San Pedro Bay Ports
Sustainable Supply Chain Advisory Committee
September Meeting Summary

Date: September 15th, 2021 | 11:30 am – 3:00 pm

Location: Via phone conference

Attachments: Attachment A - Attendees
Attachment B - Meeting Agenda
Attachment C - Presentation - CARB Proposed Freight Contractor Requirements
Attachment D - Presentation - Committee Meeting

Meeting Summary

1. Review & Approve July Meeting Summary
    a. Several members pointed out an inaccuracy in the July meeting minutes' Agenda Item 1, which described a Memorandum of Understanding (MOU) for quantifying emissions with the California Air Resources Board (CARB). Instead, this should have been attributed to the South Coast Air Quality Management District (South Coast AQMD) and referred to emissions management generally because the MOU is still under negotiation.
    b. This correction was made, and the meeting minutes were approved.

2. POLA / POLB Opening Remarks
    a. This agenda item was taken out of order, after the CARB updates in agenda item #3.
    b. Both ports reported that the pandemic-related cargo surge continues to put pressure on their supply chains; POLA cited 87 vessels awaiting berth at the port complex terminals (60 container vessels). Meanwhile, both ports continue to implement technology demonstration projects and work on the 2021 technology feasibility assessment as directed under their joint Clean Air Action Plan (CAAP). They also received approval from the Federal Maritime Commission to engage Port Check to collect the fee proposed under the Clean Truck Program (CTP). Software development is currently underway, and the system is expected to be completed in March 2022.
    c. The Port of Long Beach noted that it updated its Green Ship Incentive Program to offer higher incentives for top performers to encourage greater emission reductions from ships. For the Vessel Speed Reduction (VSR) program, joint port results to date indicate that 96% of vessels reduce their speed to the target within 20 nm of the port, and 93% do so within 40 nm.
    d. The Port of Los Angeles is upgrading all four of its air quality monitoring systems. It has also begun working with the South Coast AQMD to implement the recently-awarded JETSI program which will deploy 100 BEV drayage trucks in fleets serving the port complex.

3. Update on CARB Activities (CARB)

a. Low NOx Omnibus
    i. The Final Statement of Reasons (FSOR) has been completed and is pending final signature with the Office of Administrative Law (OAL). Staff anticipate that the rule will go into effect in early November. Staff will be able to request the requisite waiver to enforce from the EPA once the OAL has signed off on the regulation.
    ii. The rule will require all medium- and heavy-duty engines to meet a 0.05g/bhp-hr NOx standard starting in 2024, which will move to 0.02 g/bhp-hr Low NOx in 2027. The rule will also have several other more stringent in-use emission compliance and warranty requirements, although details on each of these was not covered in the meeting.
    iii. CARB noted that the federal Environmental Protection Agency (EPA) and legislatures in several states are considering adopting the same or similar regulations. CARB is in discussions with the EPA to encourage adoption of standards that are the same, or more stringent than, the Omnibus' since federal trucks operating in the state of California follow federal standards.
        - GNA noted that the rule's projected timeline aligns with the SSCAC's final meeting of the year and requested that CARB provide an update at that time.
    iv. CARB staff added that the agency will present a proposal for a Heavy-Duty Inspection program to its board in December 2021, with truck performance and reporting standards going into effect in 2023. The program will track truck emissions through twice-a-year data reports. Remote sensing devices will augment CARB's enforcement, and compliance will affect a truck's ability to register in California. Vehicles that are MY2013 or newer will be asked to supply data from their OBD system; older vehicles will be required to go through opacity testing and visual inspection. Additionally, facilities that hire or receive delivery from trucks ("applicable freight facilities"), including ports, will be required to participate in the program.
        - Committee members noted that linking compliance to registration may create significant challenges if the databases involved are not synchronized. Members cited several instances where poorly aligned state agency systems and processes created extensive delays for truck operators. CARB said that they are working closely with the Port Drayage Truck Registry (PDTR), the Department of Motor Vehicles (DMV), and other key agencies to ensure that the program synchronizes smoothly with existing databases and registration systems.
        - CARB presented an illustrative diagram of vehicle and freight facility participation in the proposed program **(see Attachment D).**
b. Advanced Clean Fleet (ACF) Rule
    i. The draft regulation and total cost of ownership calculations has been posted on CARB's website, and the agency is currently updating its emissions inventories to provide more detail about the rule's intended cuts in each sector. The agency will hold several publish workshops in the coming months and staff encouraged meeting attendees to participate.

ii. Responding to questions about the ZE registration requirement for the PDTR, staff noted that the original cutoff for registering non-ZE trucks was no longer expected to by 1/1/2023 but that the cutoff would likely go into effect later in 2023. The staff added that they aim to align this date with the deadlines driving ZEV adoption in other commercial sectors under the Advanced Clean Truck (ACT) and the Innovative Clean Transit (ICT) rules.
    - The Committee observed that these dates are not pinned to vehicle availability and pointing to concerns that many truck drivers will pre-buy used diesel vehicles to register before 2023, asked CARB to consider the annual turnover in the PDTR and interactive effects with the proposed rule. CARB said that they are currently reviewing these figures and believe that annual turnover will change between 2023 and 2035 to meet requirements, although exactly in what direction this change will occur is subject to many market forces.

iii. The Committee asked whether CARB staff could address the direction and use of funds currently proposed in the federal budget and pending Congressional approval. CARB staff was unable to comment at this time, and noted that the next meeting will conflict with their November board meeting but that support staff will be identified to attend.
    - Committee members suggested gathering input from agencies that could benefit from this funding, developing suggestions that allow the ports to take advantage of the opportunity. GNA agreed to add this as a discussion point for the November 2021 meeting agenda.

4. Review & Approve Draft Recommendations
    a. CHE Infrastructure Funding
        i. Committee member ILWU submitted proposed edits **(see slide in Attachment D)** specifying that equipment funded by TCEP would be human-operated, however PMSA was unable to accept this change. Speaking on behalf of the California Transportation Commission (CTC), Joe Lyou clarified that the funds are restricted from supporting non-human operated equipment and offered to work with ILWU and PMSA to define language that would meet their organization's needs. These members agreed to work together on this in the coming weeks, with GNA's support.
    b. Drayage Truck Infrastructure Standards
        i. No objections were raised to this recommendation, and GNA will follow up with those members who require board or executive officer review before they can issue approval.
    c. Utility Use of LCFS Holdback Funds
        i. GNA and EarthJustice provided an update on their collaboration with Mayor Garcetti's office to ensure that the proposed recommendation aligns with LADWP's limitations and opportunities for using holdback funds issues under the Low Carbon Fuel Standard (LCFS) program. Based on information received to date, the recommendation will likely advise allocating funds to port applications on a percentage basis rather than a fixed dollar basis, due to unforeseen changes within the LCFS program over time.

ii. GNA will continue to work with member EarthJustice and the Mayor's office to finalize this recommendation and circulate it for member review in the coming weeks.

5. Deep Dive - Cargo Handling Equipment
    a. Introduction (GNA)
        i. GNA summarized the ports' CHE equipment and emissions inventories as published in 2019; research on future port energy requirements; relevant recommendations issued by the SSCAC; and key concerns with fueling infrastructure that have been raised in public forums to date **(see slides in Attachment D)**.
    b. Presentation - POLA / POLB
        i. Port staff provided an overview of CHE demonstration projects completed under the Technology Action Plan (TAP) and their investments in zero emission technology under the CAAP to date. They noted that one project for a converted hydrogen fuel cell top handler is currently awaiting approval.
            a. A majority of the ports' demonstrations have been funded by CARB and the California Energy Commission (CEC), for a total of approximately $152MM and 87 units of eCHE. To date, the ports have successfully commissioned the following equipment for demonstration or deployment. The ports note that this does not represent the sum total of all units demonstrated in the port complex.
                i. 5 eRTG cranes
                ii. 5 battery electric Top Handlers
                iii. 13 battery electric Yard Trucks
                iv. 20 natural gas Yard Trucks
        - The ports added that the global COVID-19 pandemic has impacted their demonstration projects in several ways including staff access and availability, permitting timelines, commodity costs, and part delivery times.
    c. Presentation - Everport, ITS, Pasha, SSA
        i. Presentations from Everport, ITS and Pasha are included in **Attachment D**.
        ii. International Terminal Services (ITS) presented the scope, results to date, lessons learned and next steps for its demonstration of several first generation BYD yard trucks and several electrified top handlers.
            - The project has been operational since 2018 and has involved a wide range of stakeholders including the landlord port, funding partners, equipment manufacturers, utilities, inspectors, and unions. ITS noted that many of these stakeholders employ and involve their own engineering teams and project managers, and require distinct submission/approval/feedback procedures, all of which collectively create an unwieldly network of critical project staff and processes. ITS advised investing heavily in the planning stage to minimize misunderstandings, inefficiencies, and mistakes.

