



Proposed Rule 2304 Indirect Source Rule for Commercial Marine Ports

Working Group Meeting #2

Join Zoom Webinar Meeting
- from PC or Laptop
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Zoom Webinar ID: 974 7605 5135
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June 14, 2022, 10:00 AM

Agenda



Health Effects Discussion



Rule Background



Terminal Operations &
Rule Structure Considerations



Next Steps



Discussion

Health Effects

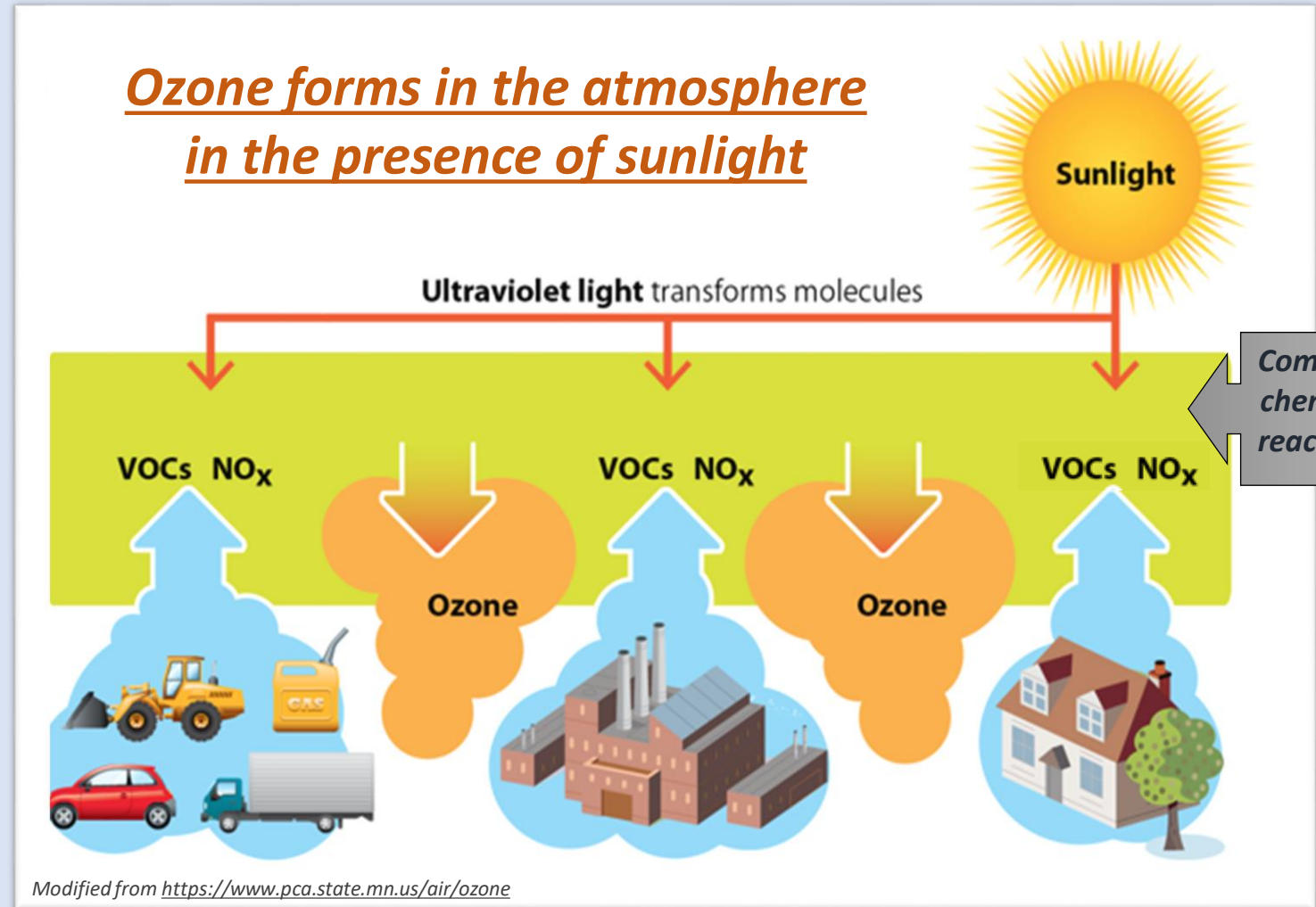
Dr. Nichole Quick, MD, MPH

Criteria Pollutants

- Ozone, particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO_x), sulfur dioxide (SO_x)
- Harmful to human health and the environment

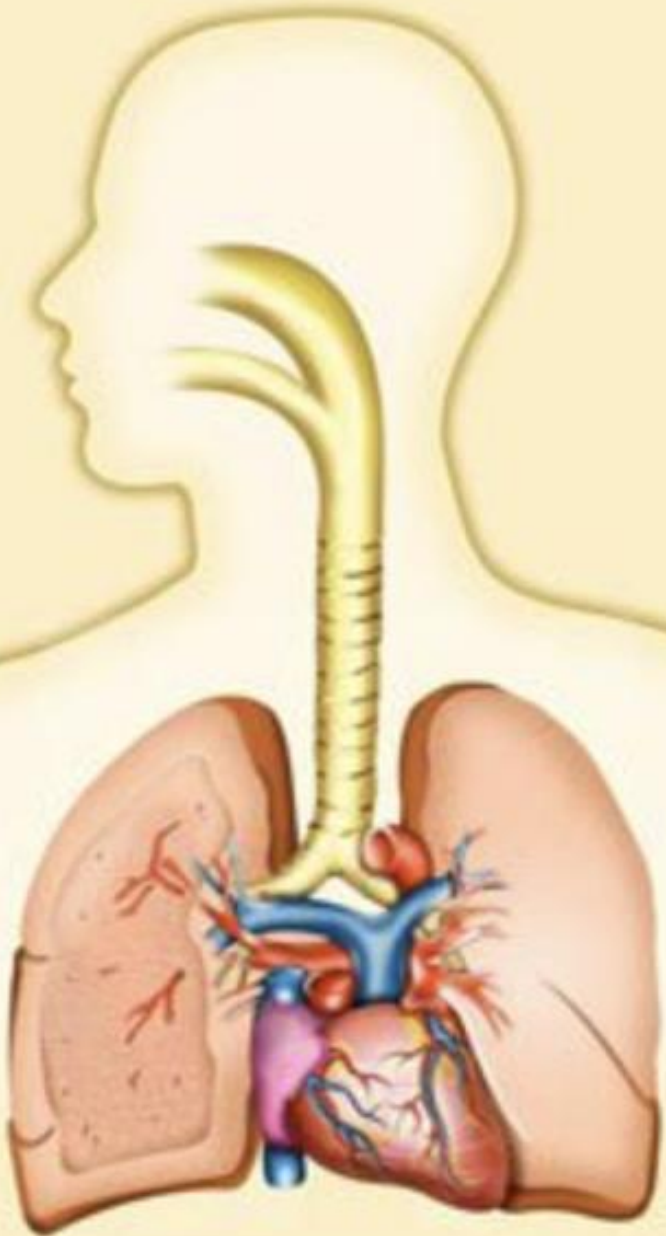
Ozone

- Not emitted directly; created by chemical reactions between NO_x and volatile organic compounds (VOC) in the presence of sunlight
- Pollutants emitted by heavy duty vehicles, ships, locomotives, cars, power plants, industrial boilers, refineries, chemical plants, and other sources
- Regional effect



Key Health Effects of Ozone

- Inflames and damages the airways
- Coughing, sore throat
- Makes lungs more susceptible to infection
- Aggravates lung diseases such as asthma, emphysema, and chronic bronchitis
- Increases the frequency of asthma attacks



