Communications

EPA's Ports Initiative website and newsletter sign-up:
www.epa.gov/ports-initiative

EPA Regional Office contacts:
www.epa.gov/ports-initiative/regional-epa-ports-initiative-contacts

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EPA Ports Initiative Technical Expert
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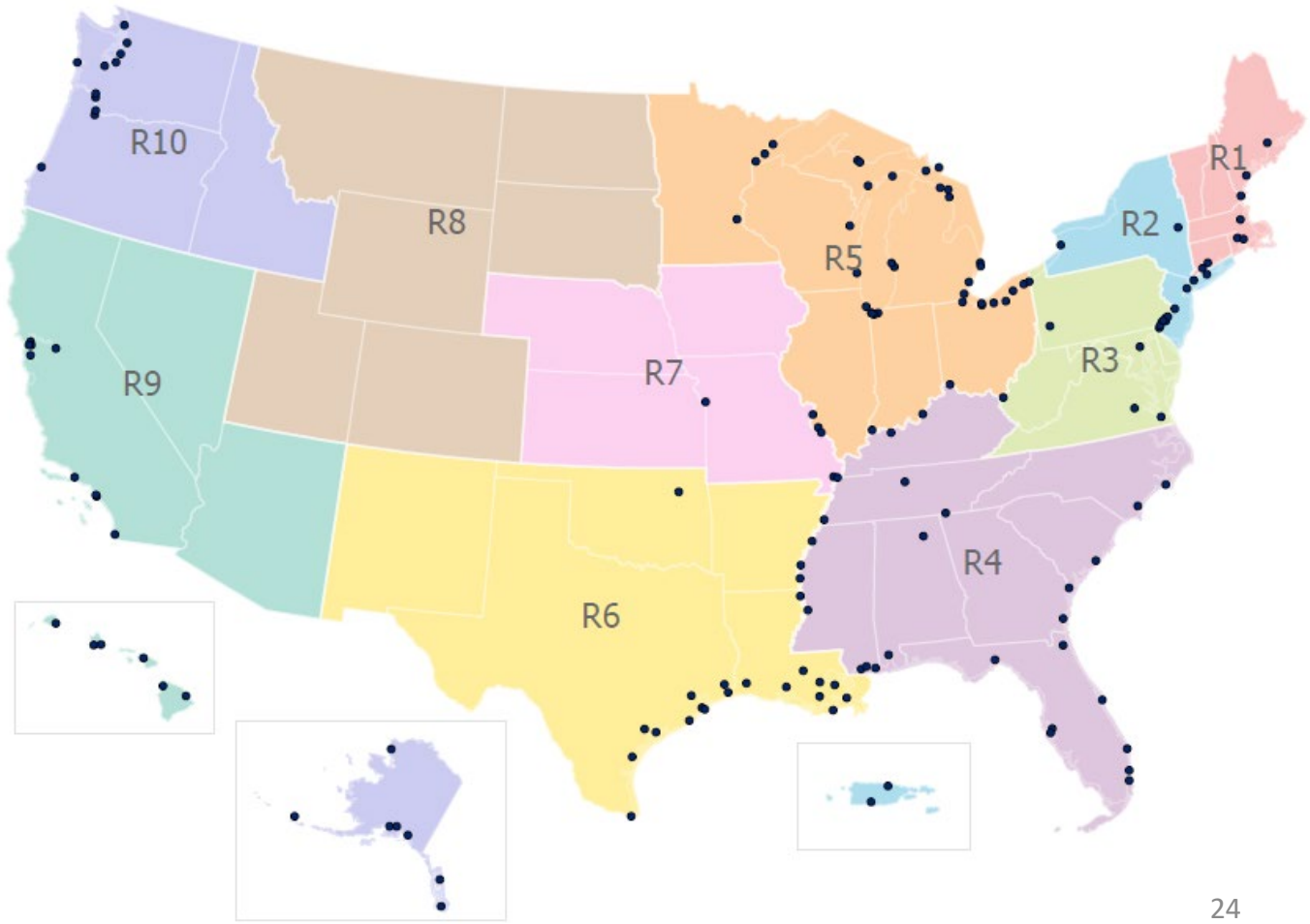
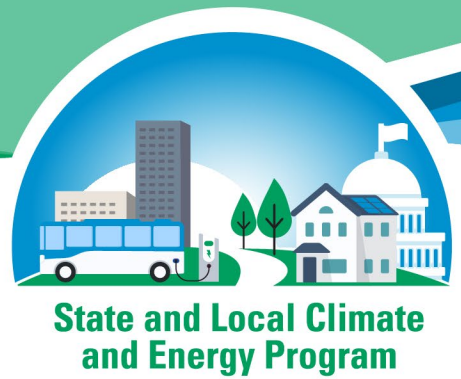
Army Corps "Principal Ports" and EPA Regions





Zero-Emission Trucks and Equipment Thriving in California Ports

Leslie Goodbody and Earl Lanberg
California Air Resources Board

Zero-Emission Trucks and Equipment Thriving in California Ports

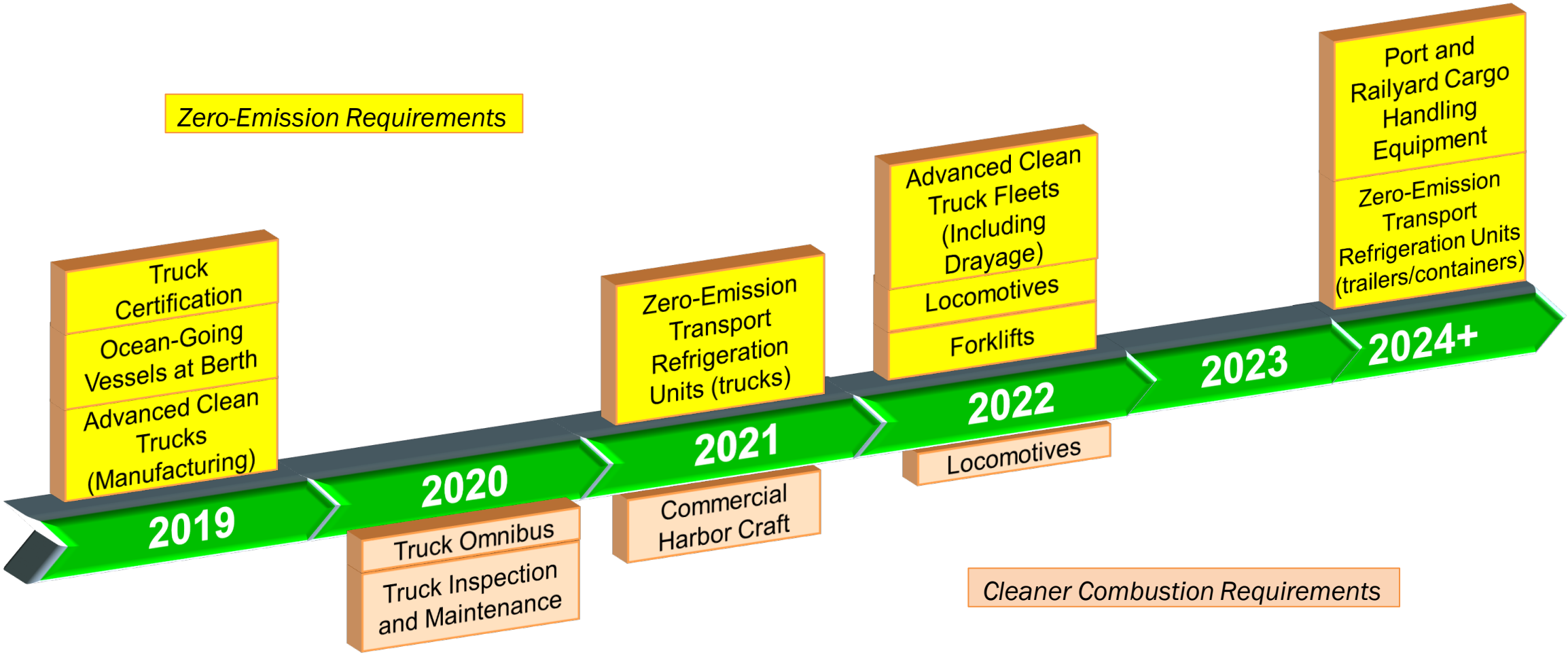
EPA Electrification Webinar
May 23, 2022