- ITS shared several concerns with vehicle durability, battery range and charge time, user experience with vehicle controls, and EVSE ease and cost to operate. While the vehicles required fewer trips to maintenance, their down time was longer than the average down time for a diesel truck due to challenges with the part supply chains. Longer periods of downtime proves to be more costly for ZEVs than ICE vehicles which can be quickly repaired and returned to service.
- ITS described several delays it encountered with the design and installation of electrical supply infrastructure and noted that terminal disruption during trenching is significant. Additionally, the footprint of installed equipment (chargers, utility gear, etc.) and safety features (bollards, K-rail, etc.) is massive, and a source of concern for the terminal as it considers operating electrical equipment across the entirety of its fleet. ITS expressed significant concern and doubt about its ability to accommodate the terminal with the 200 charging connections needed to fully electrify its terminal. Finally, the fixed nature of EVSE fueling equipment requires a change in standards of procedure (SOP) at any terminal that has previously operated its equipment with mobile fueling solutions.
- ITS noted that the EV equipment it is running can operate for a single shift, but not two shifts as it requires. It was noted that opportunity charging between the first and second shifts is not economically feasible as this would occur during peak times (4-9 pm) when power rates are highest (to discourage use at this time). A battery capable of being charged during off-peak times and operating for a full two shifts is therefore required.
- Charging equipment is currently too slow and smart chargers are required for more rapid charging. However, ITS noted that the smart chargers it has have frequently been out of operation for minor adjustments.
- Addressing cost, ITS noted that electric yad trucks are three times (3x) the cost of a diesel truck and cannot currently replace a diesel truck on a 1:1 basis, and top handlers are two-and-a-half times (2.5x) the cost of a conventional model. Available grants do not cover the full cost of this equipment, and while multiple funding sources are available their requirements vary and are often incompatible. ITS suggested that funding agencies reconsider scrappage requirements since many terminals have had to purchase equipment on an ongoing basis and cannot dispose of these devices on a cost-effectiveness basis.
- ITS concluded by recommending that the ports and funding agencies support more demonstrations of plug-in and hydrogen fuel cell technology, so that terminals can make informed commitments and begin preparing their facilities. Hydrogen fuel cell demonstrations are particularly valuable for terminals to compare the tradeoffs of bringing in fuel without trenching for more electrical supply.

iii. Everport provided a summary of its electric top handler and electric and natural gas yard truck demonstrations to date.
    - Everport is operating two battery electric Taylor top handlers with BYD battery and drive components which meet their two-shift or 12-hour needs, but do not satisfy their three-shift requirement. Everport explained that the four-hour charge time does not allow for the vehicle to be fully charged between shifts, and opportunity charging only allows operators to capture approximately two hours of charge time during the shifts.
    - Addressing cost, Everport found that operating costs were three times (3x) that of diesel equipment and fuel in an off-peak charging scenario, and five times (5x) the conventional cost when using opportunity charging throughout the day.
    - Everport has not been able to test its five BYD battery electric yard trucks due to mechanical and structural issues, including vehicle fifth wheel and beaver tail design, plug compatibility and electrical system malfunctions.
    - The terminal reports that it is operating 22 LNG-powered yard trucks with relative success. Everprot reported similar fuel consumption and costs compared to its diesel yard trucks, but noted that the lack of mobile LNG fueling does create operational challenges for the terminal. Overall it reported that its LNG yard trucks have been a pretty positive experience.
    - Everport concluded by observing that government assistance is required to convert CHE fleets to zero emission platforms, and that revising grant structures and requirements would significantly improve funding accessibility. The terminal also noted that a key question right now is how to handle existing and high-value assets which are many years from their natural retirement.

iv. Pasha Stevedoring & Terminals, or Green Omni Port, presented its history of proposing and designing zero emission CHE projects, and deploying equipment, over several years. The terminal's projects have included installation of on-site energy production and storage, installation of a microgrid, demonstration of battery electric yard trucks (both new builds and conversions), demonstration of battery electric forklifts, demonstration of on-road battery electric Class 8 trucks, and operation of an on-dock marine vessel emissions control system. Overall, the company has reported massive problems with every single part of the project.
    - On several energy production and storage projects, Pasha encountered challenges securing clear guidance and approvals from LADWP, which prevented it from achieving the scale of power production it required to support its eCHE needs. Pasha has since been installing two 1.2 MW batteries from BYD for peak shaving purposes, and 750 to 1.1 MW of solar panels. UL listing issues between BYD and LADWP have required multiple technology updates over the project's several years, although the terminal is hopeful that this is nearly resolved.

- Pasha explained that standardization and certification was a constant issue for its equipment electrification projects, citing plug and battery standards that were incompatible with the servicing utility; battery supplier changes mid-project due to the Meritor purchase of TransPower; and legal delays getting the parties involved in equipment conversion to certify that the converted product is safe to operate under OSHA Title 8. Speaking to its experience operating first generation BYD eUTRs, Pasha repoted that it had to send the vehicle back five times on design compatibility issues - the vehicle as designed was unable to complete essential terminal maneuvers. Slow repair timelines meant that these vehicles have been largely inoperative - in the three years since the demonstration began, they have operated for a total of 25.6 hours (less than three shifts' worth). Speaking to its experience operating TransPower's converted Kalmar electric forklifts, Pasha explained that these met performance requirements after two lift tests but did not comply with OSHA Title 8 without manufacturer certification. These complications have added years to Pasha's projects, and many remain incomplete. While OSHA Title 8 doesn't apply in the same way to on-road equipment Pasha encountered other restrictions with federal motor carrier and Department of Transportation (DOT) requirements when demonstrating an on-road truck.
- Pasha echoed the comments of the other MTOs that EVSE and its supporting electrical infrastructure had a large footprint and that this has prompted it to explore inductive and mobile charging solutions. It flagged that the installed EVSE was challenging to operate with 75 lb. cables and 50 lb. connector nozzle. A lack of charging solutions elsewhere also complicates the decision to operate vehicles that traverse the port complex.
- Describing its on-dock emissions control system, Pasha explained that the equipment is an awkward fit on a marine terminal, frequently getting in the way of required operations or using space that has significant value to the terminal's business overall.

v. SSA explained that it has demonstrated hybrid and battery electric variations of the equipment described by the prior three terminal representatives and has encountered the same issues. Range, permitting delays, construction delays, fuel cost increases, vehicle and charging complications have all persisted in SSA's demonstration projects with grid-powered RTGs and hybrid RTG conversions. As it prepares to demonstrate electric yard truck from TransPower, it is also taking feedback from other terminal operators into careful consideration. Finally, SSA hopes to demonstrate a hydrogen fuel cell RTG which is currently in the design stage.
    - SSA reported that OSHA certification challenges fueled its decision not to repower its existing yard trucks, and instead to work with a manufacturer on new builds. It expressed discomfort about the upcoming new build demonstration with TransPower given feedback

from terminal operators who have also used this provider. TransPower was recently acquired by Meritor.

- SSA's hybrid RTG conversion project was reported to be reasonably successful due in part to the fact that it required no new infrastructure. It also had a significant environmental impact - SSA noted that the project has resulted in a diesel fuel consumption reduction of over 90%.
- SSA is concerned about the increased cost of electricity for its ZEV programs once the SCE Charge Ready Program rates and demand charge waivers sunset. For this and other reasons, SSA is beginning to look into hydrogen fuel cell equipment.
- SSA added that as of June 2021, it has converted all its Long Beach container terminals' liquid fuel supply to an 80/20 blend of biodiesel (BD) and renewable diesel (RD), and that this is expected to reduce its CO2e emissions by over 25,000 tons annually. Given the current price of diesel, and state renewable fuel subsidies, SSA estimates that it's cost of fuel post-conversion will be on part with its costs prior to the conversion, or perhaps even yield a small savings.
- SSA concluded that designing projects to avoid interrupting operations is a sizeable challenge, and that if all terminals were to convert their liquid fuel consumption to BD/RD blends then the ports' CHE CO2e emissions reductions could be in the 70% range.

d. Discussion
    i. The committee members and port staff recognized the terminals for their extensive work to demonstration zero emission CHE and provide detailed and actional feedback for stakeholders to consider. One member emphasized that the pre-demonstration period of a project is extensive, complex, and arduous.
    ii. The Committee asked whether the terminals are collecting LCFS revenue from their operations. SSA clarified that it does not collect revenue on the BD/RD blend consumption but that this program allows SSA to access a competitive price of fuel. The terminals are all earning revenue for their eligible electrical power consumption.
    iii. ITS revealed that due to the BEV yard trucks' reliance on battery power for all systems, it is difficult to transport a vehicle that has broken down or is out of power. Everport emphasized that inability to release a trailer from a downed yard truck due to lack of battery power presented major complications.
    iv. Responding to a question about building for future demand, the terminals and the ports clarified that their projects rarely allow them to trench for the needs that they may be able to forecast today. They added that in most project cases, they aren't yet ready to commit to an infrastructure layout given the uncertainty with the technology's performance and electrical power supply.
        - The Committee observed that a deeper understanding of the electrical fueling supply options on and approaching the market would be valuable. The Committee agreed to discuss pursuing this for a future meeting.
        - SSA observed that full funding for CORE would benefit the terminals' planning abilities.

- The Committee also requested that two recommendation topics be considered: (1) developing a strategy to identify revenue streams outside of the port that can support eCHE demonstration and deployment, and (2) requesting the mayors to work with their respective fire departments on readiness to support project implementation. GNA will follow up with Committee members on both topics.

v. When asked if the ports' 2030 target for a zero emission CHE operation is feasible, all four terminal representatives said that this does not appear feasible at this time based on their experiences to date, and lack of experience with comparable hydrogen fuel cell options.
   - SSA reminded the group that the work done to date to understand these issues is remarkable, and that the emissions reductions that have been achieved are important. It encouraged terminals and the ports to support use of renewable and bio- diesel where possible.

vi. Major challenges summarized by each of the MTO guest speakers included:
   - Additional vehicles and technology options from major OEMs are required. The equipment must be lower cost, more reliable and work more consistently. MTOs report that they cannot afford the equipment at current costs and performance standards.
   - More time is required in order to develop and demonstrate hydrogen fuel cell powered equipment in order to develop an informed and optimized ZE transition strategy. The presenting MTOs said that they feel they are being told to design their "terminal of the future" around battery electric equipment but they are not certain that this will be the right ZE solution in all operations. Hydrogen fuel cell technology could play a meaningful role in many applications, and more time is required to assess this opportunity.
   - More personnel training is required and is critical to long term success.
   - The fire department and permitting authorities require extensive additional education and training in order to be ready to review and approve plans for ZE vehicle and infrastructure projects.

vii. Opportunity for Committee Recommendation
   - See action items flagged above.