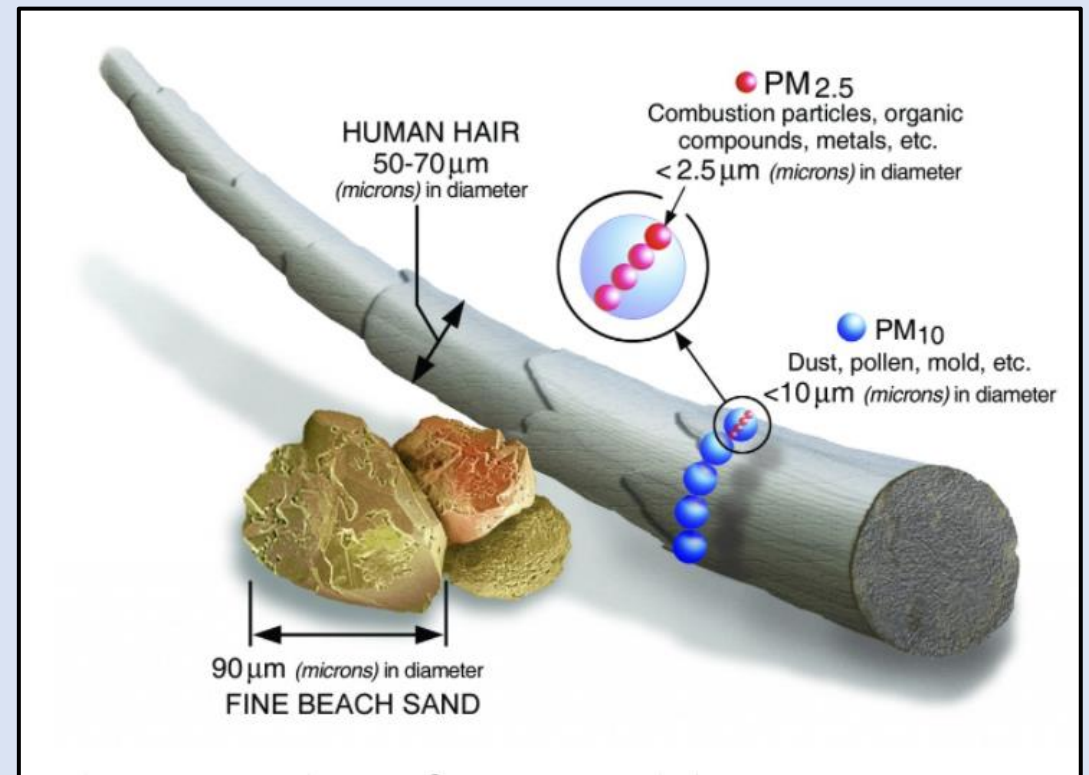
Particulate Matter (PM)

Sources of PM

- Emitted directly: construction sites, unpaved roads, smokestacks, fires, vehicle exhaust
 - *Directly emitted PM from diesel vehicles has a local effect*
- Most fine particles form in the atmosphere as a result of complex reactions of chemicals (SO_x, NO_x, etc.)
 - *PM formed in the atmosphere has a regional effect*

Health Effects of PM

- Premature death in people with heart or lung disease
- Heart attacks, irregular heartbeat
- Aggravated asthma, decreased lung function
- Increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing
- Ultrafine (<math><0.1 \mu\text{m}</math>): not regulated but known health effects
- PM from diesel exhaust is a carcinogen



Diesel Exhaust

- Source of directly emitted PM
- Local effect
- Emission sources at ports:
 - ✓ *Ships (container, cruise, etc.)*
 - ✓ *Harbor craft (like tugs, ferries, fishing vessels)*
 - ✓ *Trucks*
 - ✓ *Cargo Handling Equipment*
 - ✓ *Locomotives*
- Congestion at ports increases emissions of PM and resulting health effects

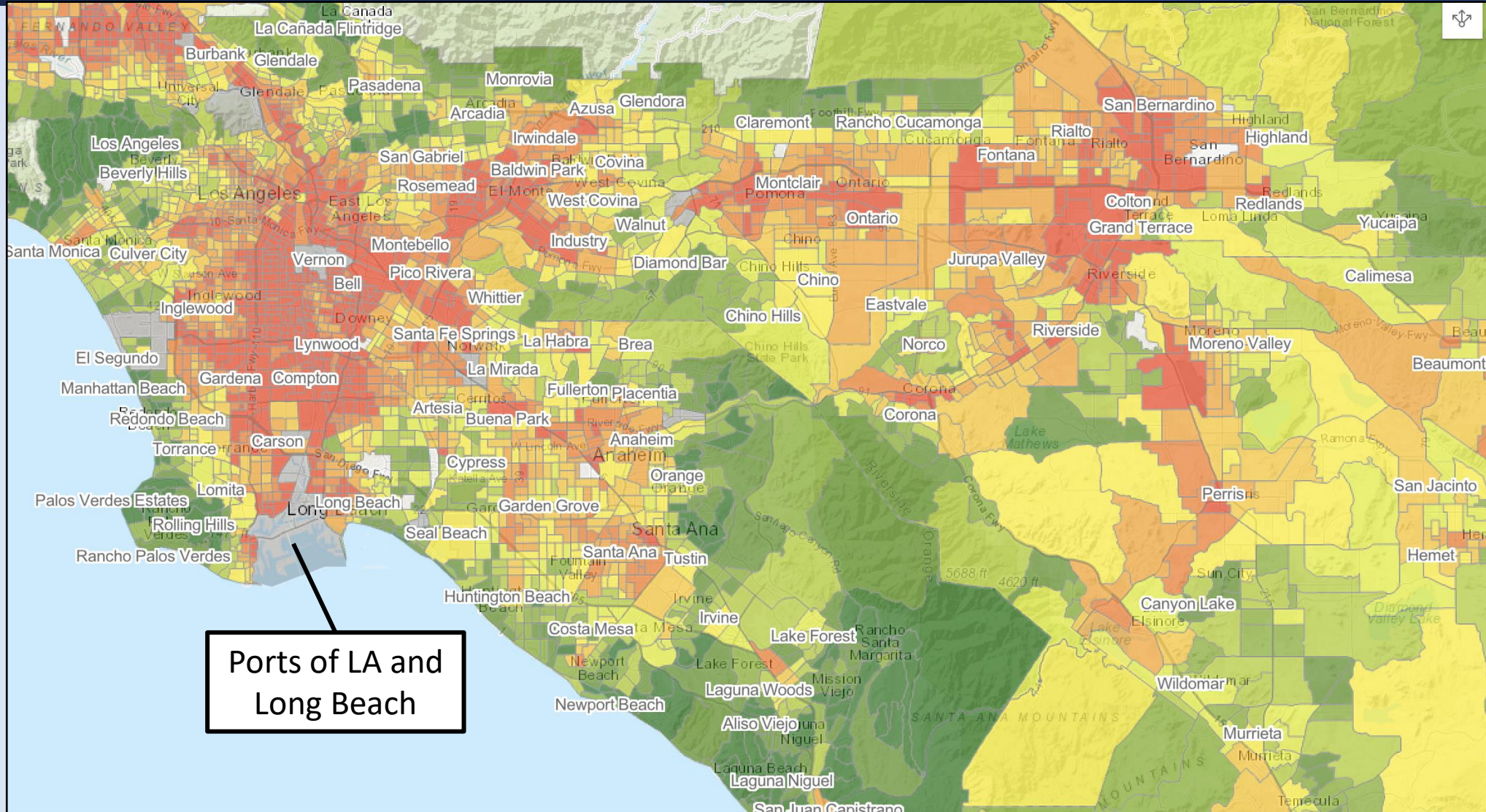
CalEnviroScreen

- Mapping tool that helps identify California communities that are most affected by many sources of pollution
- Uses environmental, health, and socioeconomic information to produce scores for every census tract in the state
- Scores are mapped so that different communities can be compared
- An area with a high score is one that experiences a much higher pollution burden than areas with low scores

CalEnviroScreen (continued)

