At Berth Regulation Workshop: Interim Evaluation Report

February 14, 2023

Agenda

- Introductions & Overview
- Purpose and Preparation of Interim Evaluation Report
- Assessment of Compliance Readiness
- COVID-19 Pandemic Impacts
- Feasibility of Control Requirements for Bulk/General Cargo and Vessels at Anchor
- Next Steps and Future Measures
- Open Q&A

New At Berth Regulation

- Adopted by CARB's Board on August 27, 2020
  - CARB's Board directed staff to accelerate tanker implementation dates to 2025/2027
- Every vessel visiting a regulated terminal must connect to shore power or alternative control strategy
- Emissions reductions requirements begin:
  - January 1, 2023: Container, Reefer, Cruise
  - January 1, 2025: Auto carrier
  - January 1, 2025 (SoCal) and January 1, 2027 (NorCal): Tanker
- Alternative compliance pathways:
  - Vessel and Terminal Incident Events (VIEs and TIEs)
  - Remediation Fund (for specific qualifying circumstances)
  - Innovative Concepts

Regulation Implementation

- January 1, 2021 - New Regulation took effect
- December 1, 2021 - Ports and Terminal Plans due
- December 1, 2021 – Innovative Concept applications due
- December 1, 2022 - Published Interim Evaluation Report
- January 1, 2023 – New requirements took effect for container/reefer/cruise vessels
- January 1, 2025 – New requirements take effect for ro-ro and Southern California tanker terminals
- January 1, 2027 – New requirement take effect for Norther California tanker terminals

Purpose of Interim Evaluation Report

- Implementation status update for At Berth Regulation
- Summary of CARB staff's findings and recommendations, including:
  - Assessment of compliance readiness
  - Summary of Innovative Concepts applications
  - Evaluation of COVID impacts
  - Feasibility of control requirements for bulk/general cargo vessels and vessels at anchor
- Recommendations for future efforts to CARB's Board

Key Recommendations

- No adjustments to At Berth Regulation, including:
  - No change to implementation dates
  - No inclusion of additional vessel categories
- CARB Board direct staff to pursue additional reductions from vessels
  - Explore measures for in-transit, at anchor, and maneuvering

Preparation of Interim Evaluation Report

- CARB solicited for comments starting in Fall 2021
- Staff analyzed:
  - Stakeholder meetings and comment letters
    - Received 11 comment letters by June 2022
  - Port and terminal plans
  - Innovative Concept applications
  - Tanker grant solicitation project
- Public outreach included:
  - Innovative Concepts application comment period
  - Remediation fund administrator process
  - Reporting system development
  - Public meetings and workshops
  - Consultations with technology providers

Stakeholder Comment Letters

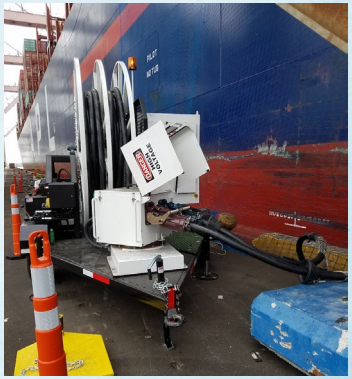
- Non-tanker vessel key concerns:
  - Delay installing shore power equipment due to COVID impacts
  - Time out of service to install shore power equipment
  - Lack of availability of non-shore power CAECS*
  - Absence of international shore power standard (for ro-ro vessels)
- Tanker vessel key concerns:
  - Lack of availability of non-shore power CAECS
  - Timeline to adapt existing CAECS for use on tanker vessels
  - Safety concerns
  - Power availability and compatibility (for shore power equipment)
  - Logistical and operational constraints
  - Utility construction delay

CARB

*CAECS = CARB Approved Emissions Control Strategy

Current Status of Emissions Control Technologies

- CAECS include:
  - Shore power
  - Capture and control systems
- Other potential strategies
  - Distributed generation
  - Cable management systems
  - Alternative fuels



Consultation with technology providers

- CARB staff is working with multiple technology providers
- Providers have expressed intention to enter/expand operations in the capture and control market
  - Developing more systems to service container vessels
  - Expanding research, testing, and development efforts to ro-ro and tanker vessels
- Development of capture and control systems for ro-ro and tanker vessels is proceeding as anticipated during rulemaking
- Two systems currently approved
  - ShoreKat Executive Order approved
  - Six additional approvals in progress