6. Conclusion & Next Steps

   a. Next Meeting: November 17th, 11 am - 3 pm, Zoom
      i. Workforce Development *(guests: TBD)*
      ii. GNA invited members to reach out with suggestions for the November agenda, or with an interest in participating in the development process.
   b. 2022 Agenda: TBD in November
      i. GNA notified participants that it will be identifying dates for the 2022 meetings over the next two months, and asked Committee members to come to the November meeting prepared to review key priority areas for discussion in the 2023 calendar year.

Attachment A

List of Meeting Participants

SSCAC Committee Members	
Marnie Primmer	FuturePorts
Michele Grubbs	PMSA
Matt Miyasato	South Coast AQMD
Heather Arias	CARB
Joe Lyou	CCA
Stella Ursua	Grid Alternatives
Ray Familathe	ILWU-13
Adrian Martinez	EarthJustice
Ricardo Hidalgo	International Brotherhood of Teamsters
Matt Schrap	Harbor Trucking Association
Los Angeles Port & City Staff	
Chris Cannon	Port of Los Angeles
Tim DeMoss	Port of Los Angeles
David Libatique	Port of Los Angeles
Erick Martell	Port of Los Angeles
Eric Caris	Port of Los Angeles
Max Reyes	City of LA, Mayor's Office
Lauren Faber O'Connor	City of LA, Mayor's Office
Jessica Jinn	City of LA, Mayor's Office
Jacob Haik	City of LA, Councilman Buscaino's Office
Long Beach Port & City Staff	
Rick Cameron	Port of Long Beach
Matt Arms	Port of Long Beach
Nina Turner	Port of Long Beach
Wei Chi	Port of Long Beach
Morgan Caswell	Port of Long Beach
Rose Szoke	Port of Long Beach
Eleanor Torres	Port of Long Beach
Meeting Facilitation Staff	
Erik Neandross	GNA
Eleanor Johnstone	GNA
Patrick Couch	GNA
Christopher Davis	GNA
Other Stakeholders	

Andre Freeman	CARB
Craig Duehring	CARB
Kim Heroy-Rogalski	CARB
Dinh Quach	CARB
Elaine Shen	South Coast AQMD
Brian Choe	South Coast AQMD
Robert Brown	Everport
Geoffrey Romano	Everport
Paul Gagnon	SSA Marine Terminals
Jim Smith	International Brotherhood of Teamsters
Sal Ferrigno	RFK
Wray Bartling	Pasha Stevedoring & Terminals
John McLaurin	PMSA
Eric Bayani	International Terminal Services

Attachment B
Meeting Agenda

1. Port Opening Remarks

2. Review & Approve July Meeting Summary

3. Update on CARB Activities
    a. Low NOx Omnibus
    b. Advanced Clean Fleet Rule

4. Review & Approve Draft Recommendations
    a. CHE Infrastructure Funding
    b. Drayage Truck Infrastructure Standards
    c. Utility Use of LCFS Holdback Funds

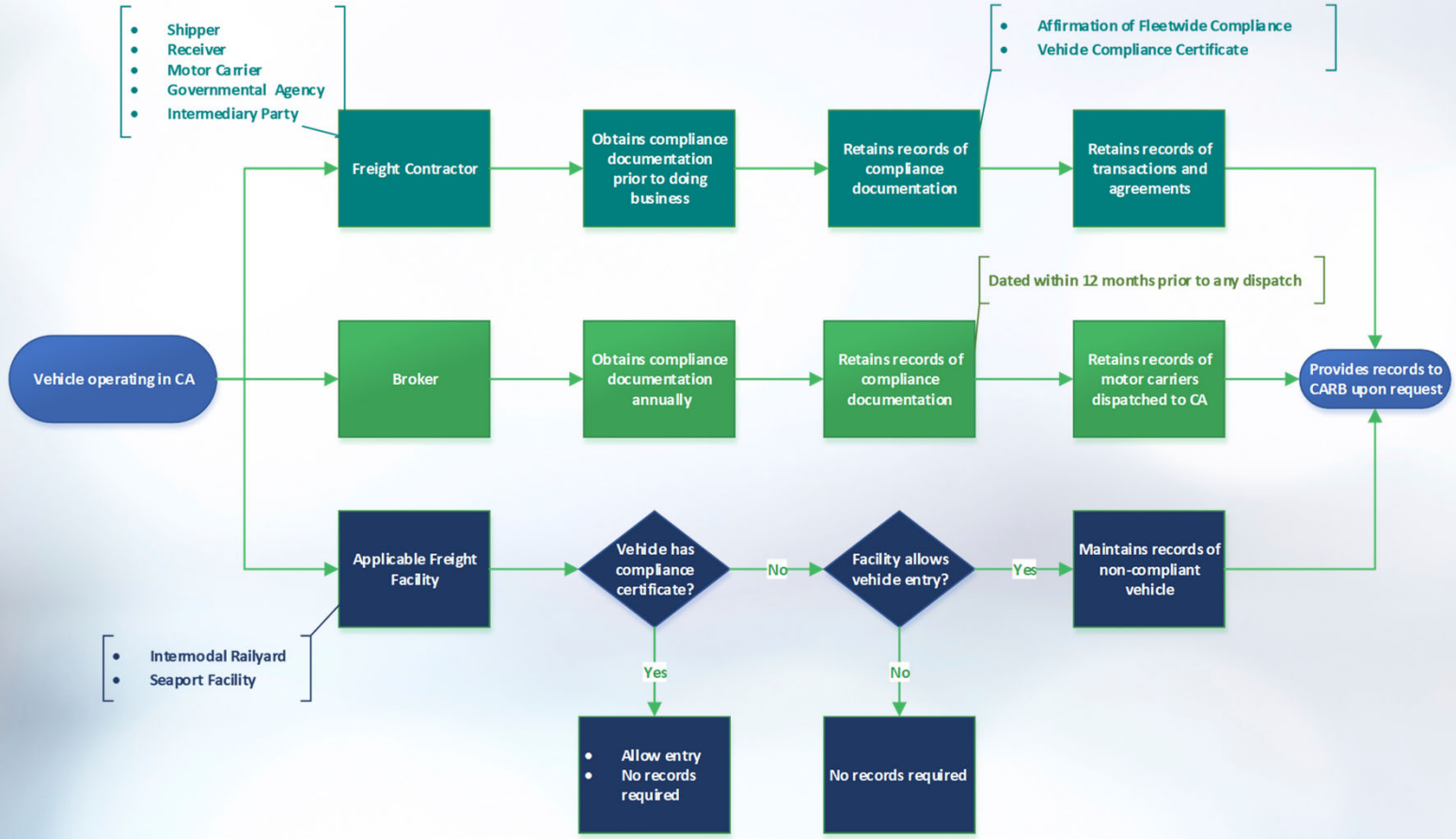
5. Deep Dive - Cargo Handling Equipment
    a. Introduction (GNA)
    b. Presentations - POLA / POLB
    c. Presentations - Everport, ITS, Pasha, SSA
    d. Discussion
        i. Opportunity for Committee Recommendation

6. Conclusion & Next Steps
    a. Next Meeting: November 17th, 11 am - 3 pm
        i. Workforce Development *(guest: TBD)*
    b. 2022 Agenda: TBD in November

Attachment C

CARB Proposed Freight Contractor Emissions Requirements

Proposed Freight Contractor Requirements



Attachment D
Presentation - Committee Meeting

Sustainable Supply Chain Advisory Committee Meeting

September 15th, 2021

THE PORT OF LOS ANGELES

Port of LONG BEACH THE GREEN PORT

Agenda

1. Review & Approve July Meeting Summary
2. Port Opening Remarks
3. Update on CARB Activities
    1. Low NOx Omnibus
    2. Advanced Clean Fleet Rule
4. Review & Approve Draft Recommendations
    1. CHE Infrastructure Funding
    2. Drayage Truck Infrastructure Standards
    3. Utility Use of LCFS Holdback Funds
5. Deep Dive – Cargo Handling Equipment
    1. Introduction (GNA)
    2. Presentation - POLA / POLB
    3. Presentations - Everport, ITS, Pasha, SSA
    4. Discussion
        1. Opportunity for Committee Recommendation
6. Conclusion & Next Steps
    1. Next Meeting: November 17th, 11 am – 3 pm
        1. Workforce Development (Guest: TBD)
    2. 2022 Agenda: TBD in November

1. Review & Approve July Meeting Summary

1. POLA / POLB Opening Remarks
    a. Both ports reported that the pandemic-related cargo surge continues to put pressure on their supply chains; POLA cited a new record of having processed 10 million TEUs year-to-date. Long dwell times at anchor present a growing threat to the ports' abilities to meet their emission reduction targets and to improve the flow of cargo through an unusually-congested supply chain. The ports cited two external factors that have further complicated their efforts - Union Pacific railroad's one-week suspension of traffic into Chicago, and President Biden's July 2021 executive order to improve competitiveness across the goods movement supply chain.
        i. The ports are exploring solutions such as just-in-time delivery and expanded anchorage areas, in response to expressions of concern from their boards and CARB.
        ii. The ports are separately working to re-activate a Memorandum of Understanding with the South Coast AQMD ~~to quantify~~regarding the emissions benefits from the Clean Air Action Plan (CAAP), in lieu of ~~adopting~~ a port-based Indirect Source Rule ~~with CARB~~. This process had been suspended due the COVID-19 pandemic.