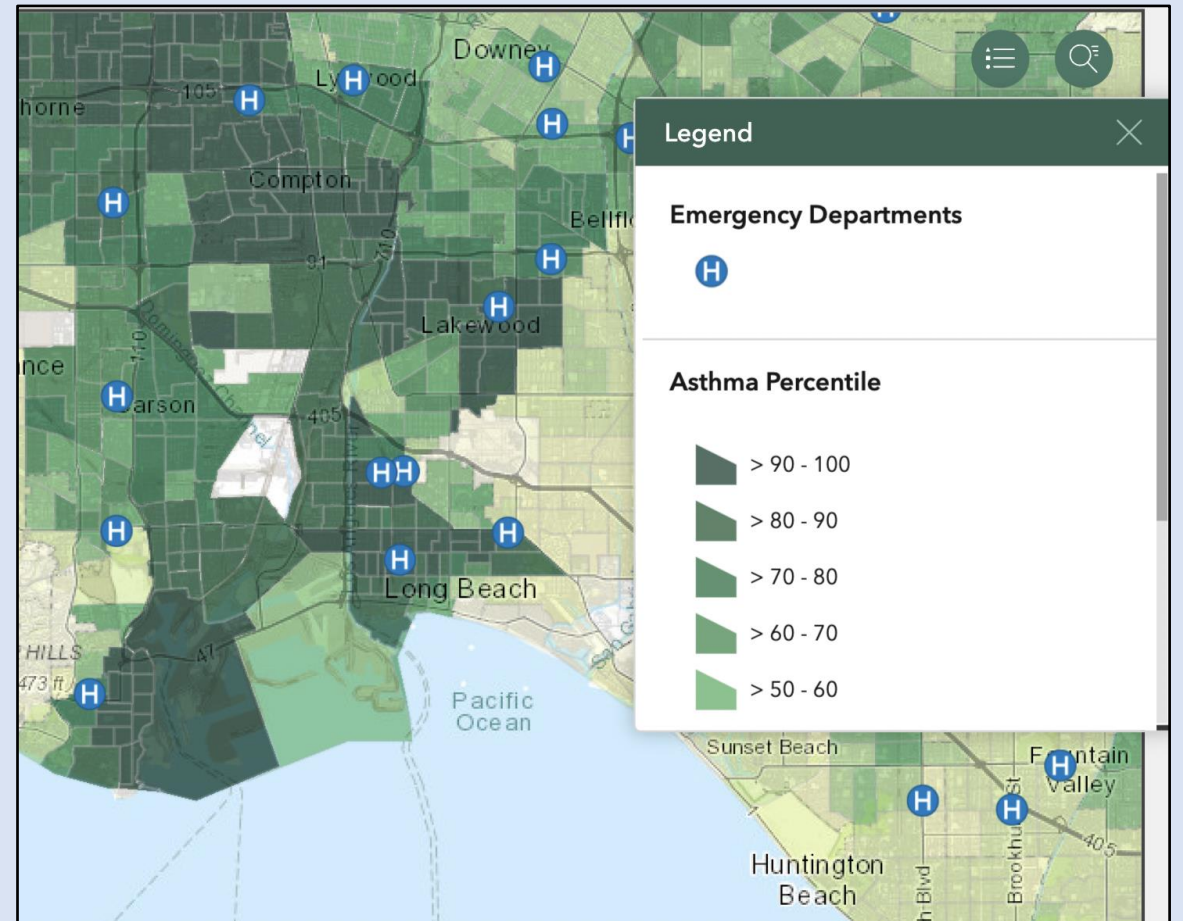
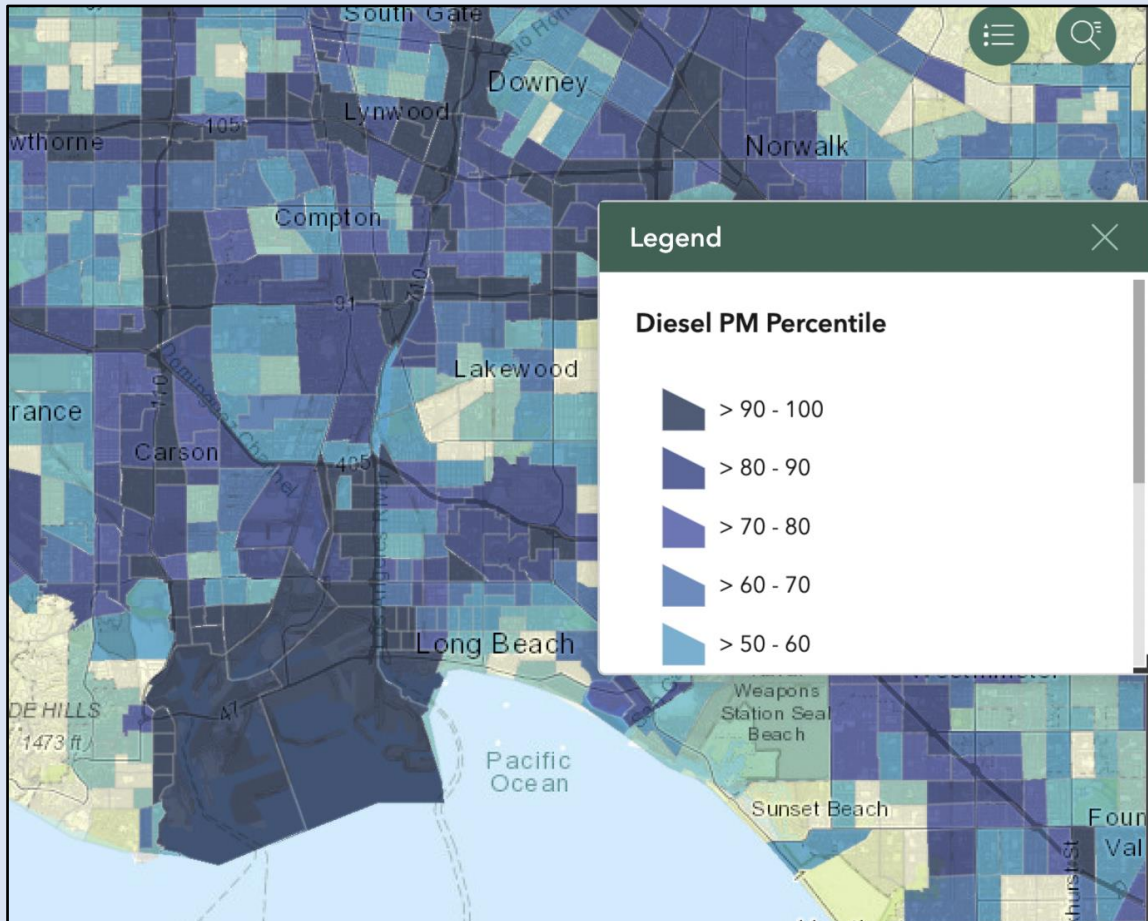
- Population characteristics:
 - Asthma
 - Spatially modeled, age-adjusted rate of emergency department (ED) visits for asthma per 10,000 people averaged over 2015-2017
 - Cardiovascular disease
 - Spatially modeled, age-adjusted rate of ED visits for heart attacks (acute myocardial infarctions) per 10,000 people averaged over 2015-2017
 - Low birth weight
 - Percent low birth weight averaged over 2009-2015

CalEnviroScreen (continued)



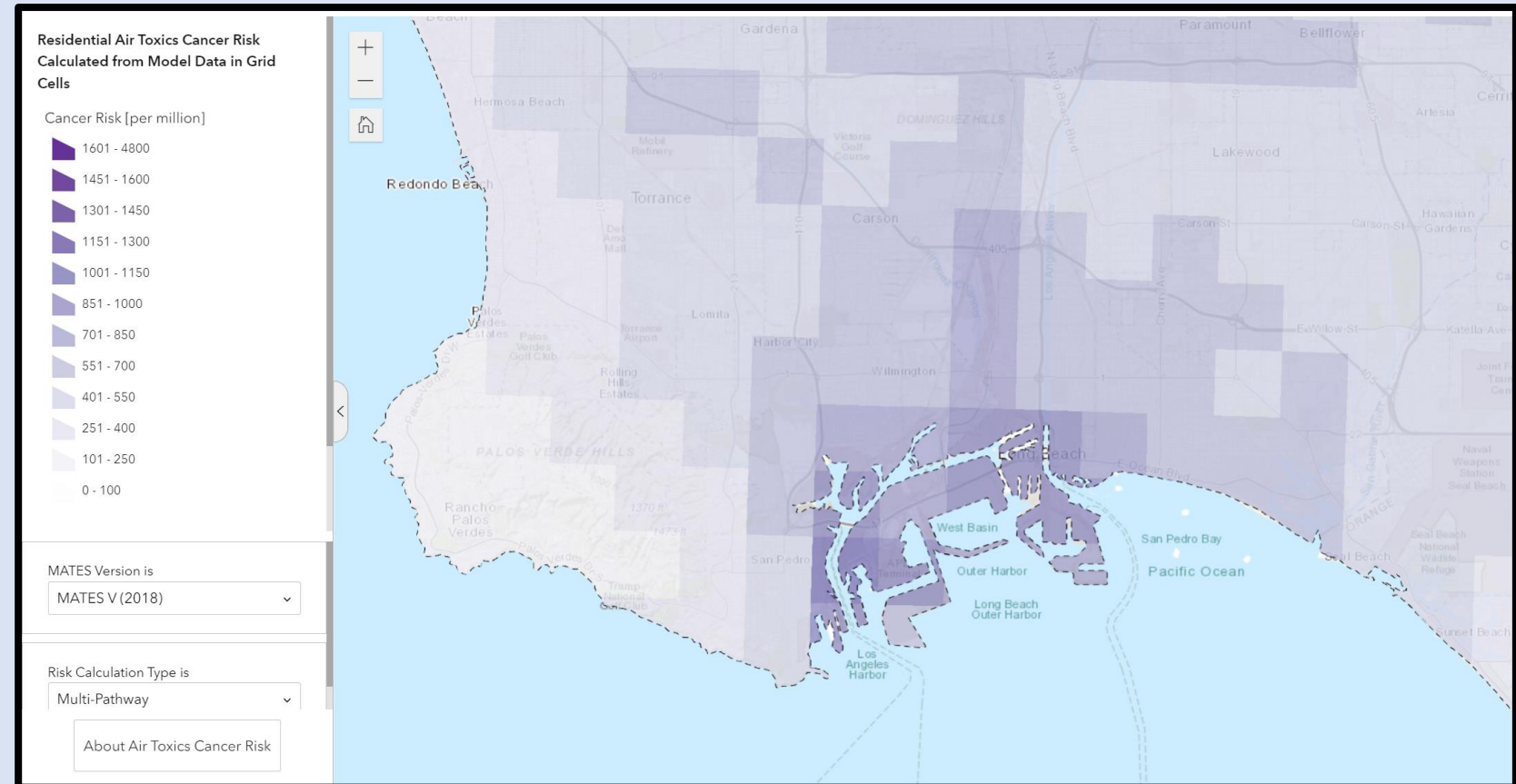
CalEnviroScreen (continued)