Leslie Goodbody; Earl Landberg

Innovative Strategies Branch

CALIFORNIA
AIR RESOURCES BOARD

New CARB Rules to Cut Pollution from Freight



Timeline shows first Board hearing date

Updated: 4/11/22

Investing to Advance Technology

Demos and Pilots	Deployment Incentives	Fleet Turnover Incentives	Financing Assistance
Low Carbon Transportation *(Demos and Pilots)*	Low Carbon Transportation *(HVIP, CORE)* VW Mitigation CAPP	VW Mitigation Moyer CAPP FARMER	*Truck Loan Assistance*

HVIP: Hybrid and Zero-Emission Voucher Incentive Project
CORE: Clean Off-Road Equipment Voucher Incentive Project
VW: Volkswagen
CAPP: Community Air Protection Program
FARMER: Funding Agricultural Replacement Measures for Emissions Reductions

Commercial Incentives

Hybrid and Zero-Emission Voucher Incentive Project

- Point of sale vouchers that offset the higher purchase price of clean technology on-road vehicles
- Close to 100 makes and models of zero-emission trucks in the HVIP Catalog

Vehicle	Weight Class	No. Models
Electric Power Take-Off (ePTO)	Class 4-7	6
Refuse	Class 6-8	12
Step & Panel Vans	Class 3-6	16
Straight Trucks	Class 4-8	56
Tractors	Class 8	8

Commercial Incentives

Clean Off-Road Equipment Voucher Incentive Project

- Launched Feb. 2020, mirrors HVIP for Zero-emission (ZE) off-road equipment
- Eligible/available port equipment includes:
  - Yard tractors: 20 makes/models in catalog
  - Forklifts: 11 makes/models – 8,820-35,000 pound lift
  - Rail car movers: 5 makes/models
  - Mobile power units: 7 makes/models – 80-500 kilowatt-hour (kWh)
- Eligible but not yet available port equipment
  - Shore-power cable systems
  - Harbor craft
  - Rubber tire gantry cranes
  - Container handling equipment

Volkswagen Environmental Mitigation Trust

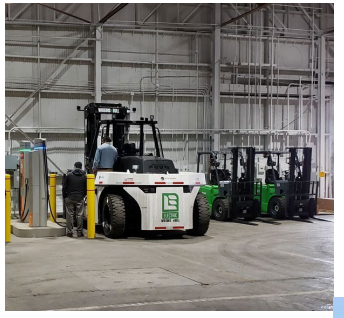
- California's allocation: **$423 million**
- Funding categories specific to freight and ports
  - **$90M** for ZE Class 8 freight and port drayage trucks
  - **$60M** for Combustion Freight/Marine
  - **$70M** for ZE freight/marine
    - Heavy forklifts and cargo handling equip.
    - Marine vessel repowers
    - Shore power systems plus cable systems
- Funding available statewide
- Based on HVIP and CORE eligibility
- ww2.arb.ca.gov/vwmitigationtrust

California VW Mitigation Trust

Earl Landberg Demonstration and Pilot Projects

CARB's Demonstration and Pilot Projects Program

- CARB funding for over 30 separate projects
- Well over $440 million allocated
- Main focus has been freight movement
- Recent Allocations:
  - 2018 Zero- and Near Zero-Emission Freight Facilities Project (ZANZEFF) - $205 million
  - 2020 Zero-Emission Drayage Pilot - $107 Million
  - 2022 $115 Million
- Some great successes



California Climate Investments
Cap and Trade Dollars at Work

Focus on Specific Pilot Projects

ZANZEFF

- Zero- and Near Zero-Emission Freight Facility Project
- Significant funding with a focus on freight and freight facilities
- Ten projects are underway or completed
  - 115 ZE heavy-duty (HD) tucks and 49 ZE yard trucks
  - 205 Pieces of charging equipment
  - 2.8 MW solar
  - 800+ kWh of battery storage
  - 3 HD hydrogen refueling stations
- Focus on two projects

Cap and Trade Dollars at Work

ZANZEFF

Zero-Emission HD On-Road Trucks and Yard Trucks

- Port drayage, warehouse and regional deliveries
  - Two fleets in the South Coast air district
    - Class- and 8 on-road trucks
    - Yard trucks
    - Forklifts
    - Solar and energy storage
- Food manufacturing, warehouse and regional delivery
  - Single facility in the San Joaquin Valley
    - Class-6 and 8 on-road trucks
    - Yard trucks
    - Forklifts
    - Solar and energy storage

ZANZEFF

On-Road Trucks

- Class 8 and 7 on-road trucks
  - Vehicle costs including taxes and insurance
  - Maintenance costs
- Daily range
  - Limitations and pace technology advancement
- Charge times
  - Time of day and duration
- Interface with infrastructure
  - Efficient use of available resources
  - Plan for success
  - Lessons learned

ZANZEFF

Off-Road Yard Trucks

- Off-Road yard trucks
  - Ready for primetime
- Daily usage
- Energy use
  - Compare to diesel
- Charge times
- Interface with infrastructure
  - Take advantage of planned breaks

Cap and Trade Dollars at Work

ZANZEFF

Infrastructure

- Overview of installations
  - Charging equipment and solar
- Planning and timeline to install
  - Long lead times
- Costs to operate
- Energy storage systems
  - Best ways to utilize
- Permitting
  - City and utility

Cap and Trade Dollars at Work

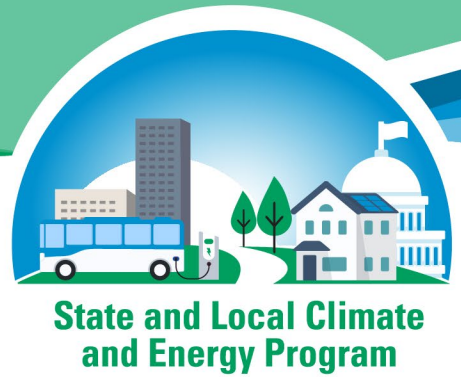
Demonstration and Pilot Projects

Lessons Learned and Looking Forward

- CARB's demonstration and pilot project's lessons learned for port electrification
  - Vehicles and equipment
  - Fuel choice
- Upcoming opportunities
  - Fiscal Year 2021/22 Demonstration and pilot solicitation
    - Zero-emission cargo handling equipment
    - Renewable fuel generation for commercial harbor craft
    - Capture and control systems for ships at anchor and berth
  - Fiscal Year 2022/23 Low Carbon Transportation Funding Plan proposal
    - Rail, commercial harbor craft, port vehicles and equipment

Program Contacts and Websites

- Advanced Technology Demonstration and Pilot Projects
  - Low Carbon Transportation Investments and (Air Quality Improvement Program (AQIP) Projects | California Air Resources Board
  - Earl Landberg, Earl.Landberg@arb.ca.gov
- HVIP – CaliforniaHVIP.org
  - Andrea Morgan, Andrea.Morgan@arb.ca.gov
- CORE – CaliforniaCORE.org
  - Todd Sterling, Todd.Sterling@arb.ca.gov
- Volkswagen Environmental Mitigation Trust
  - ww2.arb.ca.gov/vwmitigationtrust
  - Eric Brown, Eric.Brown@arb.ca.gov (Program Lead, ZE Freight Marine)
  - Leslie Goodbody, Leslie.Goodbody@arb.ca.gov (ZE Class 8)



Air Quality Initiatives and Electrification Potential

Mark Messersmith
South Carolina Ports Authority

SOUTH CAROLINA PORTS

Air Quality Initiatives and Electrification Potential

STRIVING TO BE THE GREENEST PORT IN THE SOUTHEAST

Presented to:

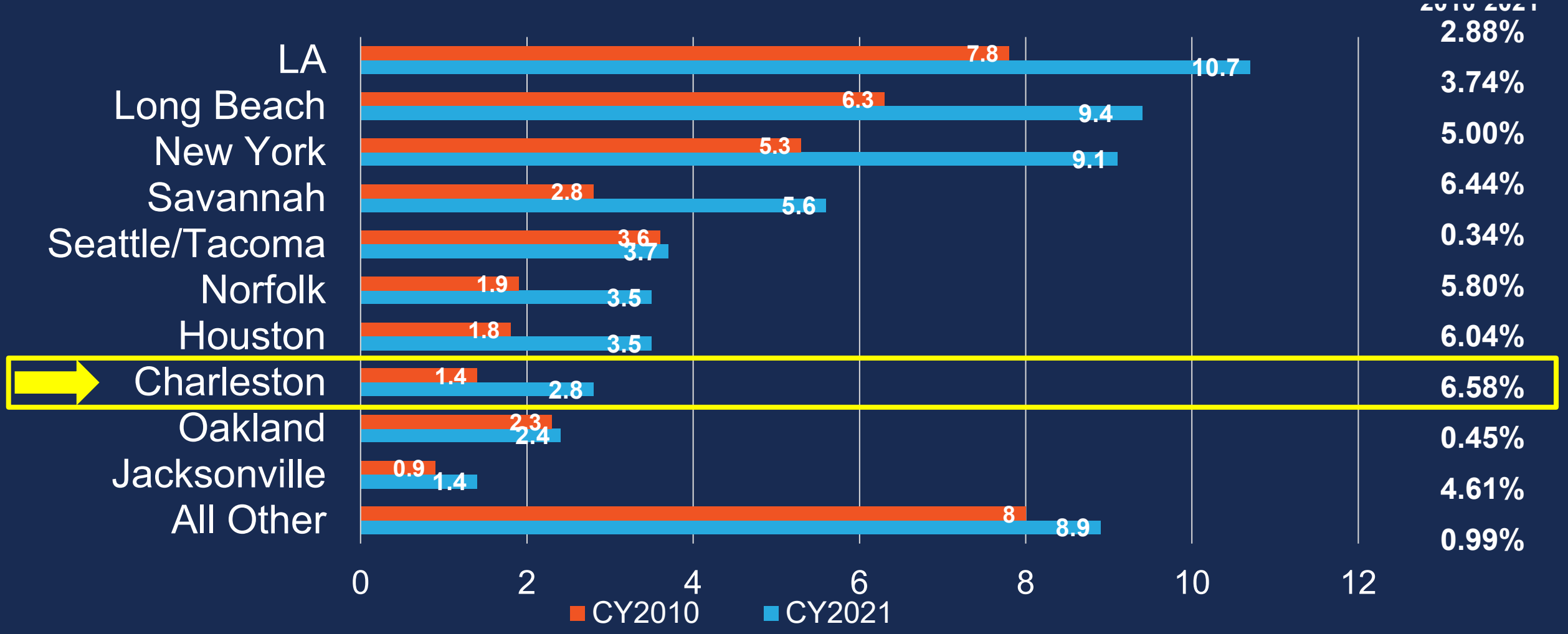
U.S. Environmental Protection Agency

Electrifying America's Ports

May 23, 2022

2021 TOP 10 US PORTS

TWENTY-FOOT EQUIVALENTS (TEUs) IN MILLIONS



TOP 10 US PORTS HANDLE 85% OF US PORT VOLUME.

CY: Calendar year

Source: AAPA & individual port websites
2021 Jacksonville reports on FY starting Oct 1

SOUTH CAROLINA PORTS
THE WORLD CONNECTS HERE

CONTAINER TERMINAL TEU CAPACITY

	2022	2033
WANDO WELCH TERMINAL	2.4 million	2.4 million
HUGH K. LEATHERMAN TERMINAL	0.7 million	2.4 million
NORTH CHARLESTON TERMINAL (NCT)*	0.5 million	0.5 million
TOTAL	3.5 million	5.3 million

*NCT dependent on bridge height and ship size.

SOUTH CAROLINA
INLAND PORTS

- Minimize supply chain air emissions
- Customers benefit from SCPA emission calculator

INLAND PORT GREER

INLAND PORT DILLON

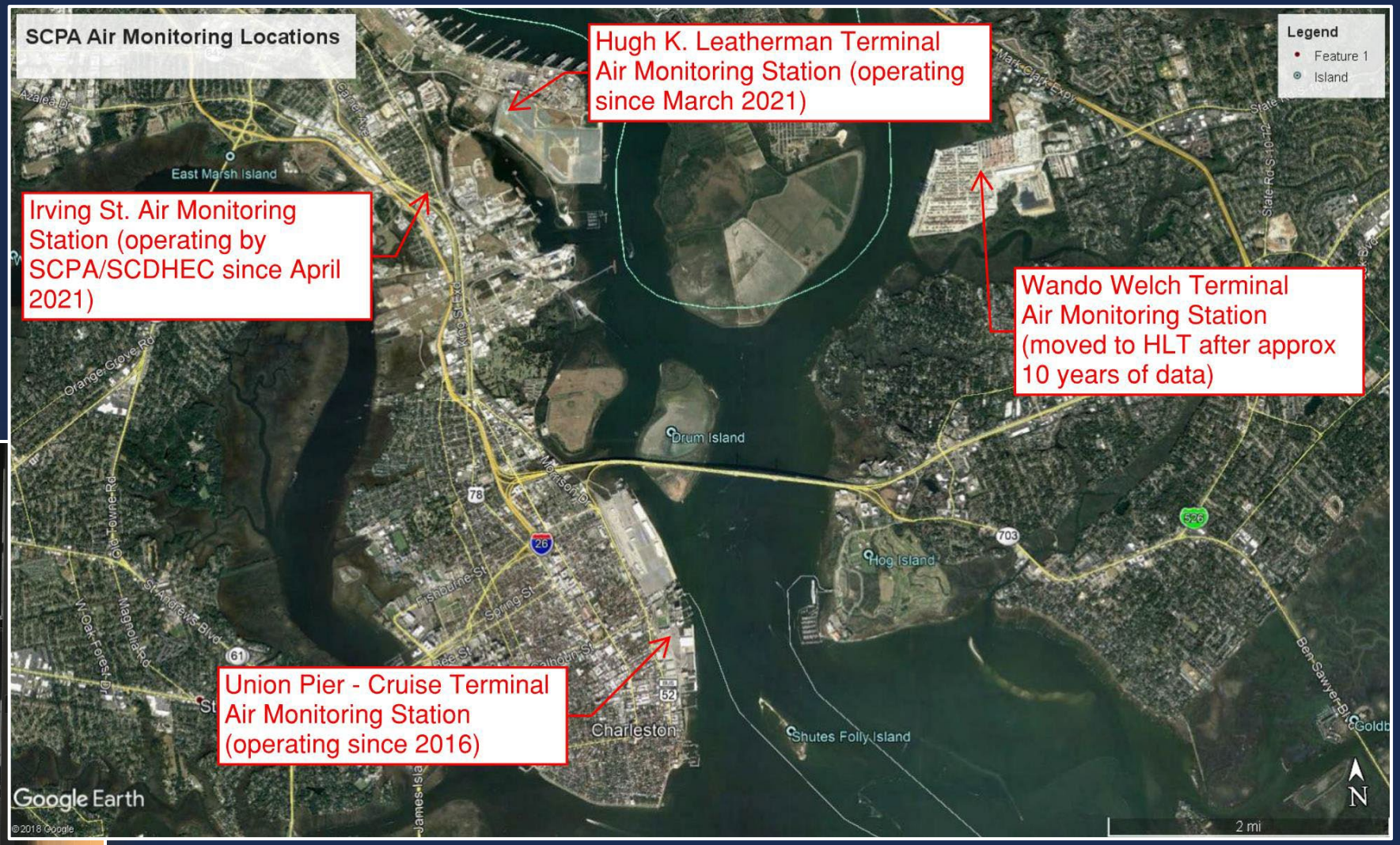
AIR EMISSIONS CALCULATOR

BENEFITS FROM USING INLAND PORTS

Table comparing Company's Emissions from current split of 70% Port A and 30% CHS vs. using CHS and Interpublic Group (IPG) only