2. Port Opening Remarks

3. Update on CARB Activities

1. Low NOx Omnibus
2. Advanced Clean Fleet Rule

4. Review & Approve Draft Recommendations

1. CHE Infrastructure Funding
2. Drayage Truck Infrastructure Standards
3. Utility Use of LCFS Holdback Funds

Sustainable Supply Chain Advisory Committee
On-dock Equipment Charging Infrastructure Funding Recommendation
September 2021

The San Pedro Bay Ports Sustainable Supply Chain Advisory Committee (SSCAC, or Committee) submits the following recommendation for reducing air pollution and greenhouse gas emissions at the San Pedro Bay Ports to the Mayor of Long Beach, Robert Garcia; the Mayor of Los Angeles, Eric Garcetti; the Executive Director for the Port of Long Beach, Mario Cordero; and the Executive Director for the Port of Los Angeles, Gene Seroka.

This recommendation is made in alignment with previous SSCAC recommendations made in support of the joint ports' Clean Air Action Plan (CAAP) for achieving emissions reductions across the San Pedro Bay Port (SPBP) complex.

Committee Research and Findings

Under the 2017 Amendment to the CAAP, the mayors of Los Angeles and Long Beach directed the ports to transition its cargo handling equipment (CHE) inventory (including yard trucks) to 100% zero emission technology by 2030. Today, the ports' collective CHE inventory comprises 1,600+ yard trucks; 700+ forklifts; 386 top handlers; 152 RTGs; 40 straddle carriers; and 600+ diverse other equipment. In addition, there are at least 4,000 marine vessel calls and 8,000 locomotive visits to the San Pedro Bay Ports annually, and at any given time, approximately 16,000 electrified transportation refrigeration units (eTRUs) are plugged in at the SPBP complex. While some future ZE CHE may rely on hydrogen fuel cells, most appear likely to be powered by batteries that will require significant amounts of electricity and extensive electrical infrastructure. Clearly, the power supply required to support 100% ZE CHE operations by 2030, and ZE marine and locomotive operations wherever feasible, vastly exceeds the ports' current electrical load.

On-dock fueling infrastructure is deployed and managed through various and often complex relationships between the ports, terminal operators, and equipment owner-operators. Investments in discreet fueling equipment, such as EV charging stations, may be made by a terminal operator, however, the electrical infrastructure laid in the ground is managed by the servicing utilities (i.e., the Los Angeles Department of Water and Power and Southern California Edison), with which the ports have a direct relationship. While port tenants may define the level of on-dock fuel supply that their equipment procurement plans require, they rely on the ports and utilities to ensure that sufficient power supply will be available at the time that this equipment is ready to deploy. The Committee recognizes that these relationships complicate planning and investment.

Expert presentations from the electrici~~i~~al utilities in prior SSCAC meetings have indicated that the cost and time to upgrade the electrici~~i~~al power to meet all of these future needs can far exceed $100 million and take 10 years to complete. Therefore, to achieve the ZE CHE goals of the CAAP by 2030, a commitment to this level of investment must take place immediately. Without any of the current marine terminals having begun to transition their CHE equipment on a large scale, it is difficult to determine how such a large investment can be made, and who is responsible for making such an investment. The Committee, therefore, observes that public funding sources can be leveraged to assist with such a project.

The California Transportation Commission's (CTC) Trade Corridor Enhancement Program (TCEP) provides approximately $400MM annually for freight infrastructure that is owned by a public entity, or, which provides significant public benefits. The CTC also requests that potential applicants engage with them over project concepts in order to inform funding program design.

Committee Recommendation for Port Action

While the joint ports' power supply forecasts are being developed with their respective utilities, it is clear that infrastructure expansion will be necessary and that external funding will be required. The Committee recommends that the ports apply for TCEP funding to install infrastructure for fueling on-dock human-operated ZE CHE. The Committee recommends that these applications be developed in coordination withCaltrans District 7 and LA Metro for the 2023 funding cycle.

5. Deep Dive – Cargo Handling Equipment

CHE Introduction

1. SPBP inventory
2. CHE fueling infrastructure challenges
3. Relevant recommendations

SPBP CHE Inventory & On-Dock Fueling Needs

On-Dock – Cargo Handling Equipment (excluding yard trucks)

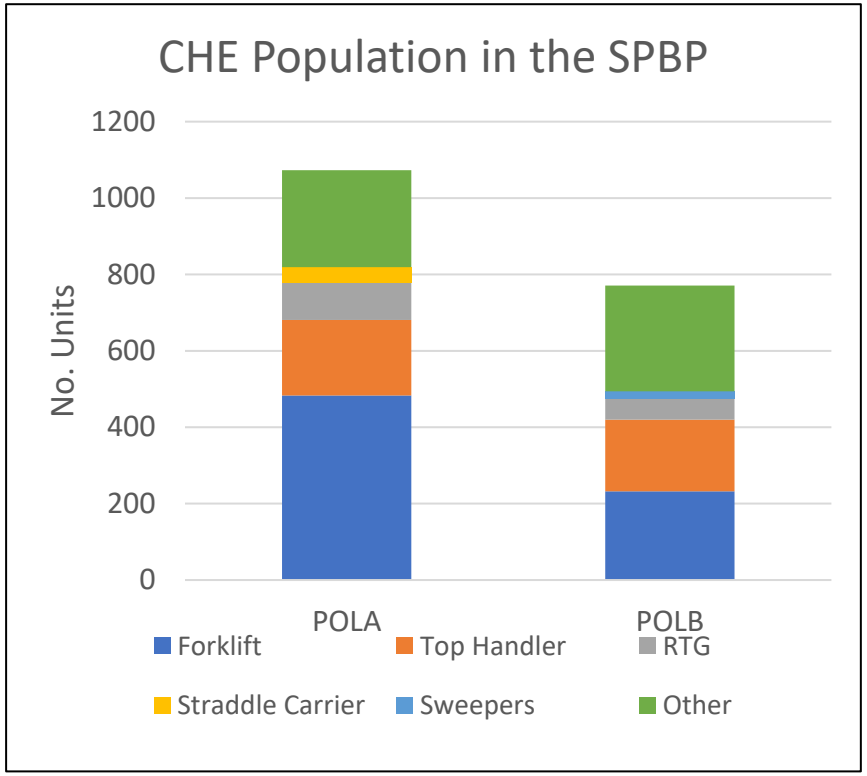
Population: 1,831 units, ~14% BEV (forklift/crane/other)

- POLA: 1,073 units
  - 483 forklifts | 198 top handlers | 98 RTGs | 40 straddle carriers | 254 Other
- POLB: 771 units
  - 232 forklifts | 188 top handlers | 54 RTGs | 20 sweepers | 277 Other

On-Dock – Yard Trucks

Population: 1,672 (58% POLA | 42% POLB)

- Approx. 15 BEV and 10 FCEV in demonstration



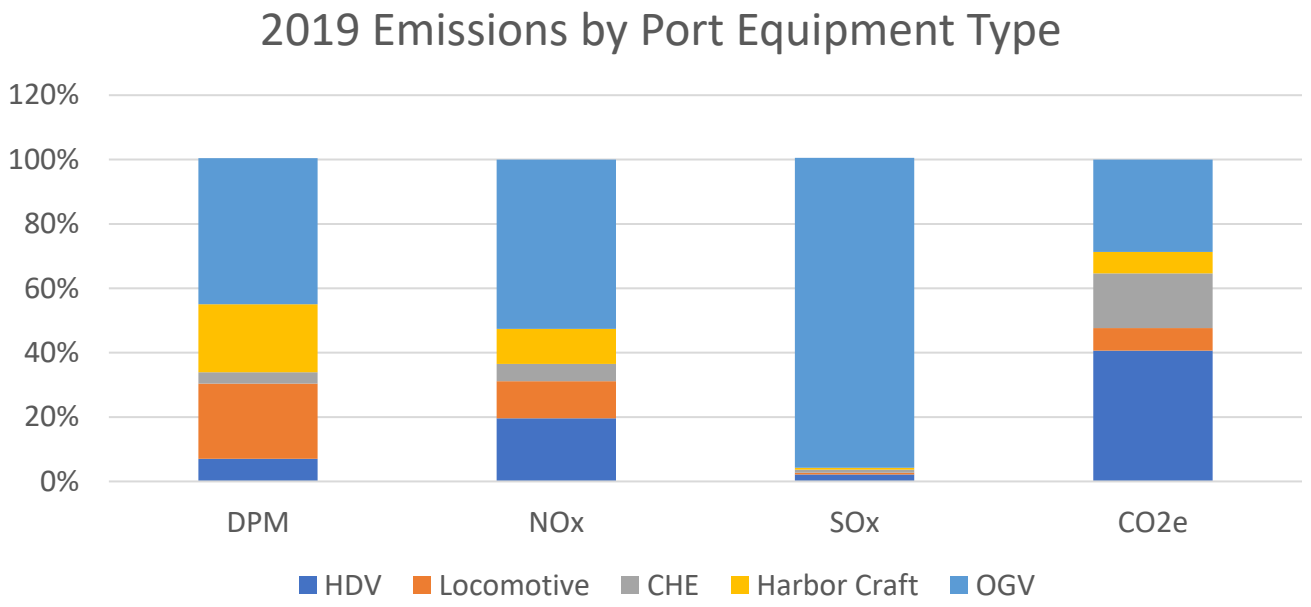
On-Dock Power Demand – Typical CA Marine Terminal

Findings from memorandum "Electrification of CA Ports", June 2021, Moffat & Nichols for PMSA

- 2035 ZE target will increase electrical load by 4x over 15-20 years
  - 2020 electrical load per million TEU: 2 MW / typical terminal
  - 2035 electrical load per million TEU: 8.4 MW / typical terminal
- eCHE load is closely tied to whether, or how much, eUTRs are charged on- and/or off-shift. The forecasted load requirement for SPBP is many times that of San Diego, Oakland and Hueneme:
  - On-shift eUTR charging: 147.9MW (2035) / 179.8 MW (2040)
  - Off-shift eUTR charging: 193.6 MW (2035) / 202.7 MW (2040

SPBP CHE Emissions Profile

- <5% of DPM, NOx and SOx come from CHE, while 17% of CO2e emissions come from CHE.
- Compared to 2005, CHE emissions have declined in all categories except for CO2e, where they are up ~5%.