Diesel PM & Asthma Percentiles



South Coast AQMD MATES V

- MATES V includes a Health Risk Assessment of all emission sources throughout the region
- Clear pattern of increased air toxics cancer risk in the community near the port complex



2016 AQMP: Health Benefits



~2,500 fewer annual asthma-related emergency room visits



~700 fewer annual hospital admissions related to asthma, cardiovascular, or respiratory conditions



>200,000 fewer annual person-days of work and school absences



An annual average of 1,600 premature deaths avoided

Public health benefits estimated to be \$173 billion cumulatively for meeting air quality standards (2017-2031)

Types of Health Assessments

Type	Scope	Air Quality Analysis	Health Effect Endpoints	Assessed Populations
Health Risk Assessment	Local	<ul style="list-style-type: none"> • Computer modeling of directly emitted pollutants • Ground-level concentration predicted downwind of a source 	<ul style="list-style-type: none"> • Cancer risk • Non-cancer acute risk • Non-cancer chronic risk 	<ul style="list-style-type: none"> • Individuals <ul style="list-style-type: none"> • Residential • Worker • Sensitive receptors • Community-wide
Health Benefits Analysis	Regional	<ul style="list-style-type: none"> • Transport and atmospheric chemistry modeling of criteria pollutants • Changes in atmospheric concentration predicted throughout the study region 	<ul style="list-style-type: none"> • Premature death • Hospitalization (asthma, heart attack) • Emergency room visits • Missed school/work days • Etc. 	<ul style="list-style-type: none"> • Region-wide • Demographic splits <ul style="list-style-type: none"> • Age • Race • Sub-region • Etc.

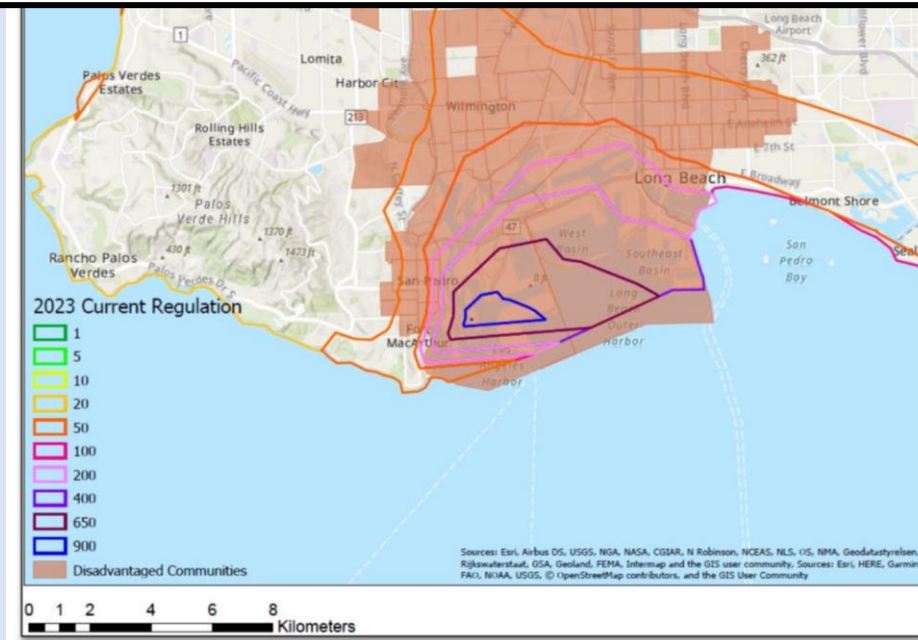
CARB Studies

- CARB is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change
- Two recent rulemakings provide examples of different types of air quality-related health studies
 - Health Risk Assessments and Health Benefits Analyses
 - Commercial Harbor Craft Regulation
 - At Berth Regulation
 - Emissions Impact of Recent Congestion at California Ports

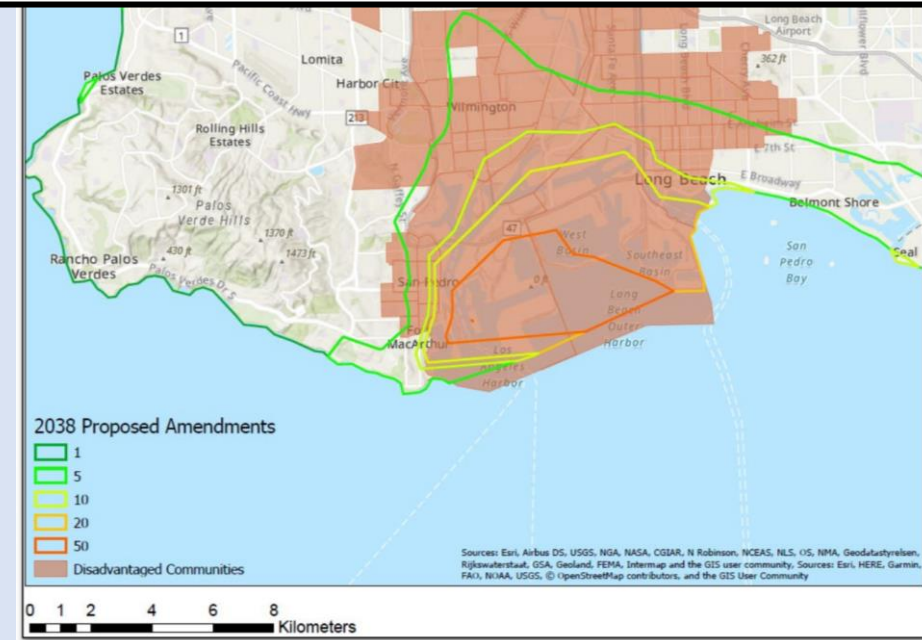
CARB Commercial Harbor Craft Rulemaking Analysis

- Health Risk Assessment evaluated potential cancer risk from harbor craft emissions with and without the amended regulation
 - Amended regulation requires zero emissions for some types of harbor craft, and cleanest engines available for others

Potential Cancer Risk from Harbor Craft Emissions in 2023 without Amended Regulation



Potential Cancer Risk from Harbor Craft Emissions in 2038 with Amended Regulation



CARB Commercial Harbor Craft Rulemaking Analysis (continued)

- Health Benefits Analysis evaluated non-cancer health endpoints
 - Analysis includes estimate of monetized benefit from avoided health outcomes

Estimated Total Cumulative Reduction in Adverse Health Outcomes from 2023 to 2038 with Amended Regulation

Air Basin	Cardiopulmonary Mortality	Hospitalizations for Cardiovascular Illness	Hospitalizations for Respiratory Illness	Emergency Room Visits for Asthma
South Coast	295 (230 - 360)	42 (0 - 82)	50 (12 - 88)	128 (81 - 176)
STATEWIDE	531 (415 - 651)	73 (0 - 144)	88 (21 - 155)	236 (149 - 323)

Estimated Monetized Valuation from Avoided Adverse Health Outcomes from 2023 to 2038 with Amended Regulation