Port and Terminal Plans

- Informed CARB staff of likely compliance pathways and potential delays
- Due to CARB by December 1, 2021
- CARB had 90 days to confirm plan completeness or identify deficiencies
- Plans posted to CARB's website for public review
  - CARB's responses and any revised plans received also posted to website
- Updated ro-ro and tanker terminal plans due to CARB one year prior to their compliance year
  - Ro-ro/Southern CA tankers by February 1, 2024
  - All other tankers by February 1, 2026

Summary of Port and Terminal Plans: Non-Tanker Vessels

- Container/reefer/cruise:
  - All terminals indicated ability to meet 2023 compliance date
  - Main compliance option is shore power
  - Minimal infrastructure upgrades needed
- Ro-ro:
  - Nearly all terminals indicated ability to meet 2025 compliance date
  - Main compliance options: shore power, capture and control, and hydrogen fuel cells
  - Significant infrastructure installation necessary for shore power use

CARB

Summary of Port and Terminal Plans: Tanker Vessels

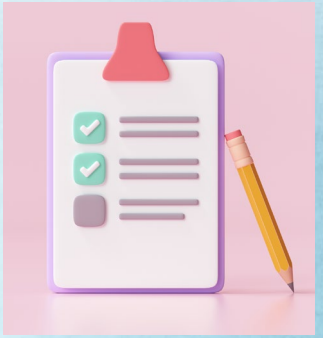
- ~50 percent of S. California terminals indicated ability to meet 2025 compliance date
- ~25 percent of N. California terminals indicated ability to meet 2027 compliance date
- Main compliance options are shore power, capture and control, and Innovative Concepts
  - Significant infrastructure installation necessary for shore power use
- Insufficient site-specific information received to recommend changes to tanker implementation dates

Feasibility Studies

- **Key takeaway: Installation timelines vary, but shore power and capture and control technologies are adaptable**
- CARB received multiple feasibility studies (all specific to tanker vessels)
  - DNV Report
  - ABS Study
  - Three site-specific studies
- DNV Report – key findings:
  - Shore power and land-based capture and control systems may take up to 14 years to implement
  - Barge-based systems may be developed in 5 years or less
- Valero site-specific study - key findings:
  - No compliance option can be implemented by January 1, 2027
  - Terminal will not select a CAECS until after reviewing CARB's Interim Evaluation Report

Innovative Concept Applications

- CARB received a total of 12 Innovative Concept applications by December 1, 2021 deadline
  - Three applications have since been withdrawn
  - Many applications contain several sub-projects
    - 63 sub-projects
- Broad suite of proposals received, including:
  - Hydrogen fuel cells for cold ironing
  - On-board wind power generators
  - Capture and control technologies (early and extra reductions to use for compliance)
  - Deploying liquified natural gas (LNG) vessels



Compliance Readiness Findings: Container/Reefer/Cruise

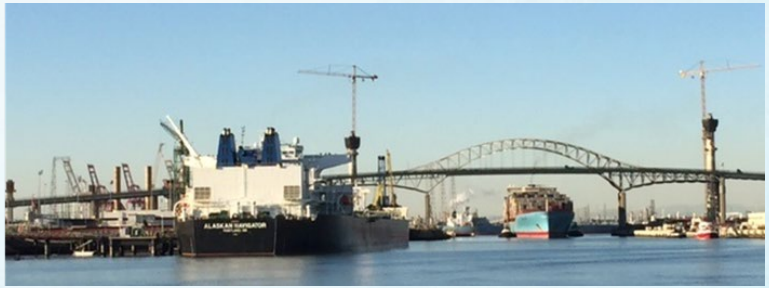
- Compliance began January 1, 2023
- Majority of vessels already reducing emissions under the 2007 At-Berth Regulation
- Stakeholder concerns mainly center around equipment installation delays
- Well positioned to use compliance flexibilities built into the Regulation if delays in equipment installation occur

Compliance Readiness Findings: Ro-Ro/Auto Carrier

- Most vessel/terminal operators actively pursuing a compliance pathway
- Information received during Interim Evaluation review indicated ability to meet 2025 compliance date
  - Since publication of Interim Evaluation Report, some ports have expressed doubt about ability to meet the 2025 deadline
- Well positioned to use compliance flexibilities in the Regulation if delays in control equipment installation occur

Compliance Readiness Findings: Tankers

- Feasibility studies claim no commercially available safe compliance option however shore power is available/proven technology
- Many tanker terminal operators have not yet committed to a control strategy and have not yet provided complete terminal plans
- Compliance flexibilities available in the Regulation if delays in control equipment installation occur