CHE Fueling Infrastructure Challenges

- Utility commitments to address power supply concerns
  - Reliability of supply
  - Availability of peak power for operations that require fueling/charging between 1st and 2nd shifts
- Incremental labor cost associated with ZE fueling operations
- Cost and time to install fueling equipment & supporting infrastructure
  - Risk of stranded assets during tech development stage
- Lack of mobile fueling/charging options
  - Fixed infrastructure at fueling pads limits terminal flexibility
  - Cost and time of fueling large equipment at fixed sites

Relevant Committee Recommendations

Funding & Resource Prioritization (July 2019)

- Replace smaller capacity forklifts with zero emission equipment where such equipment is commercially available and viable
- Continue to carefully monitor and extract lessons learned from the ongoing N/ZE demonstrations, including a focus on in-use emission levels achievable with each technology.
- Continue to implement the SSCAC's 2017 CHE Recommendation

Funding Allocation (August 2017)

- Call on local, state and federal agencies to prioritize funding for N/ZE goods movement technologies

Relevant Committee Recommendations cont'd

Cargo Handling Equipment Recommendation (May 2017)

- Conduct an opportunity study for NZE/ZE technology adoption
- Develop "equipment requirements" for each major piece of equipment, and issue a RFI
- Advocate for funding and identify priority areas for N/ZE on- & off- road deployments
- Develop, publish a "Score Board" to publish projects and successes

Zero-Emission Top Handlers (October 2016)

- Demonstrate equipment including with electric UTRs and in rail operations
- Identify opportunities, barriers for ensuring standardization of charging infrastructure for top handlers and UTRs

Presentation – POLA / POLB

Overview of CHE Demonstrations at the Ports

SSCAC Meeting - September 15, 2021

Rose Szoke, Port of Long Beach
Teresa Pisano, Port of Los Angeles

Overview

- Status of Technology Advancement Program (TAP) CHE Demonstrations
- Overview of Ports' Grant Funded CHE Demonstrations
- Completed CHE Demonstrations
- Ongoing COVID-19 Impacts

Status of TAP CHE Demonstrations

- TAP CHE demonstrations completed at the Ports since 2007: 11
  - Various technologies
- TAP CHE demonstrations underway at the Ports: 1
  - Electric, hybrid yard tractors
- TAP CHE projects pending Board approval in 2021: 1
  - Converted, hydrogen fuel cell top handler

More information may be found in past reports as well as the TAP Annual Report via www.cleanairactionplan.org.

Overview of Ports' Grant-Funded CHE Demonstrations

- The Ports were awarded approximately $152 M in grant funds to support the advancement of technology, which includes a combined total of 87 units of ZE CHE.
- To date, the Ports have successfully commissioned the following CHEs for demonstration/deployment:
  - 5 eRTG cranes
  - 5 battery-electric top handlers
  - 13 battery-electric yard tractors
  - 20 near-zero natural gas yard tractors (Port of Los Angeles only)

ZE RTG Cranes

ZE Top Handlers

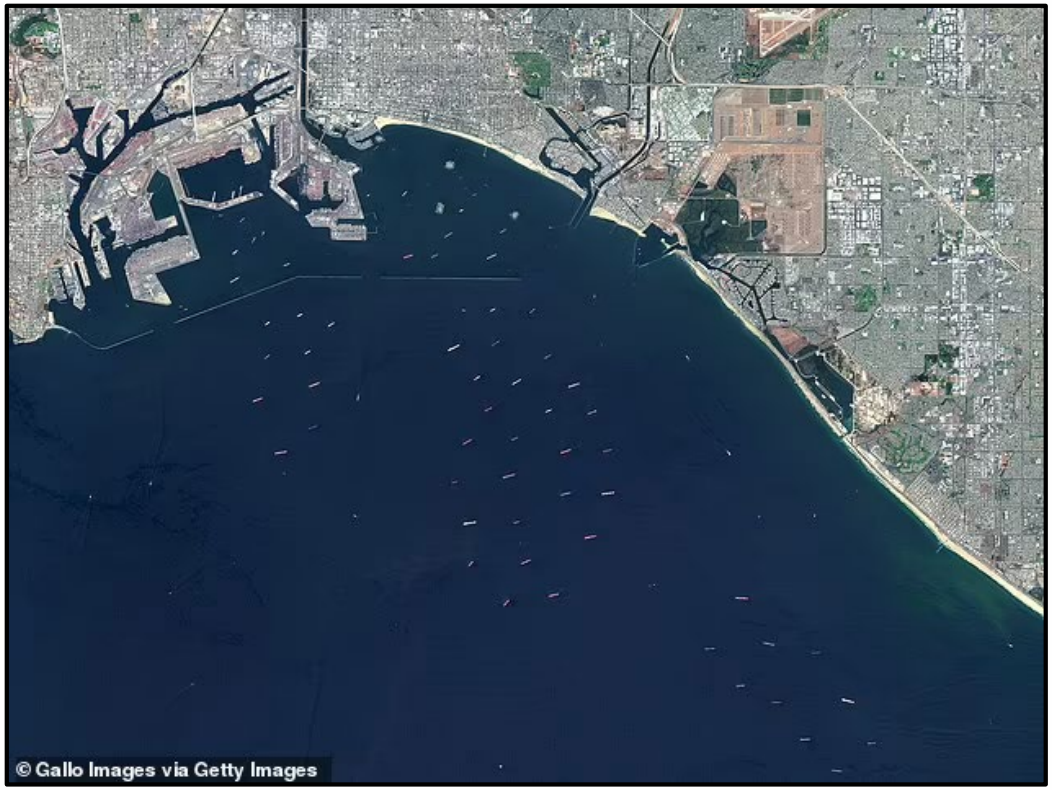
Near-ZE and ZE Yard Tractors

Completed CHE Demonstrations

- POLA has completed the following CHE demonstrations:
  - 2 Taylor/BYD battery-electric top handers (Everport)
  - 5 BYD battery-electric yard tractors (Everport)
  - 20 Capacity near-zero natural gas yard tractors (Everport)
- POLB has completed the following CHE demonstration:
  - 1 Kalmar/TransPower battery-electric yard tractor (LBCT)
  - 3 Taylor/BYD battery-electric top handlers (SSA, LBCT)
  - 6 BYD battery-electric yard tractors (ITS)
  - 1 BYD battery-electric yard tractor with Cavotec smart-charging (ITS)

Current COVID Impacts

- Travel restrictions
- Permit approvals taking longer than normal
- High cost of commodity
- Long lead times for parts



Contacts/Information

- Jacob Goldberg, Port of Los Angeles: jgoldberg@portla.org
- Rose Szoke, Port of Long Beach: rose.szoke@polb.com

- www.cleanairactionplan.org
- www.polb.com/zeroemissions
- https://www.portoflosangeles.org/environment/air-quality/zero-emissions-technologies


Thank You!

Presentations from Marine Terminal Operators

1. International Transportation Service
2. Everport Terminal Services
3. Green Omni / Pasha Stevedoring & Terminals
4. SSA Marine Terminals

International Transportation Service

Terminal Experience and Lessons Learned
&
Major Considerations when converting to Zero Emission

7 x electric tractor (eUTR)
1 x baseline diesel tractor

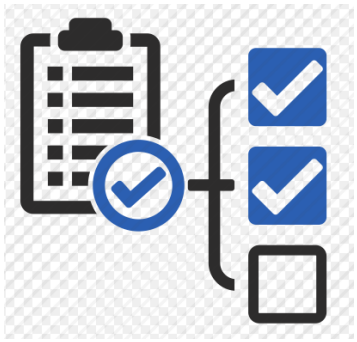
6 x manual 200 kW chargers
1 x Smart Charger

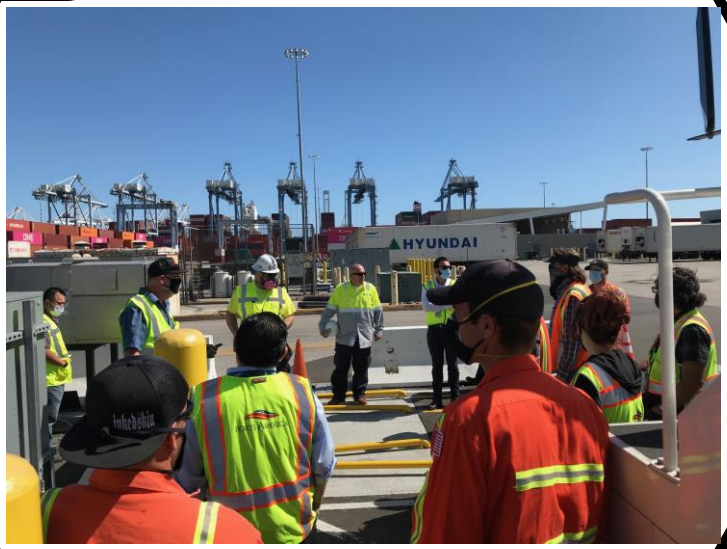
20 electrical connections and dedicated meters / gear (SCE)