Emissions Summary (tons per year (TPY))								
	1,650 containers from Charleston			3,850 containers from Port A			Summary	
	Scenario 1 (Truck only)	Scenario 2 (Port to Rail to Greer - Truck to DC)	Emission savings per year	Scenario 1 (Truck only)	Scenario 2 (Port to Rail to Greer - Truck to DC)	Emission savings per year	**Net Emission Savings to Company (TPY)**	**Percent Reduction in Emissions (%)**
Criteria Pollutants								
Particulate matter (PM_{10})	0.4763	0.2463	0.2300	1.3417	0.5605	0.7811	**1.0111**	**55.62**
Volatile Organic Compounds (VOCs)	0.8476	0.4388	0.4088	2.3876	0.9980	1.3896	**1.7984**	**55.59**
Nitrogen Oxides (NO_X)	9.8477	5.2463	4.6014	27.7402	11.7433	15.9968	**20.5983**	**54.80**
Carbon Monoxide (CO)	3.2530	1.6787	1.5743	9.1635	3.8249	5.3386	**6.9129**	**55.68**
Sulfur Dioxide (SO_2)	0.0129	0.0066	0.0063	0.0363	0.0151	0.0211	**0.0274**	**55.77**
Greenhouse Gases								
Nitrous Oxides (N_2O)	0.0034	0.0023	0.0010	0.0095	0.0046	0.0049	**0.0060**	**46.30**
Methane (CH_4)	0.0036	0.0038	-0.0003	0.0101	0.0062	0.0039	**0.0036**	**26.43**
Carbon Dioxide (CO_2)	1,250.1421	644.9157	605.2265	3,521.5576	1,469.7072	2,051.8504	**2,657.0768**	**55.68**
Carbon Dioxide Equivalent ($CO_2(e)$)	1,251.2620	645.7224	605.5396	3,524.7121	1,471.2527	2,053.4593	**2,658.9990**	**55.67**

Air Monitoring



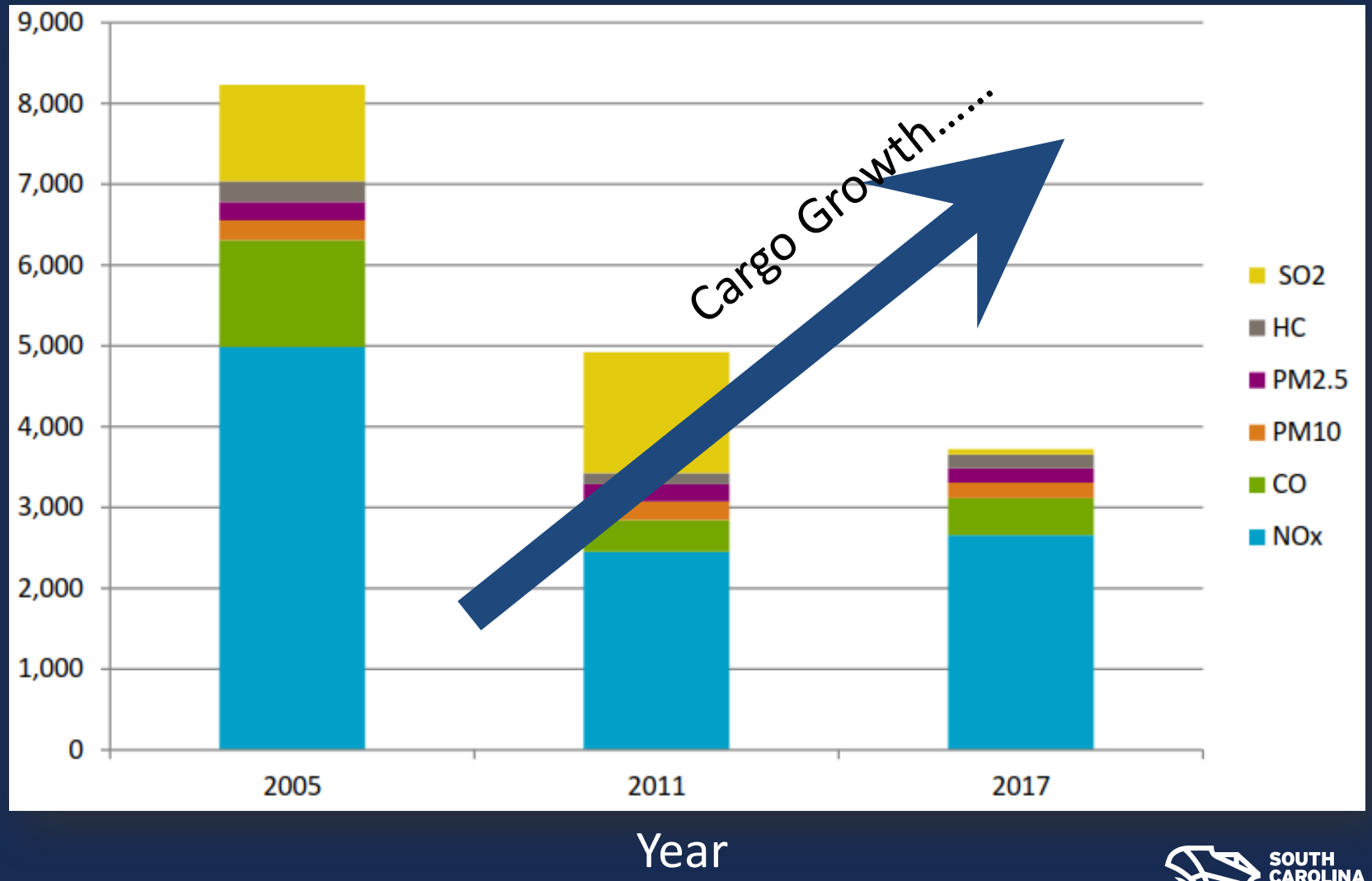
SCDHEC: South Carolina Department of Health and Environmental Control
HLT: Hugh Leatherman Terminal

SOUTH CAROLINA PORTS
THE WORLD CONNECTS HERE

Emissions Trends

SCPA Charleston Area Terminals

- 96% SO_2 reduction
- 18% reduction in PM
- IMO Emission Standards (SO_2)
  - 2000: 1.5% sulfur inside ECA
  - 2010: 1.0% sulfur inside ECA
  - 2020: 0.5% sulfur inside ECA
- Significant overall reduction in emissions since 2005
- Tons/TEU also going down



SOUTH CAROLINA PORTS
THE WORLD CONNECTS HERE

Rubber Tired Gantry (RTG) Crane Repower

- 2019 Diesel Emission Reduction Act Grant
- Repowers 12 Tier 2, single speed diesel genset powered RTG's
- Provides 12 brand new Diesel-Electric Hybrid Systems
  - Tier 4 variable throttle hybrid battery/genset systems
- Significant emission reduction (tons)
  - Annual – 0.987 Hydrocarbons (HC) ; 4.13 CO ; 21.43 NOx ; 0.856 $PM_{2.5}$
  - Lifetime – 9.87 HC ; 41.27 CO ; 214.28 NO_x; 8.56 $PM_{2.5}$

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

dhec Healthy People. Healthy Communities.