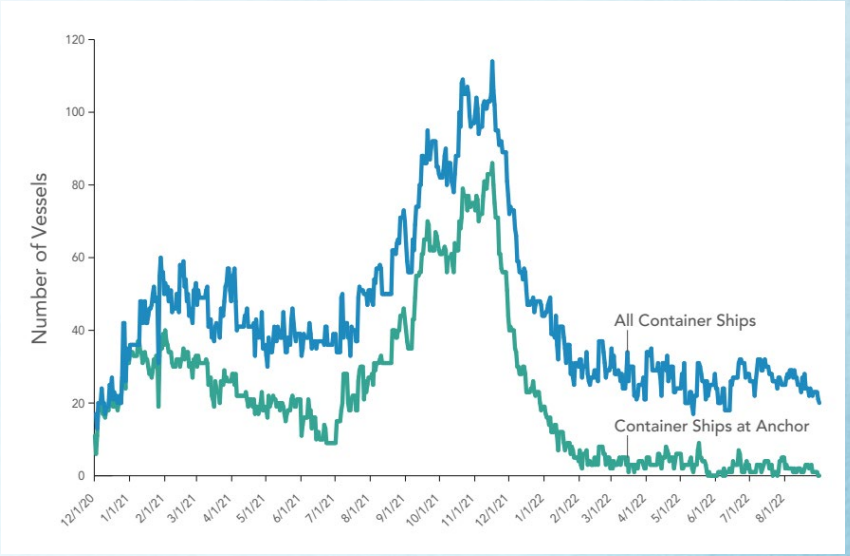


CARB

COVID-19 Pandemic Industry Impacts

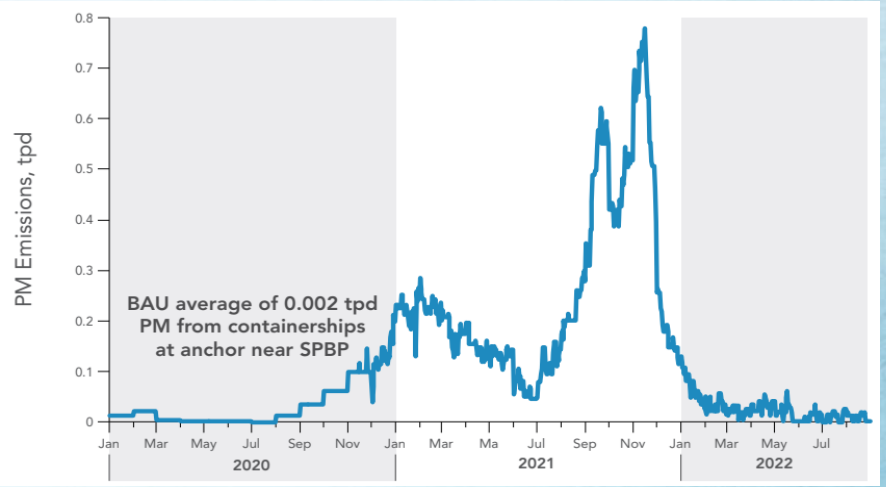
- Pandemic created widespread uncertainty in early days
  - Volatile schedules
  - Vessel lay-ups
  - Decreased vessel calls
  - Port congestion
- Port congestion led to high numbers of container vessels anchoring off San Pedro Bay Ports

Anchored Containerships off the
Ports of Los Angeles and Long Beach



NOx and PM Emissions from Anchored Container Vessels at San Pedro Bay Ports

- Increase in anchored container vessels led to sharp increase in NOx and PM emissions



CARB

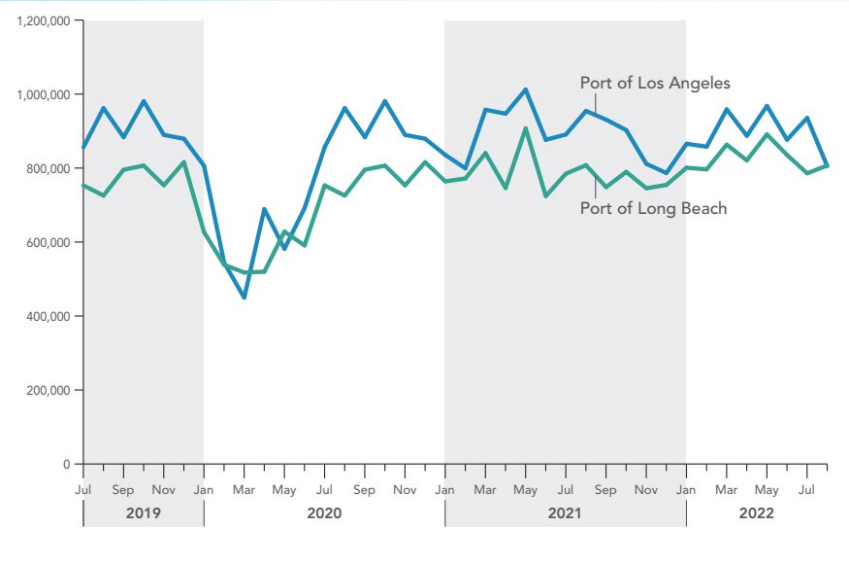
BAU = Business As Usual, SPBP = San Pedro Bay Ports