Avoided Health Outcome	Statewide Valuation
Avoided Premature Deaths	\$5,242,800,000
Avoided Hospitalizations	\$8,700,000
Avoided Emergency Room Visits	\$197,000
Total Valuation	\$5,251,697,000 (\$5.25 billion)

CARB At Berth Regulation

- Health Risk Assessment and Health Benefits Analysis conducted for amended At Berth Regulation
 - Regulation reduces diesel PM and NOx from ocean-going vessels' auxiliary engines while they are docked at California ports

Potential Cancer Risk from At Berth Emissions in 2031 with and without Amended Regulation



Estimated Total Cumulative Reductions in Adverse Health Outcomes from 2021 to 2032 with Amended Regulation

Air Basin	Premature Deaths	Hospital Admissions	Emergency Room Visits
South Coast	209 (164 - 256)	66 (8 - 122)	104 (66 - 142)
Total	250 (195 - 305)	78 (10 - 145)	126 (79 - 172)

- At Berth rulemaking analysis scaled up to analyze port congestion impacts in 2021

Approximation of Adverse Health Outcomes due to Emissions from Extra Ships at Anchor due to Port Congestion in 2021

Cardiopulmonary mortality	20
Hospitalizations for cardiovascular illness	3
Hospitalizations for respiratory illness	3
Emergency room visits for asthma	10

Background - Staff Activities Since February Working Group Meeting:

March Mobile
Source Committee
Meeting

Ongoing health
effects discussions
with Dr. Quick

Continuation of rule
concept
development

Stakeholder
meetings with
environmental &
community groups

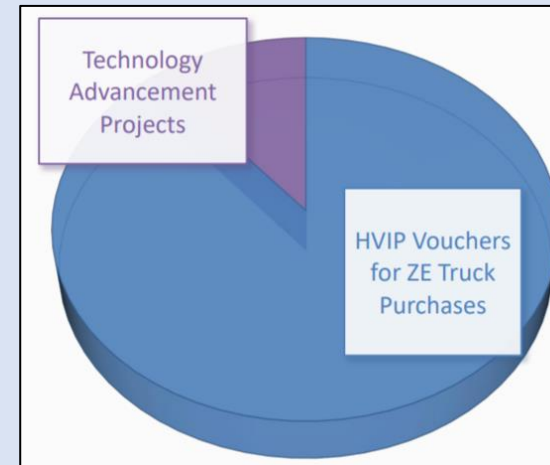
Group stakeholder
meeting with PMSA

Terminal tours & site
visits for information
gathering

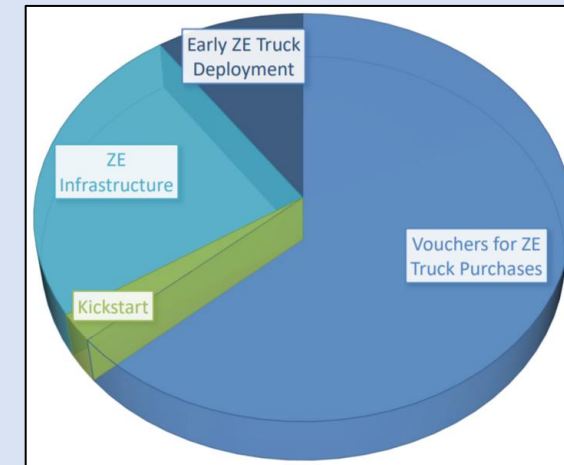
Background – Recent Key Activities at the Ports

- Ports began collecting truck fee on April 1
 - About \$8 million collected in month of April
 - Ports have separate spending plans
 - Total revenue anticipated in Year 1 = \$90 million
 - Spending plan aims to replace ~2% of trucks from Year 1 funding

POLA Year 1 Spending Plan



POLB Year 1 Spending Plan



- Port of Long Beach signed on to Port of LA/Shanghai Green Shipping Corridor
 - Goal is the first zero carbon trans-Pacific container ships by 2030
 - No specific goal yet for non-GHG pollutants
 - Reduce other supply chain emissions from participating ports (yet to be defined)

Background - Key Challenges for PR 2304

- Currently fleets that visit ports rely mostly on older conventional diesel technologies
 - Older diesel technology typically makes up >95% of fleets
- Transition to zero-emissions
 - Infrastructure hurdles
 - Timing / commercial availability of ZE technologies at scale
 - Remaining non-ZE fleets that haven't turned over to ZE yet will still be old diesels absent other approaches
 - Cost
- Federal/State regulatory authority

Background - PR 2304 Rule Concept Considerations

Air Quality Impacts from Port Operations

*State/Federal
Regulations &
Authority*

*Availability &
Feasibility of
Technology*

*Business Model of
Industry / Terminal-
Specific Operations*

*How are
decisions
made about
deploying
emission
sources?*

Recent staff focus

Terminal Types/ Terminal Operations

- ❖ It is important to understand facility operations for a successful rulemaking

Key Players in the Maritime Industry

Port Authority (PA)

- **San Pedro Bay Ports** act as a landlord port

Landlord Port

- The PA owns only the basic infrastructure, leasing it out to operators

Terminal Operator

- Entity operating the terminal – could be a stevedore, carrier, manufacturer, or other logistics provider

Labor Organization

- *ILWU, IBEW, Teamsters, etc.*

Beneficial Cargo Owner (BCO)

- The owner of the goods being shipped

Stevedore

- A person employed, or a contractor engaged, at a dock to load and unload cargo from ships

Carrier

- Provides transportation services and operates transportation equipment (e.g., truckers, rail, shipping lines, etc.)