SOUTH CAROLINA PORTS THE WORLD CONNECTS HERE

SCPA Clean Trucks – New Electric Vehicle (EV) Trucks

- 2021 Diesel Emission Reduction Act Grant
- Replaces 8 older diesel trucks with new electric class 8 trucks
- Partnership with
  - Benore Logistics Systems
  - A&R logistics
  - Peterbilt
- Benefits to upstate SC, low country SC, and Savannah area

FUTURE CONTAINER BARGE OPERATION

REDUCING EMISSIONS AND CONGESTION

- Transport containers by barge between the Wando Welch Terminal (WWT) and the Hugh K. Leatherman Terminal for delivery to the Navy Base Intermodal Facility (NBIF) by private drayage road
- Provides cost-effective movement of cargo
- Reduces the number of truck trips to local rail yards resulting in:
  - Reduced traffic congestion
  - Reduced potential for accidents
  - Reduced emission of air pollutants
- Protects against increase in trucking costs and delays due to current and future driver shortage

FUTURE CONTAINER BARGE OPERATION

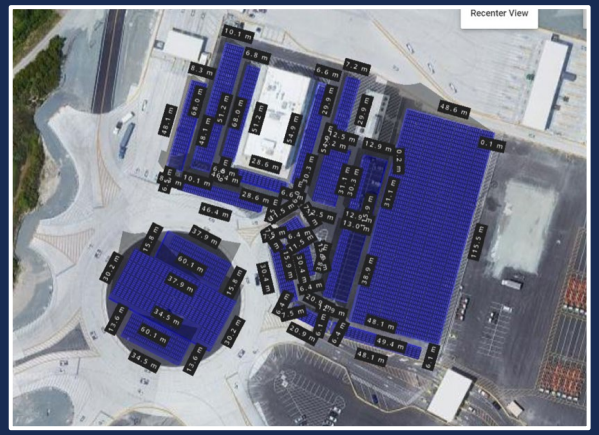
POTENTIAL E-TUGS AND SOLAR ARRAYS/MICROGRID

Hugh Leatherman Terminal Wharf Extension

- Grant Opportunity
- 2 electric tugs and 2 barges
- Solar photovoltaic arrays at HLT (2.09MW) and WWT (1.18 MW)
- High capacity shoreside battery energy storage at HLT and WWT
- Emissions Avoided (million tons): 115,000 CO_2, 178 NO_x, 2 $PM_{2.5}$
- Potential Partners: Shell Marine, Crowley, Cte

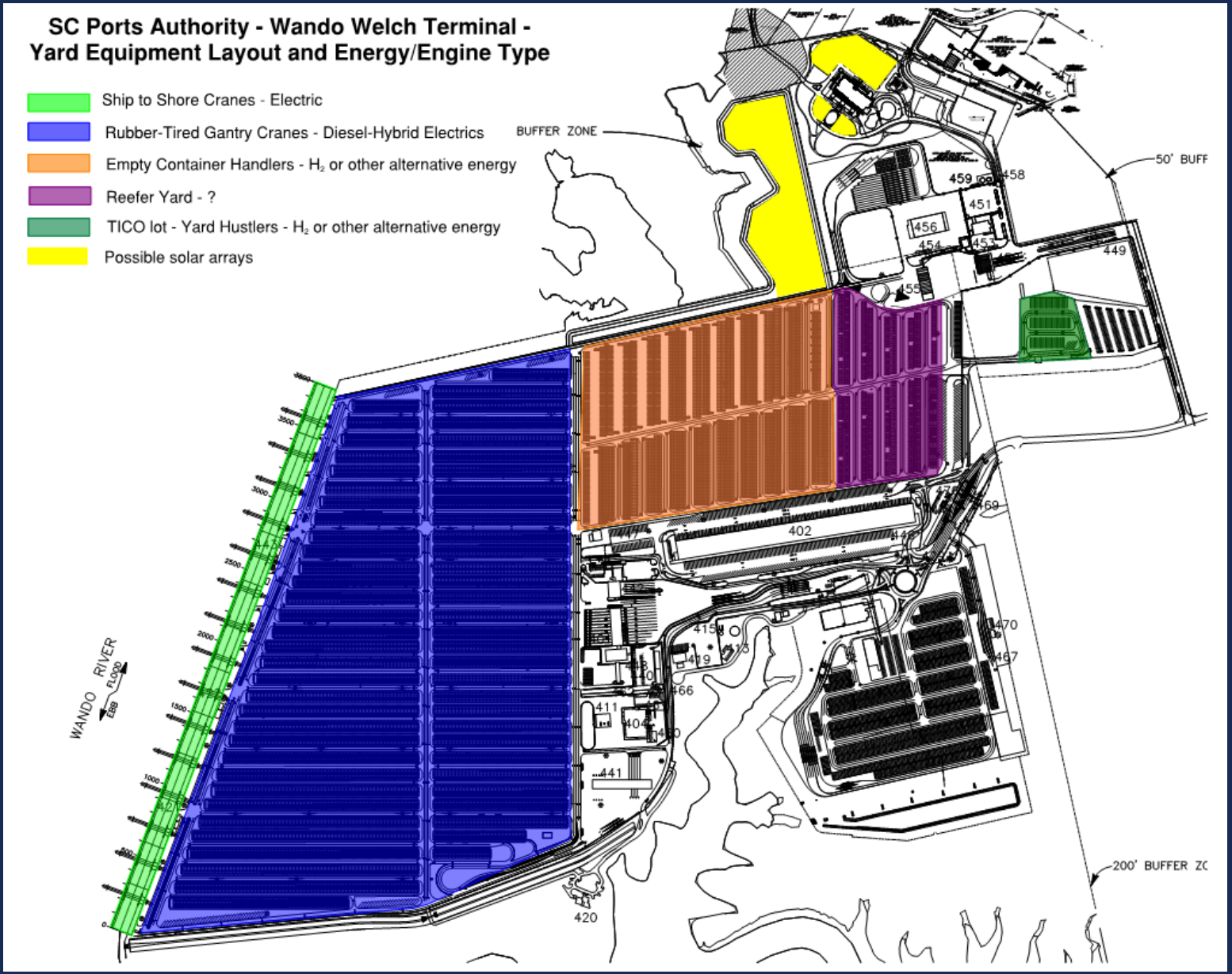
Wando Welch Terminal Wharf Extension

Solar Panels on raised frames



Solar Panels on raised frames

Planning for the Future



- Electric Ship to Store (STS) Cranes
- Diesel-Hybrid Electric RTG's
- Electric Refrigerated Container Storage Area
- Empty Container Handlers Conversion
- Terminal Tractors
- Over the road (OTR) Trucks
- Future Clean Truck Program 2.0

SOUTH CAROLINA PORTS
THE WORLD CONNECTS HERE

Port Electrification

Challenges

- Responsible upgrades to equipment with useful life
- Investing in new technologies – Risk vs. Reward
- Understanding the needs/desires of the equipment operators
- Port emissions aren't just from port equipment
- Influencing without overburdening
- Space / Real estate
- Understanding the scale of what is needed for net zero emissions
  - Ex: ~6 acres solar arrays for 2 e-tugs with ~ 4.5-mile transits

Opportunities

- Partnerships (public-private, etc.)
- Regional planning efforts
- Economies of scale
- Flexibility – Don't stifle industry creativity
- No one size fits all approach
- Grant programs

STRIVING TO BE THE GREENEST PORT IN THE SOUTHEAST

SOUTH CAROLINA PORTS

THE WORLD CONNECTS HERE

THANK YOU.