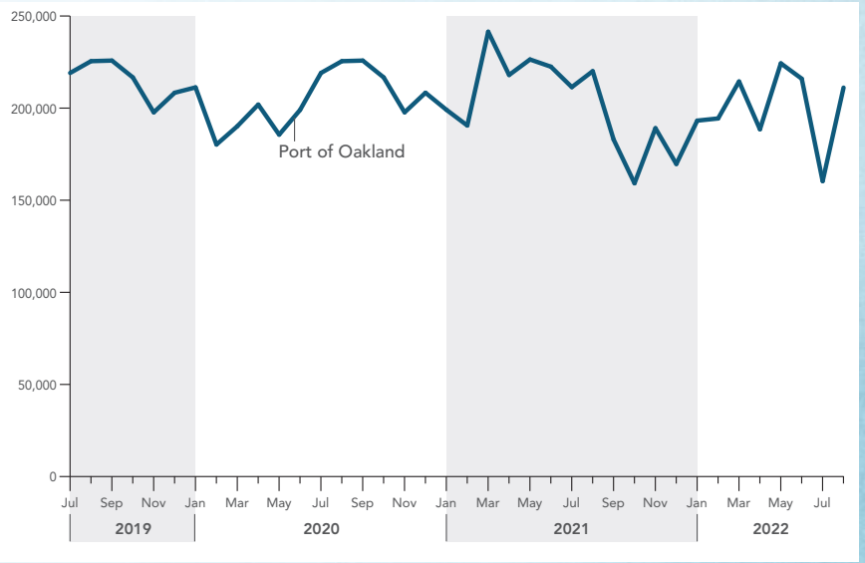
Recovering from COVID-19 Pandemic

- Cargo rebound in 2020 led to record profits for container industry and oil companies
- Auto carrier volumes and cruise passenger demand were recovering to near pre-pandemic levels by mid-2022
- Supply chain disruptions and equipment shortages remain
  - The Regulation contains compliance pathways to accommodate pandemic-related delays, including:
    - Terminal and Vessel Incident Events (TIEs/VIEs)
    - Remediation Fund
    - Innovative Concepts

Container Throughput (in TEUs*)

- Cargo volumes (TEUs) dropped sharply at start of pandemic
- Container volumes grew sharply in 2020, reaching record highs