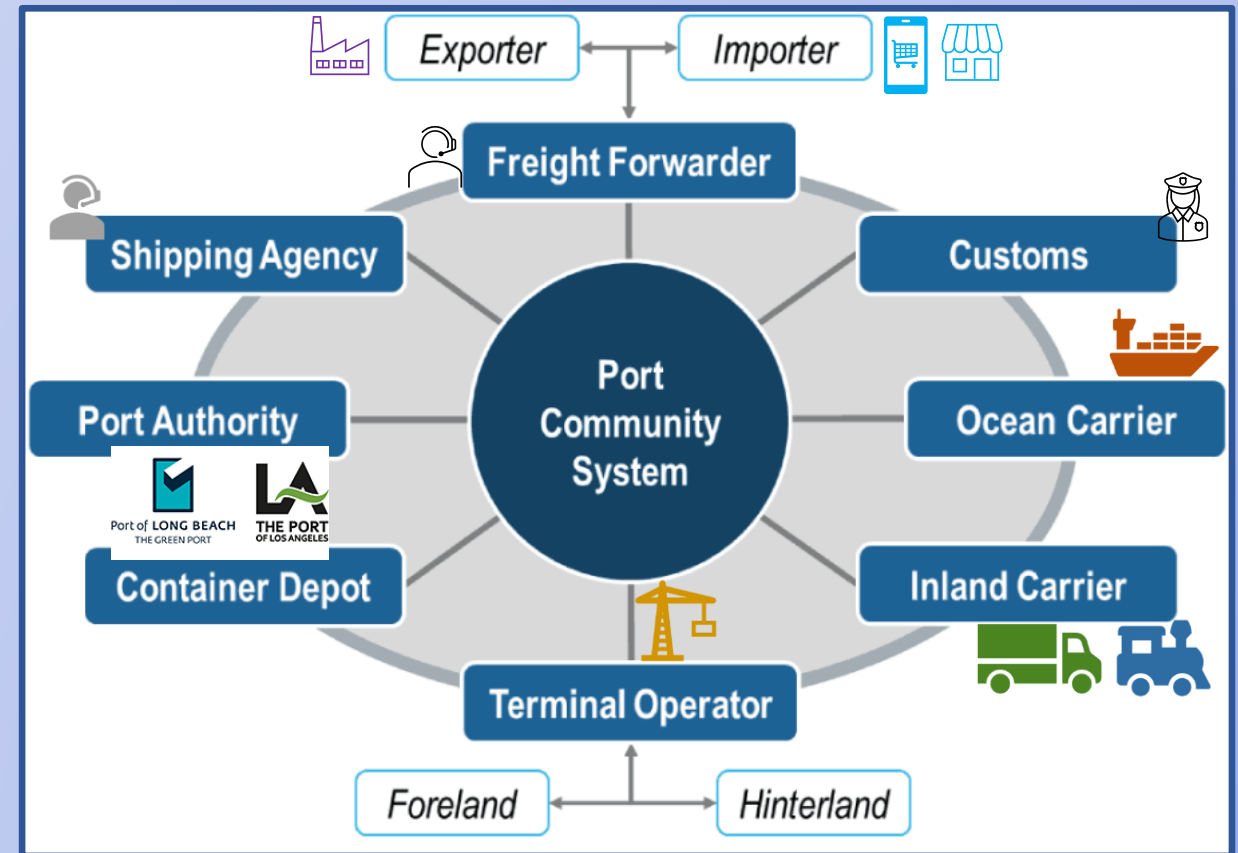
Shipper

- Contracts with the carrier for transportation of goods

Port Operations - Industry Business Model

Many entities involved in port operations

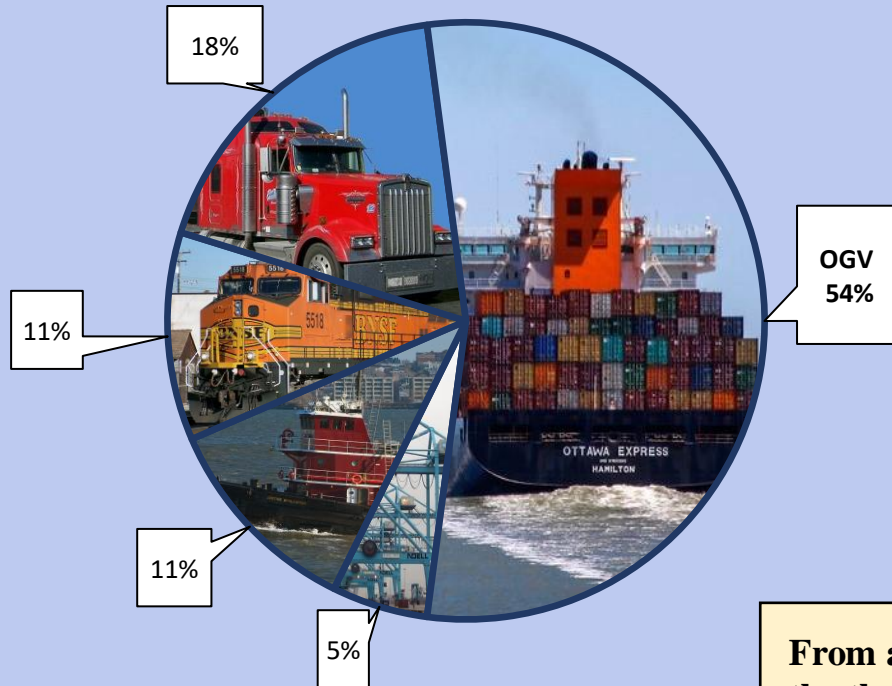
- Port authority/landlord
 - POLA & POLB
- Terminal operator/tenant
 - Independent
 - Affiliated with carriers
 - e.g., container terminals
 - Affiliated with importers
 - e.g., tanker terminals
- Carriers: ships, rail, trucks
- Beneficial Cargo Owners (BCO)
- Intermediaries



Source of underlying chart: Theo Notteboom, Athanasios Pallis and Jean-Paul Rodrigue (2022) *Port Economics, Management and Policy*.

San Pedro Bay NOx Emission Sources

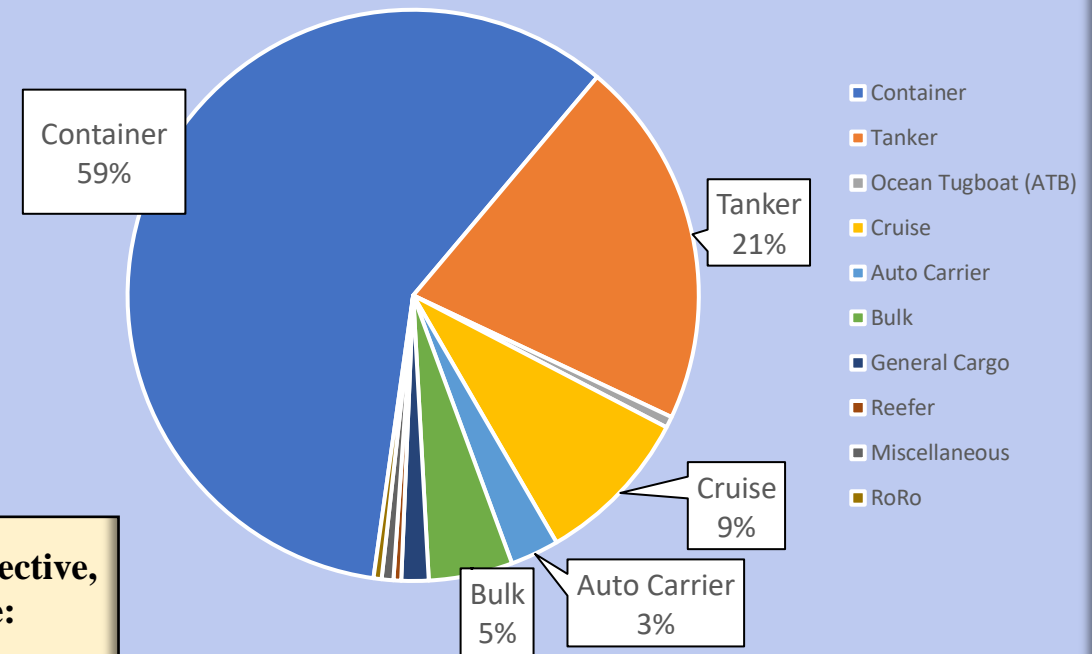
ALL SOURCE CATEGORIES



From an emissions contribution perspective, the three predominant vessel types are:

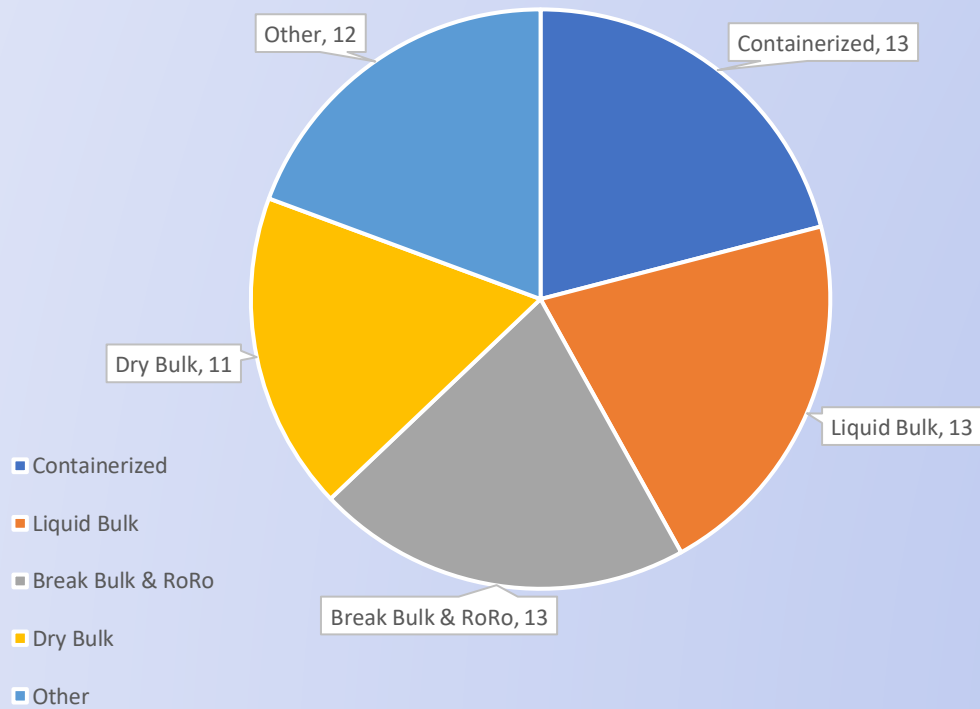
1. Containerships
2. Tankers
3. Cruise ships