State and Local Climate and Energy Program

Utility-Port Coordination in Tacoma

Jeremy Stewart
Tacoma Power

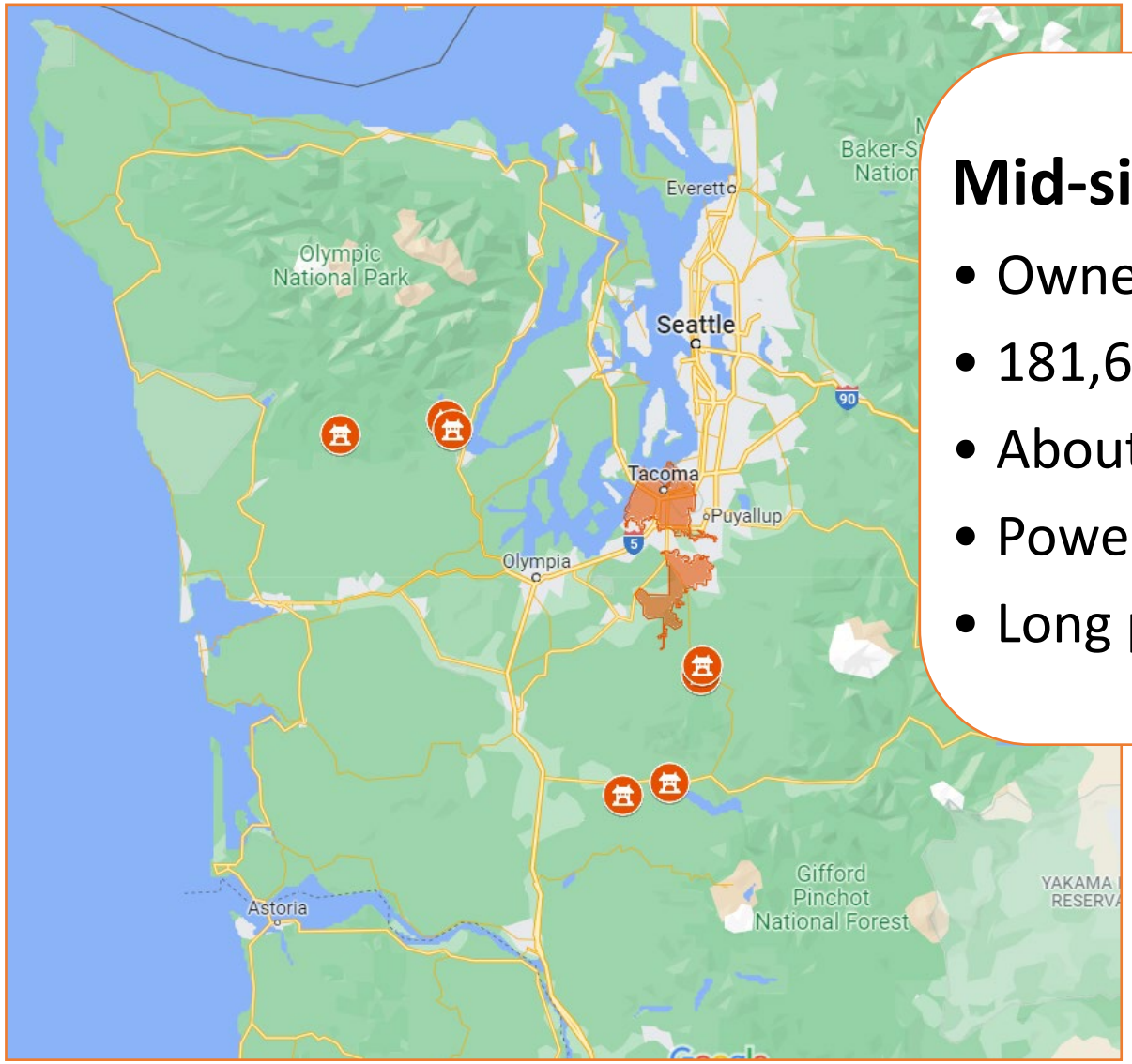
Graham VanderSchelden
Port of Tacoma

Planning a green energy future

Jeremy Stewart
Energy Research and Development
Tacoma Power

TACOMA POWER
TACOMA PUBLIC UTILITIES

Tacoma Power



Mid-size municipal electric utility

- Owned by the City of Tacoma
- 181,600 customers
- About 35% of customers are low-income
- Power supply is 97% clean
- Long power supply – excess power to sell

Dramatic Change

TACOMA POWER
TACOMA PUBLIC UTILITIES

Load Management

Electrofuels

Electric Fleets

Transmission and Distribution

EV Charging

Traditional Power Resources

Shore Power

Renewable Power Resources

Good planning is essential

TACOMA POWER
TACOMA PUBLIC UTILITIES

VS

Goals

Maintain power system reliability

Keep costs low for all customers

Maximize use of clean electricity

Incentives and cost recovery

Energy efficiency

Peak demand reduction

Reliable load shifting

Dispatchability / vehicle to grid

Low carbon fuel standard credits

Incentives must be based on value added to the power system.

Otherwise costs are passed onto bills of all customers, many of whom are low-income

Size, Scale, and Scope

TACOMA POWER
TACOMA PUBLIC UTILITIES

Very Large
Over 3 MW

Large
500 kW – 3 MW

Medium
50 kW – 500 kW

Small
Under 50 kW

Generation → Transmission → Substation

Distribution → Secondary Transformer → Meter

Panel → Wires and conduit → EVSE

Utility owned

Customer owned

Thanks

Jeremy Stewart
Energy Research and Development
Tacoma Power
jstewart@cityoftacoma.org

TACOMA POWER
TACOMA PUBLIC UTILITIES

Tacoma/Seattle Port Electrification

Graham VanderSchelden

EPA Ports Initiative Webinar

May 23, 2022

THE NORTHWEST SEAPORT ALLIANCE

65

Northwest Ports Clean Air Strategy

- Vision: Phase out seaport emissions by 2050
  - Doing our part to limit climate change
  - Reduce environmental health disparities

PLAN →

DEMONSTRATE →

TRANSITION

Major Initiatives:

- Electrification Planning
- ZE Cargo Handling Equipment Program
- Shore Power Program
- Clean Truck Program