August, 2021

Stakeholders

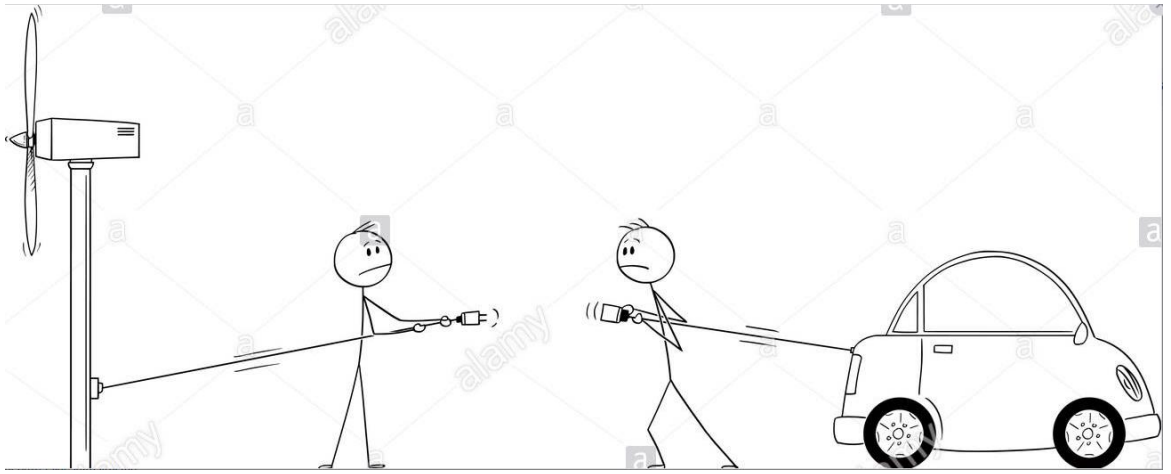
- Stakeholders:
  - Landlord / Engineers / Consultants
  - Utilities / Engineers / Consultants
  - OEMs / Vendors / Suppliers / Engineers
  - Inspectors
  - Management
  - Union Labor
    - Operator / Plug / Mechanic
    - Surveys & Feedback





Challenges

- New Project Excitement
- New Technology
- Many Stakeholders
- Unknowns / gaps
- Lengthy Items:
  - Permit Sign Off
  - UL Listing
  - Construction codes
    - Bollards / K-rail
- Data Collection



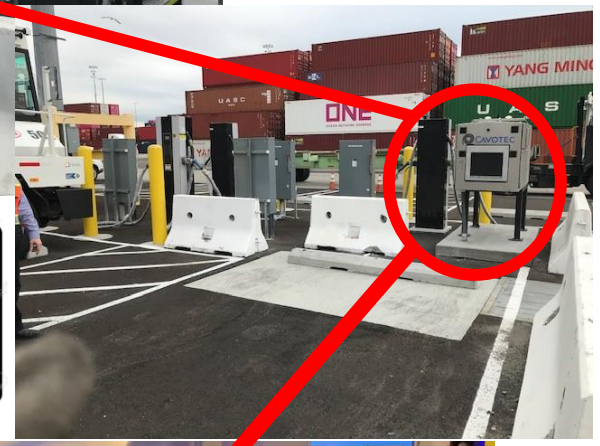
Infrastructure (Under/Above)

- Operational Impact
  - Digging
  - Budget for mistakes

- Space Hog
  - Chargers
  - Disconnect
  - Utility Gear
  - Safety Impact
    - Bollards / K-rail
    - Slip Trips and Falls

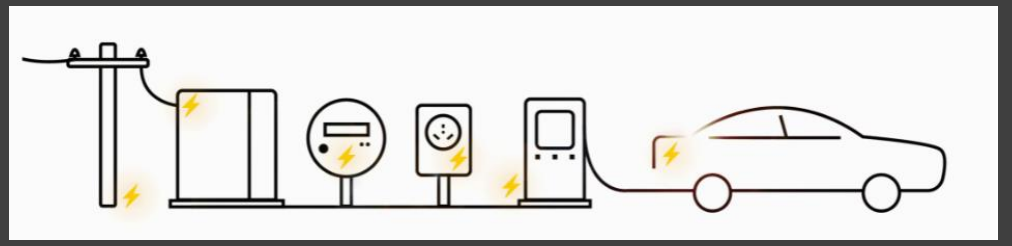
Vehicle & Charger Performance

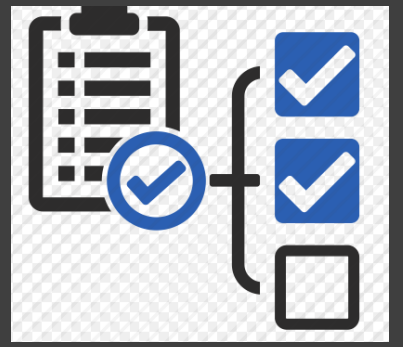
- Battery works for one shift, but need 2 shift battery before charging
- Manual chargers work, but too slow
- Smart charger is sensitive, needs Gen 2/3
- Surveys / Feedback
  - EV sensitive / fragile
  - Charger - Error Codes
- Costs
  - EV maintenance and repairs are less, but numerous adjustments (downtime)
  - Electric kwh rates can be less or higher than diesel pr/gallon
  - EV manual Plug/unplug labor costs is higher



GOING TO SCALE (1)

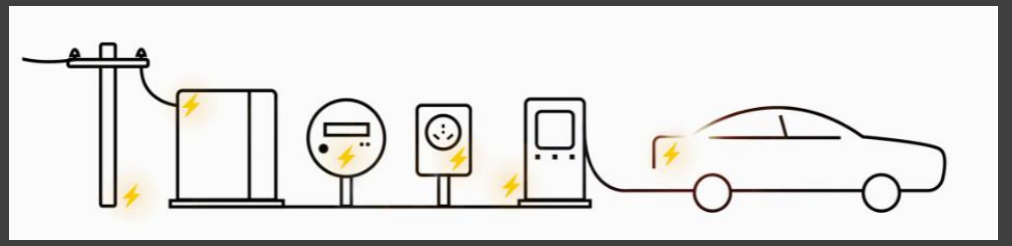
- Build Out / Infrastructure
  - Budget/Grant + Contingency Funds
  - Preparation / Design / Engineering
    - Time consuming necessity
    - Costly
  - Construction/Project Manager (PM)
    - Stakeholders
    - Delays (multiple projects started at the same time)
  - Clarify stakeholder responsibilities
  - Space Hog i.e., chargers, utilities, bollards, krail
  - Chargers are fixed

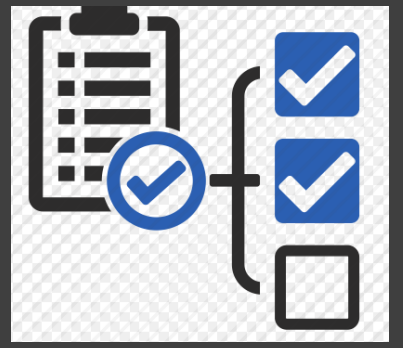




GOING TO SCALE (2)

- Performance
  - Data Collection responsibilities
  - Clarify KPIs and data availability
- Technology Evolution
  - New technology
    - Keep / Return
    - Budget?
  - Transition $$$
    - Demo Old / build New
    - Prep / Design / Engineer, AGAIN!





GOING TO SCALE (3)

- Facility Transition to Electrification
  - Labor
  - Maintenance Dept
  - Management
  - Standard Operating Procedures
- CONCERNS
  - Costs per unit (3x)
  - Infrastructure costs vs diesel/gasoline
  - 1 for 1 replacement
  - Smart chargers
  - Grants are challenging with too many conditions

GOING TO SCALE (4)

- Future Plans + Technology Evolution
  - More demos of plug in and fuel cell
    - Hydrogen storage
    - Mobile hydrogen fuel tankers
  - Demonstration of other CHE
    - RTGs, Tophandlers, Heavy Lifts
  - Renewable energy & batteries (micro grid)
    - Is there enough power?
    - Utility compromise / rule changes

- FUNDING/ TERMINAL DESIGN&ENGINEER / CONSTRUCTION / INSTALLATION / PROCURE / IMPLEMENT / START OPS = YEARS???

Everport Terminal Services

Operating Experience – Top Handlers

We have two electric Taylor ZLC-976 Zero Emission Top Handlers with BYD battery and drive components.

Battery range is good for 12 hours

4 to 5 hours charging time.

<u>Current Operations</u>
We have been running the two top handlers on the 1st and 2nd shifts. Tops are plugged in for charging at the end of the second shift.

<u>Future Operations</u>
If running three shifts, where do you find the time to charge the top handlers?
Must use opportunity charging.

Two coffee breaks and one lunch per shift = 2 hours per shift (total of 4 hours) of opportunity charging.

We are not sure whether we can actually run three shifts at this time. Future innovations in smart charging and battery storage capacity still need development.

Operating Experience – UTR’s

We have not had the opportunity to test electric UTR’s to the extent we would like to due to mechanical and structural issues we had with the first generation of UTR’s we received.