2022 OGV NOx EMISSIONS BY VESSEL TYPE

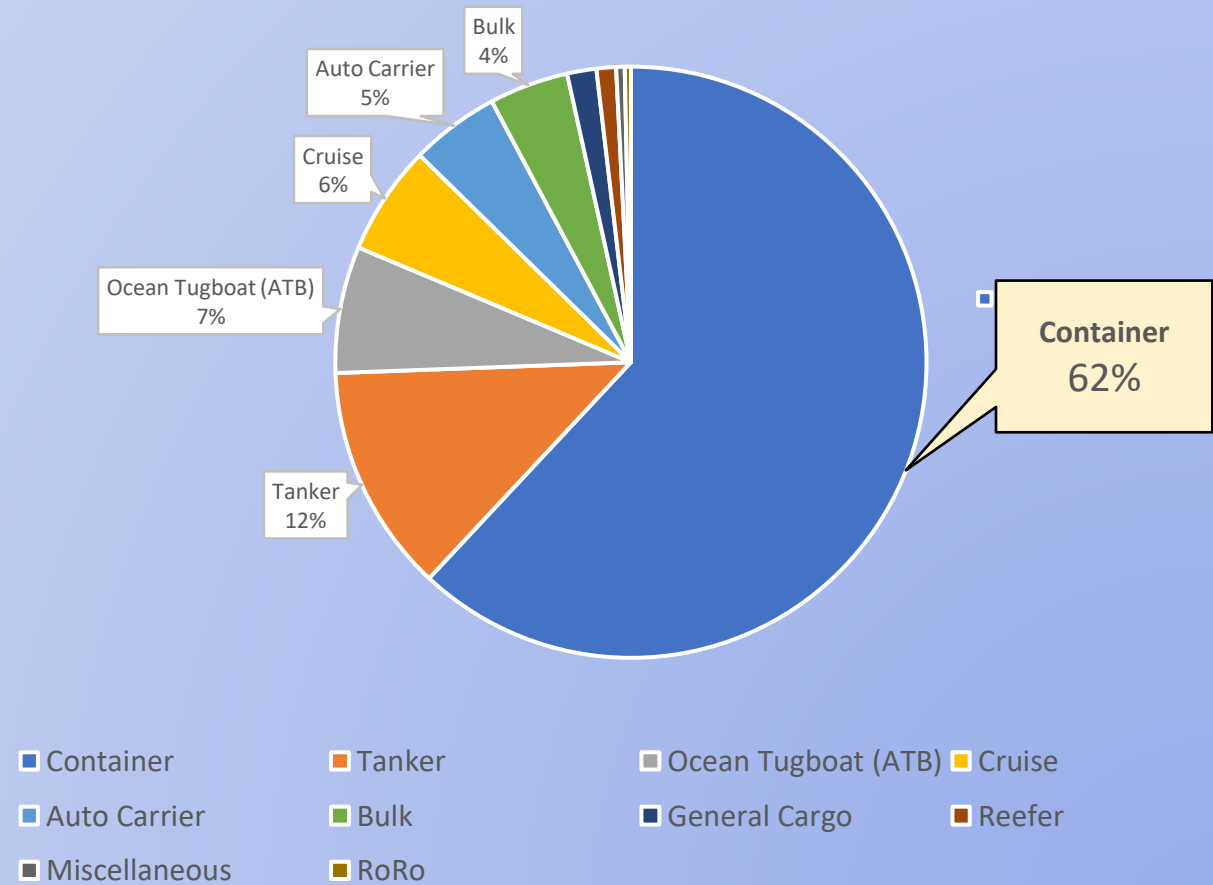


Not All Port Terminals Are Alike

Breakdown of the Count of Terminals by Terminal Type at POLA/POLB



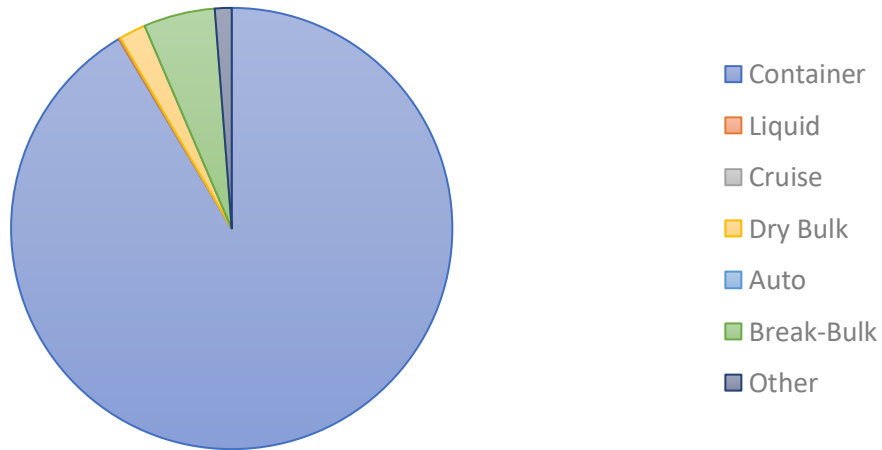
2020 Total OGV Departure Activities POLA



Potential PR 2304 Rule Structure Considerations

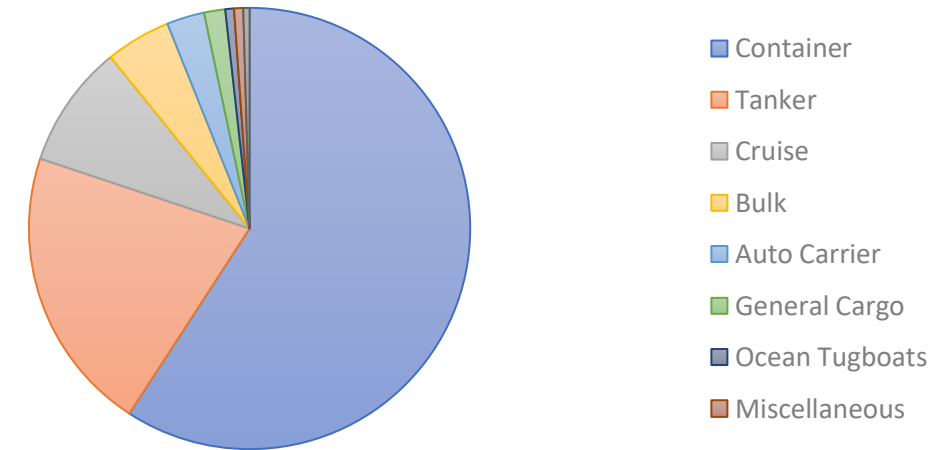
- One rule for all terminal types, or multiple rules for different terminal types?
 - Timing/sequencing? Grouping? Compliance metrics?

Cargo Handling Equipment NOx Emissions



610 tons in 2020

Ship NOx Emissions Within 40 nm of Ports



6,329 tons in 2020

Explore container terminals first

Container Terminals



Container terminals are facilities where cargo containers are transshipped between different transport vehicles, for onward transportation

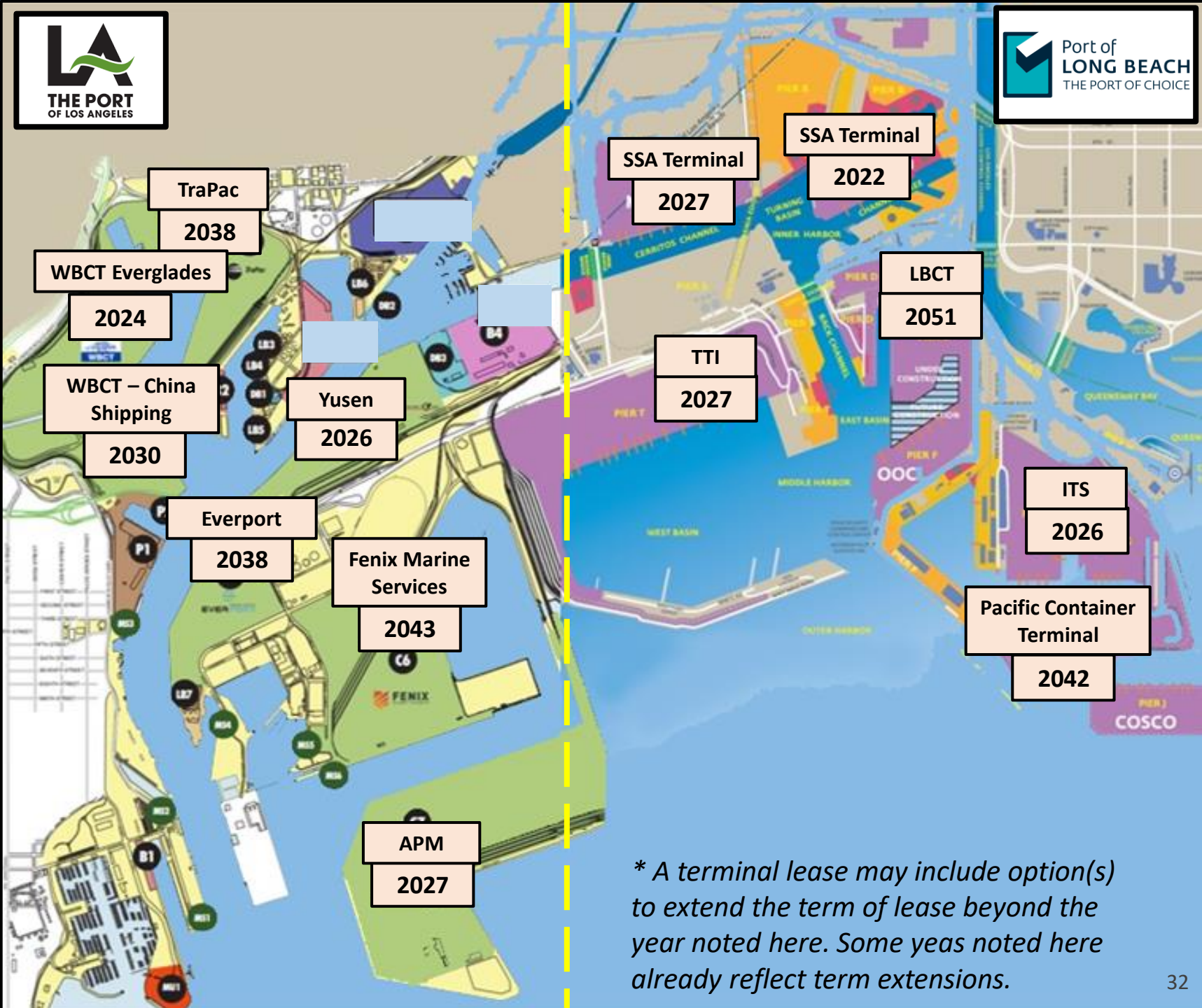
A container terminal relies on an array of cargo handling equipment (CHE) including cranes, trucks, and forklifts