THE NORTHWEST
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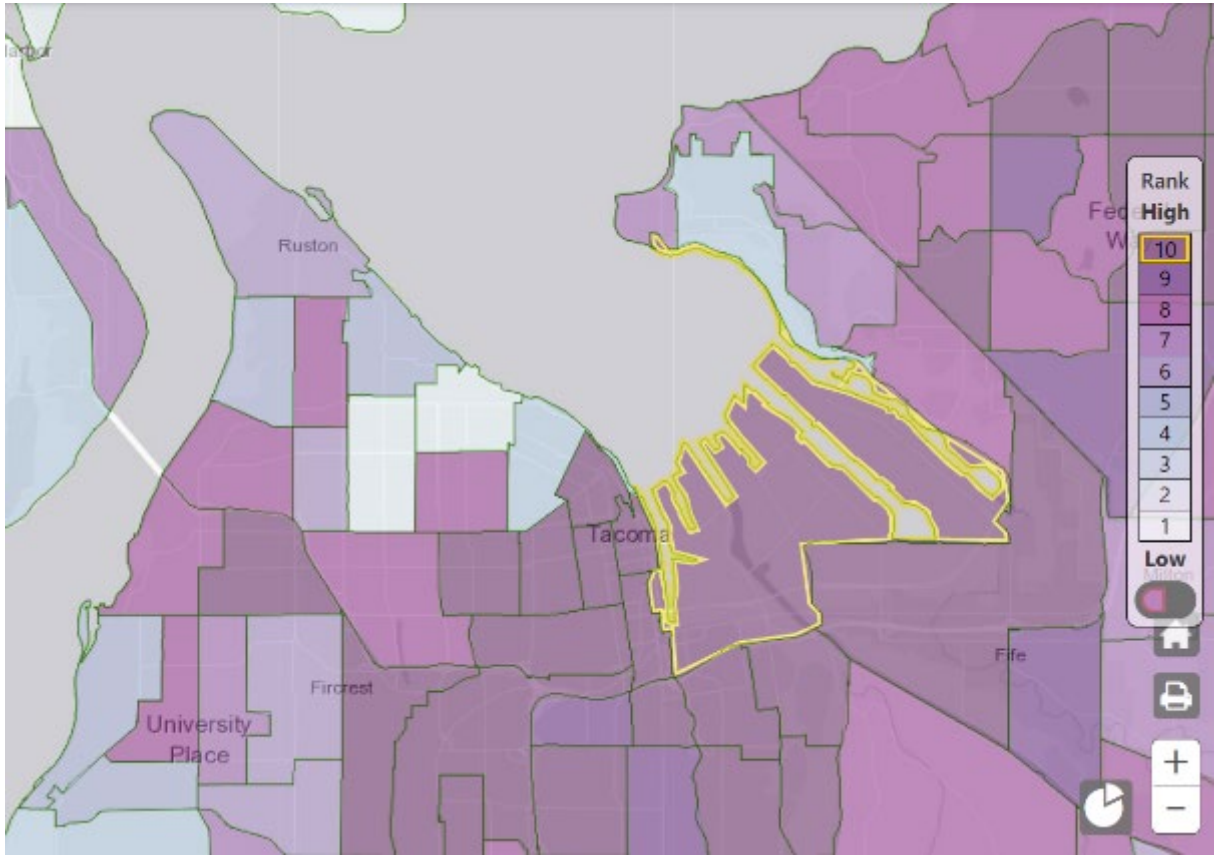
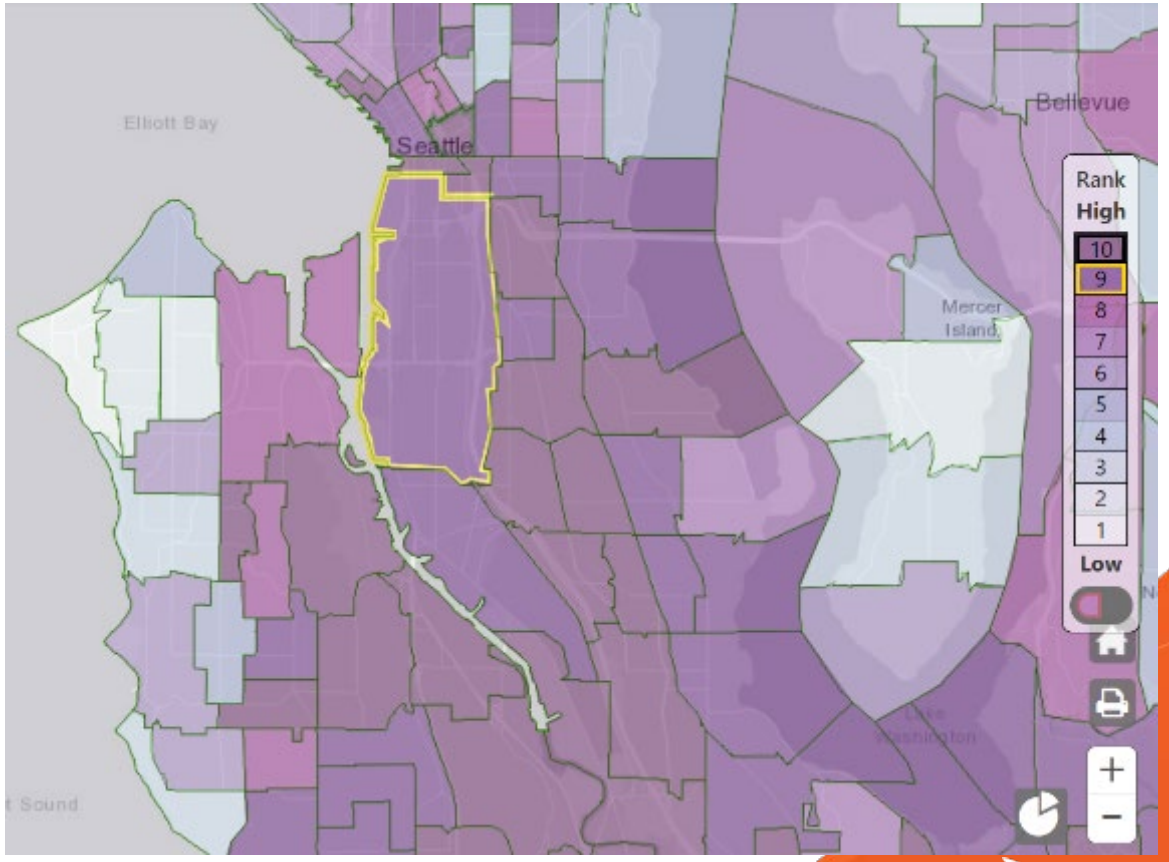
SEATTLE + TACOMA

Addressing Environmental Health Disparities





THE NORTHWEST SEAPORT ALLIANCE
SEATTLE + TACOMA

Clean Cargo Handling Equipment (CHE) Program

5-year Goal: Demonstrate at least 25 pieces of ZE/near zero emissions (NZE) CHE

Opportunities:

- Increasing funding opportunities
- Increasing availability of technology
- Increasing industry awareness/support

Challenges:

- Cost prohibitive without incentives
- Infrastructure
- Technology constraints
- Operator confidence

THE NORTHWEST SEAPORT ALLIANCE
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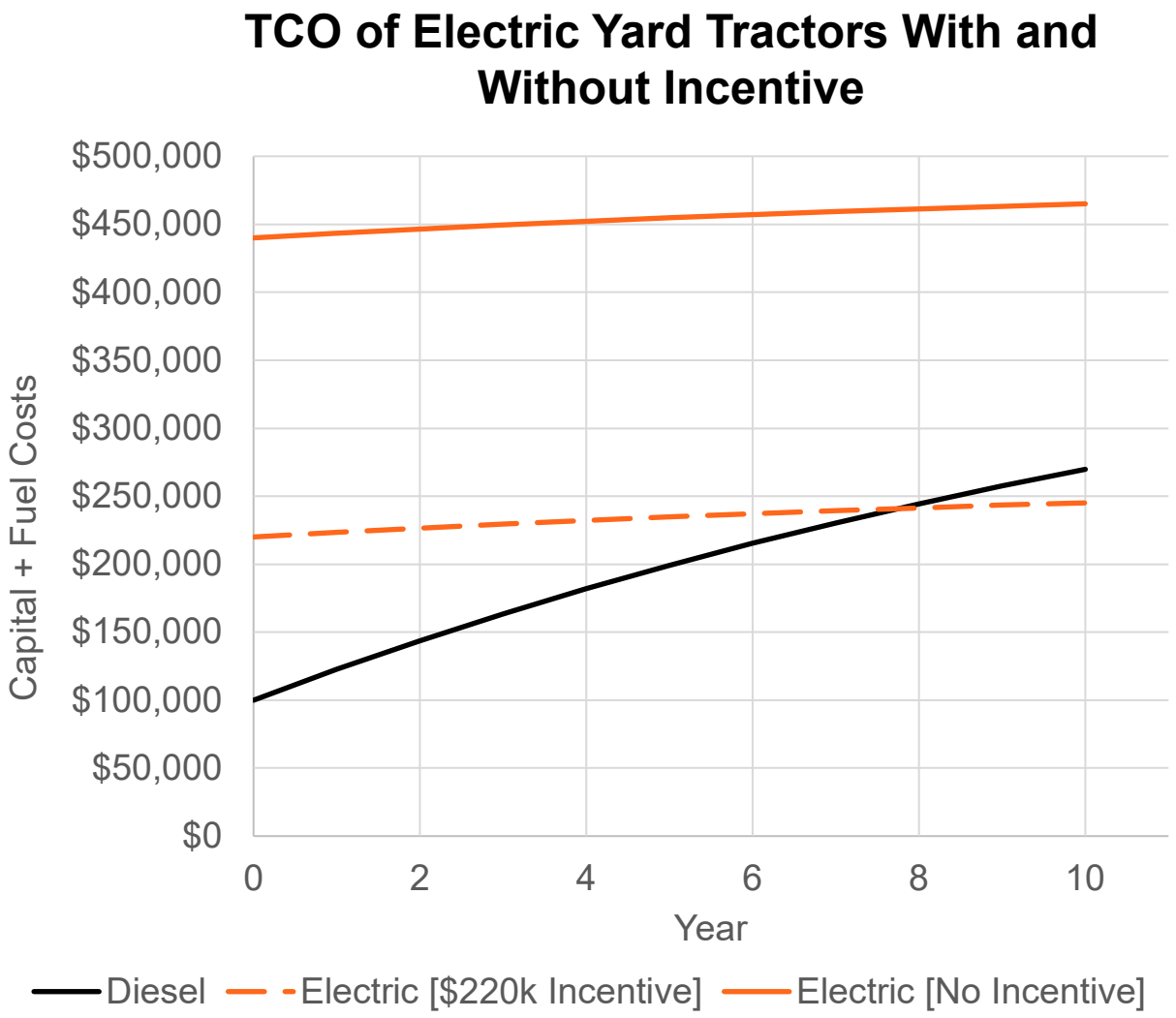
Total Cost of Ownerships (TCO) Case Study – Yard Tractors