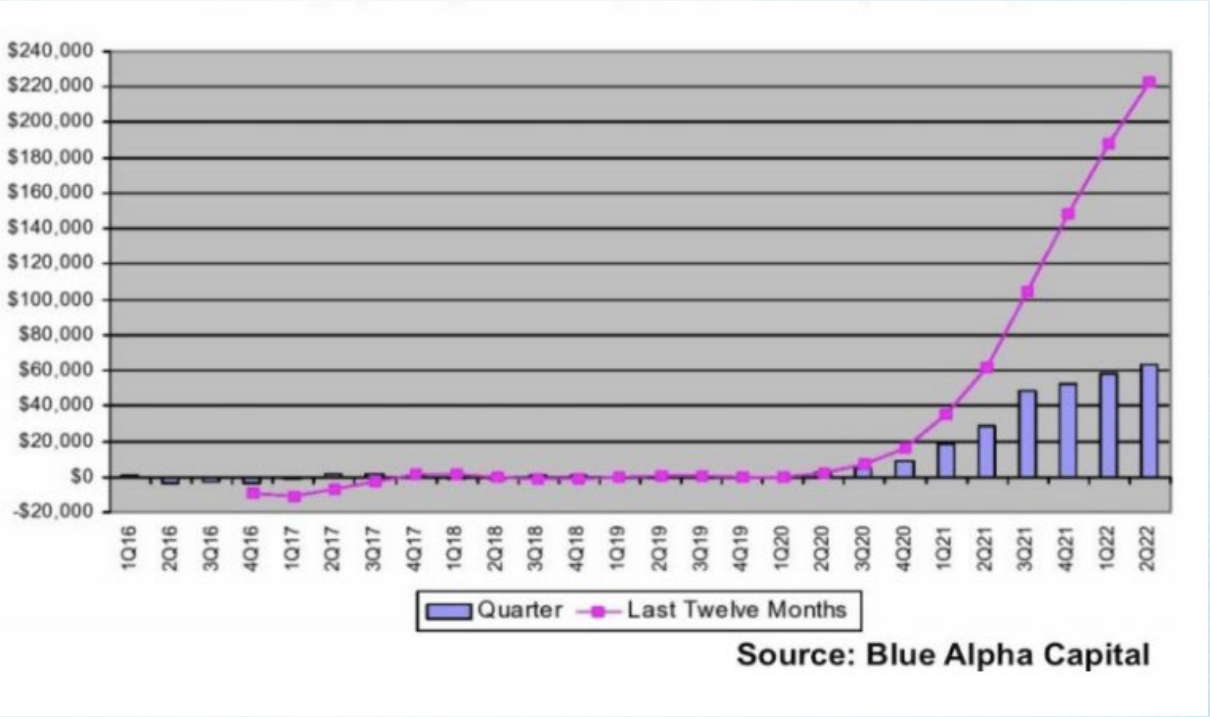




CARB

*TEU = Twenty-foot Equivalent Unit

Container Shipping Industry Net Income by Quarter From 2016 (in USD Millions)



CARB

Feasibility of Control Requirements for Bulk/General Cargo

- CARB staff engaged with bulk and general cargo operators
  - Received limited responses to requests for information
- Unique operational challenges remain:
  - Line-hauling
  - Tramp schedules
  - Physical berth constraints
- Emissions projected to grow from increased activity
- Pursuing measures that require cleaner vessels may be best way to achieve emissions reductions

Feasibility of Control Requirements for Vessels at Anchor

- Record numbers of container vessels anchored off San Pedro Bay Ports in 2021
- Solutions currently used to reduce emissions at berth are challenging to adapt to reduce emissions at anchor
- Voluntary vessel queuing system provided relief from 2021 anchorage congestion
  - No guarantee this program will be used in the future
  - More research needed to determine potential health impacts of vessels anchoring farther offshore
- Onboard solutions may provide best benefit to emissions at anchor

Conclusions

- No new significant concerns brought to CARB's attention
- Main compliance pathways are shore power or capture and control
  - Generally reflects findings from CARB staff's Berth Analysis
- Stakeholder key concerns include:
  - Meeting compliance timelines
  - CAECS availability
  - Feasibility and safety of control technologies for tanker vessels
- All regulated vessel categories have recovered or are recovering steadily from COVID-19 pandemic

Conclusions (cont.)

- Critical not to delay the health benefits provided by the At Berth Regulation
- Not recommending changes to implementation dates
  - Flexibilities built into the Regulation to assist with compliance
- Bulk/general cargo vessels and vessels at anchor
  - No significant technology advancements have been made
  - Further investigation of health impacts needed
  - Inclusion of these vessel categories may be more appropriate under future measures

Next Steps & Recommendations for Future Efforts

- Submit comments on the Interim Evaluation Report by March 8, 2023
- Update to CARB Board in May 2023
  - Brief Board on findings and recommendations
- Reductions needed from transiting, maneuvering, and anchoring
- Achieving in-transit emissions from vessels is necessary for significant NOx and PM reductions
  - Key to meeting CA State Implementation Plan for attainment
  - Emissions from OGVs expected to continue growing
  - Essential to public health protection for disadvantaged communities
- CARB staff recommend prioritizing exploration of measures to achieve additional reductions from vessels

Contact Information

- Bonnie Soriano, Chief, Freight Activity Branch, Bonnie.Soriano@arb.ca.gov, (279) 208-7264
- Angela Csondes, Manager, Marine Strategies Section, Angela.Csondes@arb.ca.gov, (279) 208-7190
- Nicole Light Densberger, Staff Air Pollution Specialist, Marine Strategies Section, Nicole.LightDensberger@arb.ca.gov, (916) 790-9176
- General Inquiries: ShorePower@arb.ca.gov
- More information can be found at: https://ww2.arb.ca.gov/our-work/programs/ocean-going-vessels-berth-regulation

Open Q&A