- ❖ The Ports of Los Angeles and Long Beach are the two busiest marine container ports in the nation
 - A combined (13) major container terminals
 - *Container terminal may be (co-)owned/operated by ocean carrier*

Overview of Container Terminal Leases*

Typical agreement length with ports is 20 to 30 years
Longest agreement length is 50 years

Lease agreements provide opportunity for ports to include environmental mitigation on terminal



* A terminal lease may include option(s) to extend the term of lease beyond the year noted here. Some years noted here already reflect term extensions.

Simplified Terminal Business Models

- Next slides reflect staff's current understanding after discussions with industry stakeholders
- Simplified relationships are presented considering how a potential indirect source rule may apply to various commercial marine port participants
 - Logistics industry is substantially more dynamic and complex than shown on following slides
 - Additional complexities of these business relationships will continue to be explored with stakeholders during rulemaking
- Current preliminary ISR regulatory concepts include potential requirements addressing cleaner CHEs and OGVs and onsite infrastructure

Various Types of Ownership Structure for Container Terminal Operators/Tenants*

EXAMPLE 1:

Exclusively owned by a shipping line/ parent company:



&



EXAMPLE 2:

Co-ownership by a shipping line:



&

Pacific Container Terminal

EXAMPLE 3:

No shipping lines are involved in operations



&



*Terminal operator and tenant may or may not be the same entity.

Container Terminal Ownership

Container Terminal	Ownership of Terminal Tenant/Operator
APM Terminals Pacific	Maersk
EverPort Terminal Services	Evergreen
Fenix Marine Services	CMA CGM, EQT Infrastructure
International Transportation Service (ITS)	Macquarie Infrastructure Partners, Ports America
Long Beach Container Terminal	Macquarie Infrastructure Partners
Pacific Container Terminal	COSCO, SSA, CMA CGM
SSA Terminals (Pier A)	SSA, Terminal Investment Ltd. (MSC)
SSA Terminals (Pier C)	Matson, SSA
Total Terminals International	Terminal Investment Ltd. (MSC), HMM
TraPac	MOL, Brookfield Asset Management
WBCT - China Shipping (Holding) NA	China Shipping (COSCO)/COSCO, Yang Ming, Ports America
WBCT - Everglades Company Terminal	Terminal Investment Ltd. (MSC)/COSCO, Yang Ming, Ports America
Yusen Terminals	NYK, Macquarie Infrastructure Partners

Consolidation in Shipping Industry

The top ten container shipping lines by size control >85% of the share of trans-Pacific traffic



Opportunity for consolidated decision-making on many emission sources

Major shipping lines have an ownership stake in 11 of the 13 container terminals at POLA/POLB

Shipping Line Relationships

- ❖ Some terminals owned or partially owned by a specific shipping line, but also service other shipping lines

Examples:



➔ 7 Terminals serviced



➔ 6 Terminals serviced

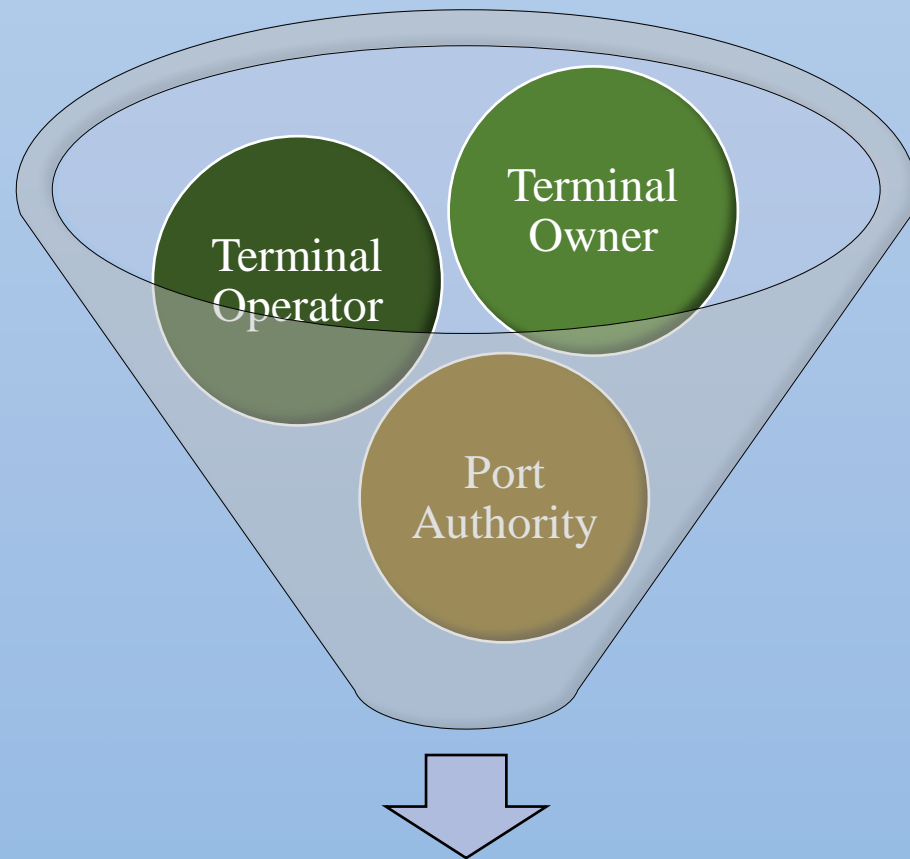
- ❖ Some shipping lines are integrated with other logistic services

Ocean Transportation Intermediaries (OTIs) are either Ocean Freight Forwarders or Non-Vessel-Operating Common Carriers and are regulated by the Federal Maritime Commission pursuant to the [Shipping Act of 1984](#).

Examples:



Potential Rule Applicability



ISR Applicability TBD

Business operations as they relate to applicability

- ✓ Who coordinates with carriers of ships, trucks, and trains
- ✓ Ability to phase in cleaner equipment
- ✓ Infrastructure planning needs & utility demand

Next Steps

- Working group meetings every 2-3 months
 - Continue to meet regularly with stakeholders in between WG meetings
- Committee update in August

Release Draft Rule Language

Conduct Community Meeting & Public Workshop

Public Hearing

June
2022

1st/2nd
quarter 2023

2nd Quarter
2023

3rd Quarter
2023

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Sign up for the mailing list at: <https://www.aqmd.gov/sign-up> (select “Proposed Rule 2304”)

Email us at: PortsISR@aqmd.gov.

For more information, visit: www.aqmd.gov/fbmsm (click into “Commercial Marine Ports”)