Tacoma South Intermodal (SIM) Yard Truck Project

Deploy 6 battery-electric yard tractors

- Remanufactured existing diesel tractors

Duty cycle conducive to electrification

- 1 shift operation
- "slow" 22 kW charging

Funding Support ~45%

- EPA DERA grant
- Tacoma Power incentives

THE NORTHWEST SEAPORT ALLIANCE
SEATTLE + TACOMA

TAC SIM Yard Truck Project - Process

Work with operator to scope project

- Preliminary design of infrastructure/cost estimate
- Identify EV yard trucks
- Identify grant incentive opportunities
- TCO calculations

Engage with utility Electrification Team in parallel

Apply for funding

- Letters of commitment from operator and support from utility

Execute project

Shore Power Program

10-year Goal: Install Shore Power at our Major International Container Terminals

Opportunities:

- Technology has been demonstrated in California
- Industry experience & standardization
- Container fleet becoming more shore power capable
- Growing number of funding opportunities

Challenges:

- Extremely high upfront cost
  - Complicated business case
- Utility demand charges
- Very complex projects
- Operational challenges

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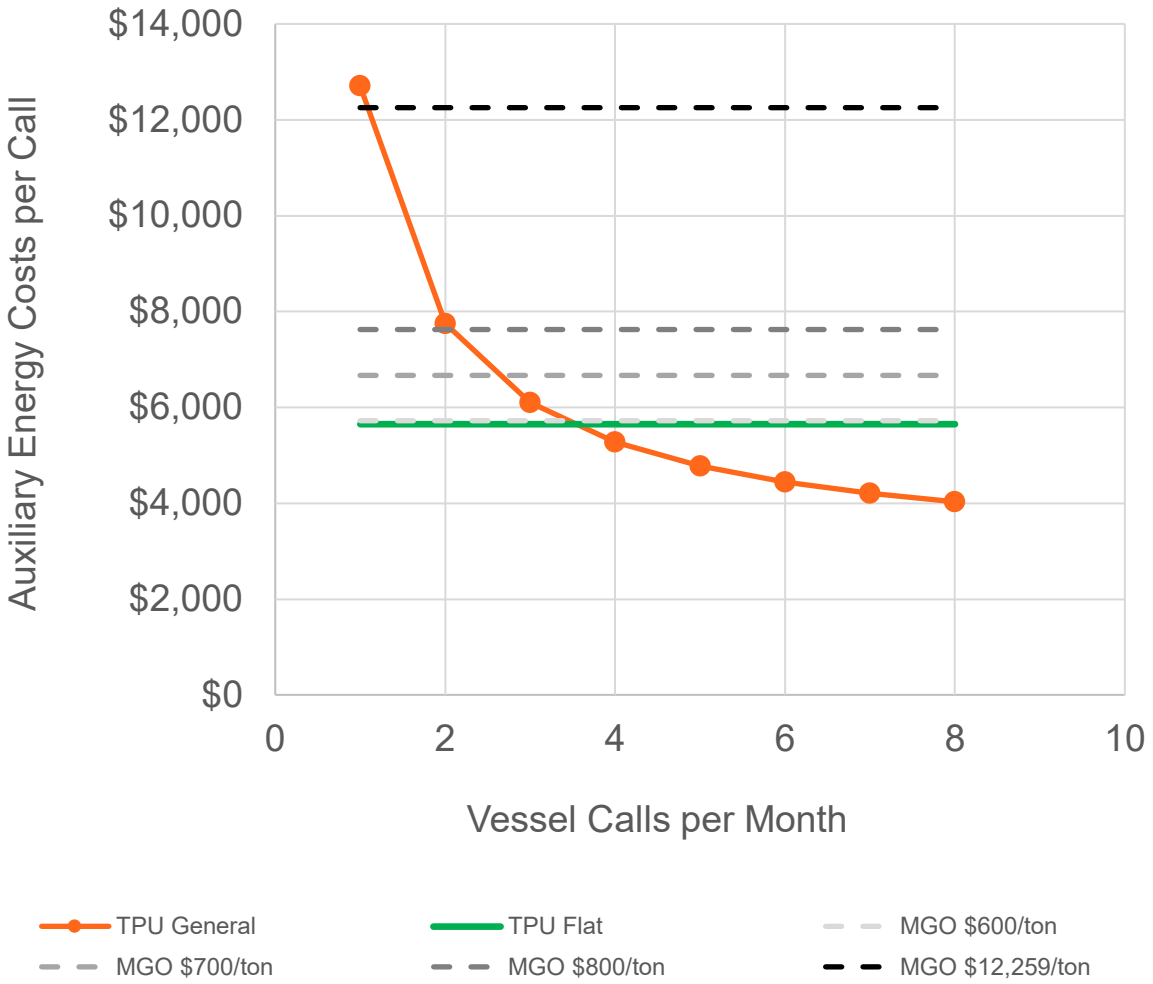
SEATTLE + TACOMA

Shore Power Efficacy



Assumption: 40 hours/vessel call

	Total Calls	Shore Power Capable Calls	Percentage Shore Power Capable Calls	Hours per Shore Power capable call	Shore Power Capable Hours
Husky	86	67	78%	68	4,574
PCT	103	72	70%	35	2,497
WUT	83	39	47%	53	2,061
Tacoma Harbor	*272*	*178*	*65%*	*51*	*9,132*
T-18	398	197	49%	32	6,393
T-30	97	47	48%	30	1,395
Seattle Harbor	*495*	*244*	*49%*	*32*	*7,788*
Gateway Total	**767**	**422**	**55%**	**40**	**16,920**

	Emission Reduction Potential from 2020 Shore Power Capable Fleet (tons/yr)		Emission Reduction Potential if all Vessels were Shore Power Capable (tons/yr)	
	GHG	DPM	GHG	DPM
Husky	3,902	1.26	5,008	1.62
PCT	2,097	0.68	2,999	0.97
WUT	1,755	0.57	3,735	1.21
South Harbor	*7,754*	*2.51*	*11,742*	*3.8*
T-18	5,215	1.68	10,536	3.4
T-30	1,161	0.37	2,397	0.77
North Harbor	*6,376*	*2.05*	*12,933*	*4.17*
Gateway Total	**14,130**	**4.56**	**24,675**	**7.97**

TPU: Tacoma Public Utilities
MGO: Marine gas oil
DPM: Diesel particulate matter
PCT: Pierce County Terminal
WUT: Washington United Terminals

THE NORTHWEST SEAPORT ALLIANCE
SEATTLE + TACOMA

Shore Power Program

Existing Shore Power

- TOTE (Tacoma)
- Port of Seattle: Pier 91 Cruise Terminal (Seattle)

Current Projects:

- Terminal 5 (Seattle): Installing shore power as part of Terminal redevelopment
- Husky Terminal (Tacoma): Retrofitting shore power on active terminal
  - Redeveloped in the 2010s, conduit and some vaults were installed for shore power
- Terminal 18 (Seattle): Beginning design

Future Projects:

- 2 container terminals in Tacoma
- 1 container terminal in Seattle

THE NORTHWEST SEAPORT ALLIANCE
SEATTLE + TACOMA

Energy Planning

Northwest Seaport Alliance (NWSA) South Harbor Electrification Roadmap &
Seattle Waterfront Clean Energy Strategy

**** Partnering with utilities**

- Energy use inventory by facility & by harbor
- Future energy use projections/scenarios
- Grid resources and capacity assessments
- On terminal infrastructure needs assessment
- Energy innovation analysis
- Infrastructure development strategy

Thank You

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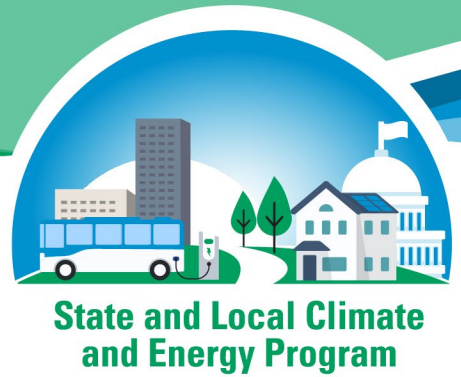

Question and Answer Session

Connect with the State and Local Climate and Energy Program

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U.S. Environmental Protection Agency
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