Mechanical and Electric Issues

Electric UTR’s

Charging problems – Plugs not working, error codes caused by bad connections, blown circuit breakers, issues with amperage, Etc. beaver tail needed to be extended etc.

Structure Issues - Many structural issues with the way the machine was built... Had to send it back to the factory for many modifications. Beaver tail needed to be extended, fifth wheel area needed stronger material, etc.

Top Handlers

Charging problems – Plugs not working, error codes, caused by bad connections, blown circuit breakers, issues with amperage etc.

What happens when the machine breaks down during an operation? How do we get it off the container? How do we tow it back to the shop?

We are still addressing these things with the manufacturer.

Operating Costs

Operating Cost – Diesel V/S Electricity
Cost comparison – Diesel V/S Electricity (January 1, 2020 through December 31, 2020)
Cost to run all of our diesel equipment,
12 Rubber Tire Gantry, 28 Top Loaders, 5 Side Handers, 13 Forklifts, 106 Yard Trucks, 1 Sweeper, 23 light tower.
188 pieces of diesel equipment…
$1,579,621.88

Cost of electricity to run 106-yard trucks and 28 top handlers.
With charging during the cheapest times of the day (low peak)
$3,933,910.44
Cost is 3 to 1.
Using opportunity charging during demand peak periods (during the day shift), the rate goes up exponentially. Cost almost jumps to almost 5 To 1

Solution = Smart charging, strategically programming charge time at low peak rate period, alternating equipment.

Capex – Purchase Price Comparison

- Diesel Top Handler Average Cost = $685K
- E Top Handler- Average Cost = $1.5 million
- 118% increase in cost
- Diesel UTR v/s E-UTR
  - $140 diesel
  - $365 E-UTR
  - 175% more
  - For every piece of equipment, you need a charger. Average cost is $30 to $50K
- To replace 28 tops increase of $22.8 million or 124% increase in capital investment.
- To replace 106 UTR's increase of $23.9 million 185% increase in capital investment.
- This does not include, fork lifts, shuttle buses, light towers, side handlers and other diesel-powered equipment.

We will need government assistance on the Capex as well as on the operating cost to make this work.

Current Assets

What do with current assets that still have operating and economic life? How do we phase this equipment out and bring in new electric equipment.

Liquefied Natural Gas

We currently have 22 LNG Yard Trucks

Operating Experience

Operating experience has been positive.

Fuel consumption is about the same as diesel but far less emissions.

Our main complaint is the fact that we have to bring each tractor to a stationary fuel tank to refuel. There is no solution for mobile fueling at this time.

We are still studying the fuel consumption rate comparison between LND and DSL. Our preliminary finding is:

LNG Consumption rate per hour = 1.9
DSL Consumption rate per hour = 2.20
Note we believe there is a certain amount of leakage from the fuel hauler which could impact our fuel consumption rate. Still studying this…

GREEN OMNI TERMINAL

The Good, The Bad & The Ugly

Original Green Omni Concept

BYD UTR

- Manufactured from the ground up by BYD
- PST received Generation 1 with power train behind the rear axle
- This design effected the fifth wheel ramp redesigned five times
- Major issues with charging station not UL approved and LA building and safety required retrofit
- Numerous breakdown with prolonged wait for tech to repair 6-8 months
- Units have a total of 25.6 hours of operations and are currently not operating
- Current problem with units low voltage battery drains to not recoverable and units wont start. It's been over six months waiting for answer to the problem from BYD

Charging Stations

2 BYD Charging Stations
7 TransPower Charging Stations
1 MicroGrid

TransPower UTR

- Cab & Chassis designed by Ottawa/Kalmar and converted to electric by TransPower
- This way of manufacturing presented a challenge for PST as the employer. Title 8 of the State of California require any off road lifting device that is altered without the manufacturers permission or expressed sign off on the enjoining becomes the employers liability if some gets hurt on that piece of equipment. CAL OSHA, Title 8, Section 3650, CFR 29, ANSI/ITSDF B56.1 through 56.10, and NFPA 505-2006, UL 583 -1996- UL 558-1991. 1910.178 1910.178(a)(4), 1910.178(a)(4).

TransPower UTR

TransPower Forklifts

- First one arrived Jan 2019
- Converted Kalmar 21 Ton forklift
- After two lift test the unit performed to spec (the Good)
- This way of manufacturering presented a challenge for PST as the employer. Title 8 of the State of California require any off road lifting device that is altered without the manufacturers permission or expressed sign off on the enjoining becomes the employers liability if some gets hurt on that piece of equipment. CAL OSHA, Title 8, Section 3650, CFR 29, ANSI/ITSDF B56.1 through 56.10, and NFPA 505-2006, UL 583 -1996- UL 558-1991. 1910.178 1910.178(a)(4), 1910.178(a)(4).

TransPower Forklifts

TransPower Semi International

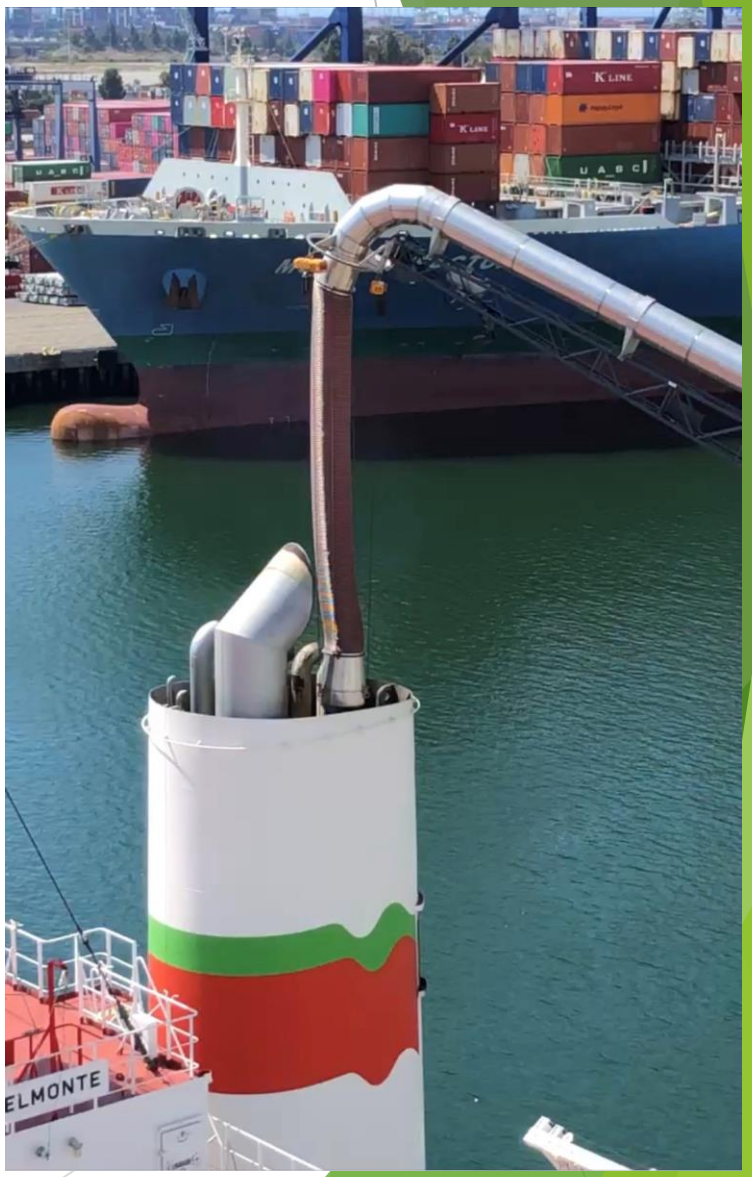
- Manufactured by International and converted by TransPower
- Not the same issues with osha but Federal Motor Carrier and DOT
- Lost a year over a year waiting for experimental permit and FMC safety hold
- Lost addition time waiting for charging station to be approved
- Last minute battery change over more lost time
- Finally got them running July 2021 drove 49 miles and depleted the battery by noon.
- Transmission software issue causing jerking under load currently waiting for a fix

TransPower Semi International

Clean Air Engineering Maritime
The ShoreKat

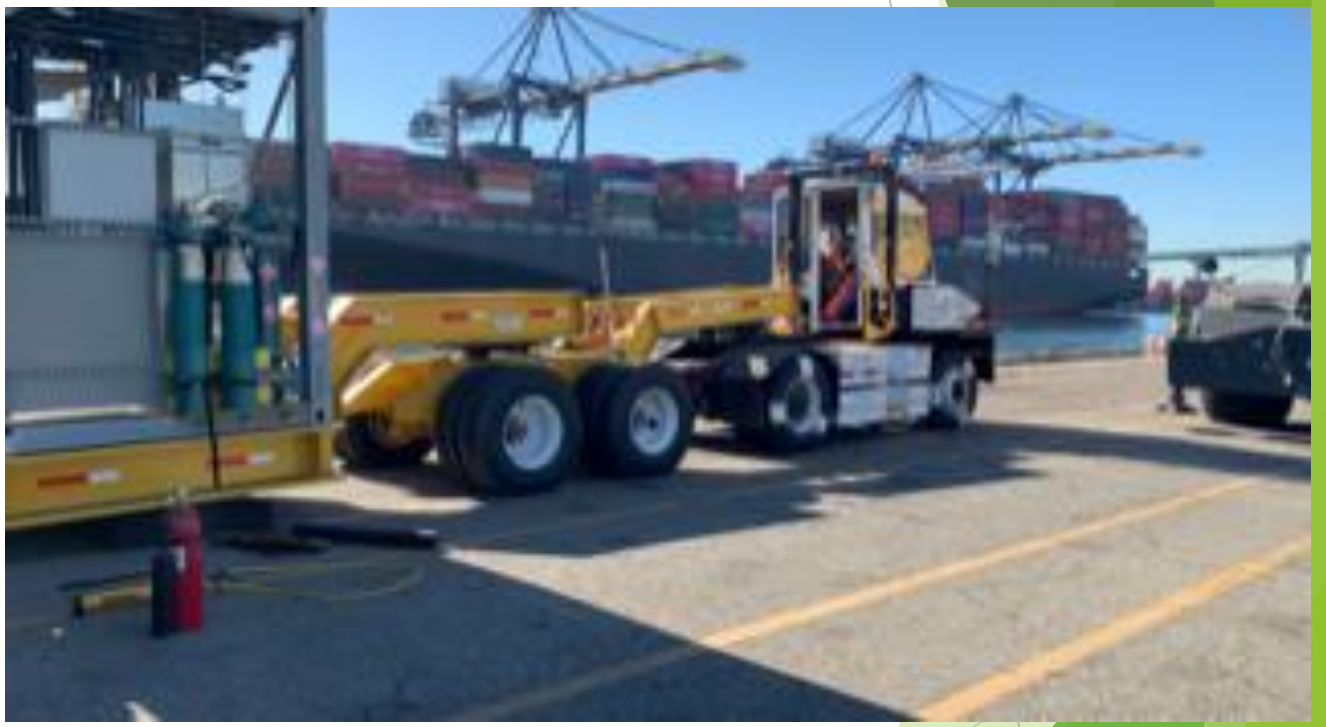
- ShoreKat Manufactured by TriMer Corporation for CAEM
- First parts arrived PST Jan 2018 two 53’cages
- Assembled Nov 29, 2018 completed December 28, 2018
- Design flaw trailer could not be pulled with standard UTR and ShoreKat didn’t get move into place until April 1, 2019
- President Trump Steel Tariff dropped ship traffic to a minimum
- Require two ILWU mechanics for all three shifts
- Weight of the ShoreKat can only be placed on a cement dock
- Loss of a lane under the STS Cranes
- Current design does not contain all generator exhaust stacks

CAEM ShoreKat

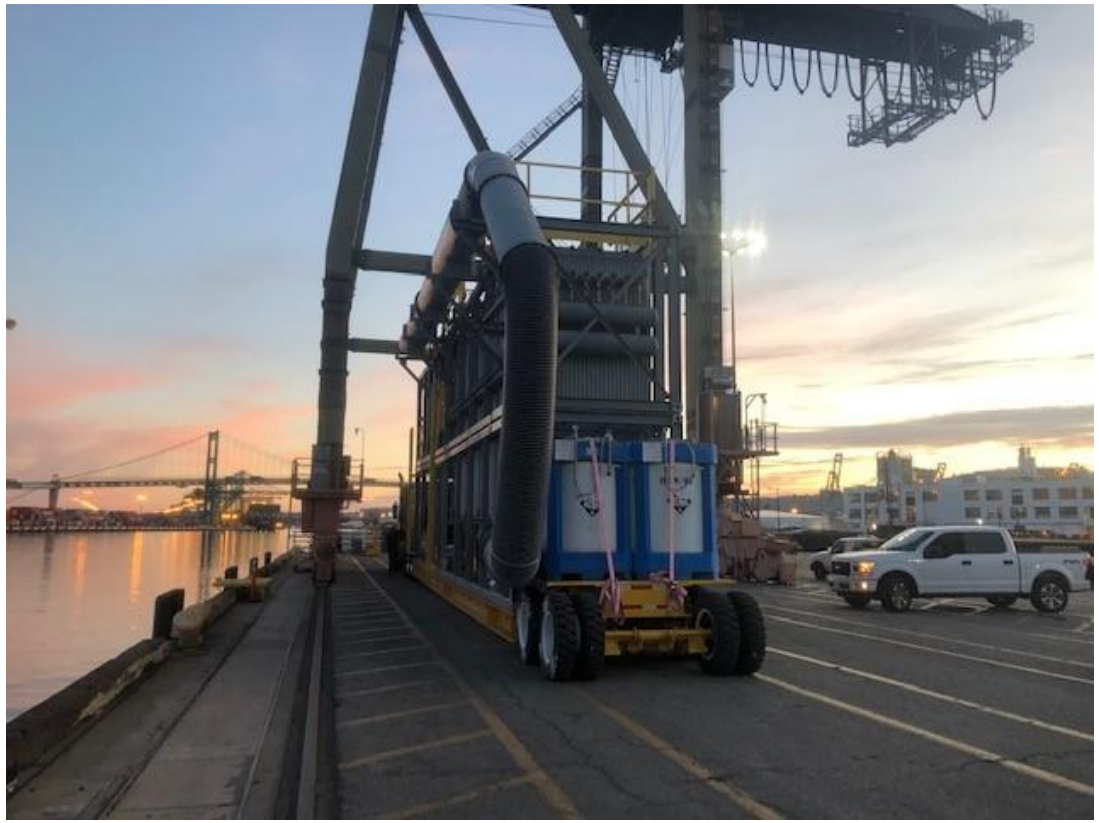


CAEM ShoreKat

CAEM ShoreKat



CAEM ShoreKat



BYD BATTERIES

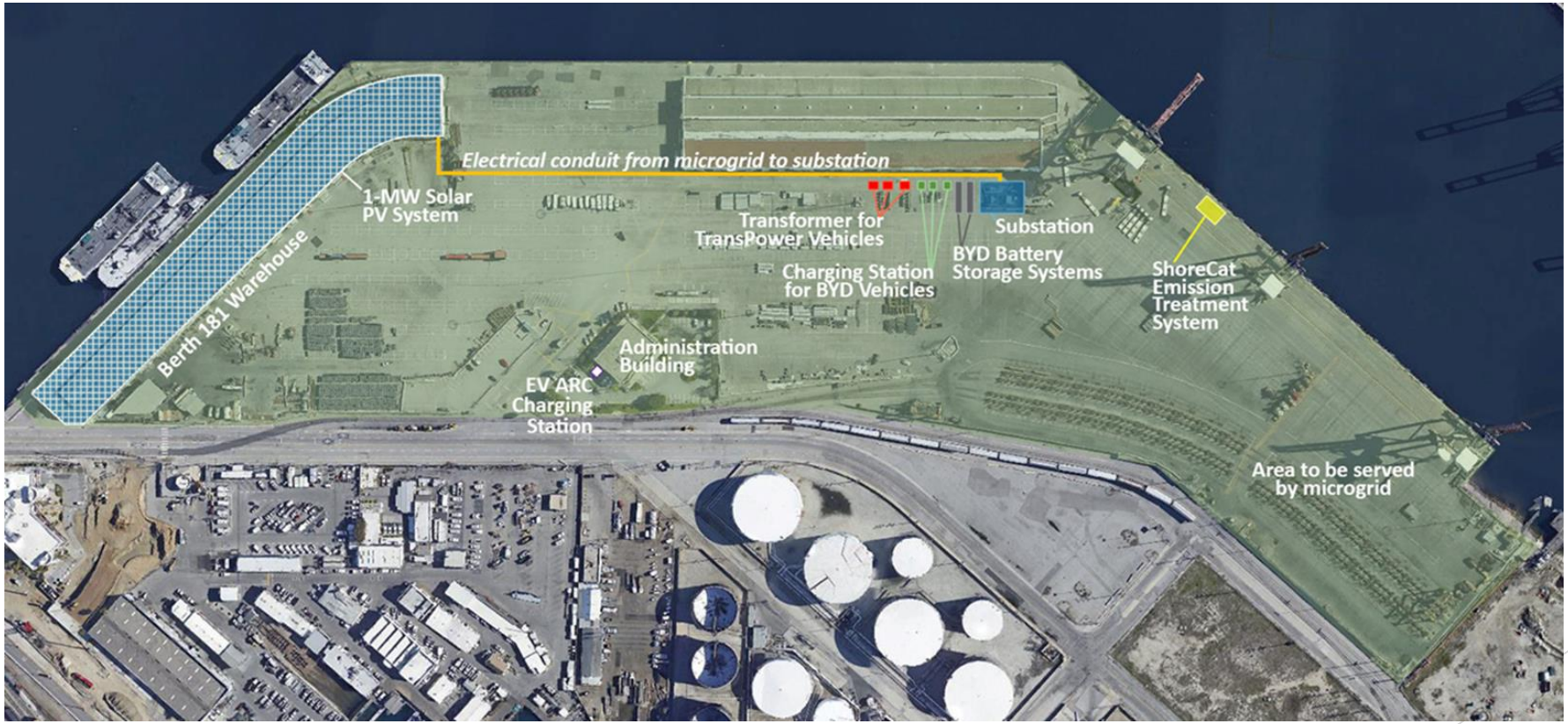
- 1.2 Mega watts storage capacity
- Arrived 2017
- Required several UL updates to meet LADBS code
- Units required a special waiver for City of Los Angeles
- Fire suppression system is having to be reworked to meet LA code

BYD BATTERIES

SOLAR PANELS

- Initial plan for 1.1 Mega Watts of solar panels may go to 750
- Waiting for PST and POLA to complete lease negotiations
- Roof has been replaced
- Transformer and power control modules have been installed

SOLAR PANELS



SSA Marine Terminals

Discussion

1. Opportunity for Committee Action

6. Conclusion & Next Steps

1. Next Meeting – **Wednesday, November 17th, 11 am – 3 pm**, Zoom
    1. Workforce Development (Guest: TBD)
2. 2022 Agenda – TBD in November