



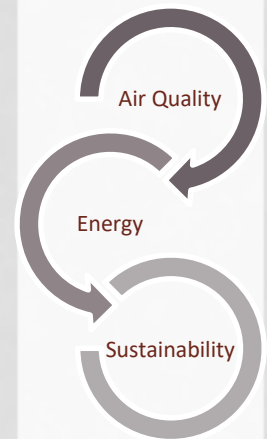
STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION



DIVISION OF AIR QUALITY AIR QUALITY, ENERGY, AND SUSTAINABILITY

OCEAN GOING VESSELS & HARBOR CRAFT

BUREAU OF MOBILE SOURCES



Stakeholder Meeting - September 16, 2020

OVERVIEW

1. Ocean Going Vessels

1. What are the emissions & how can they be controlled?
2. CARB regulations and their potential application to NJ
3. Answer questions and discuss issues.

2. Harbor Craft

1. What are the emissions and how can they be controlled?
2. CARB regulations and their potential application to NJ
3. Answer questions and discuss issues



REGULATORY CONCEPTS

- California is developing updated regulations expanding the use of shore power and emissions capture systems for ocean going vessels at berth.
- California has existing rules requiring the use of low sulfur fuels within 24 nm of shore.
- New Jersey could adopt by reference relevant sections of the California Code of Regulations.

CURRENT CARB REGULATIONS

- Adopted 2007 with 2014 implementation
- Auxiliary engines on container and reefer ships
 - 50% power reduction in 2014
 - 80% final power reduction by 2020
- Option of using shore power or emissions capture systems with alternative technology allowed

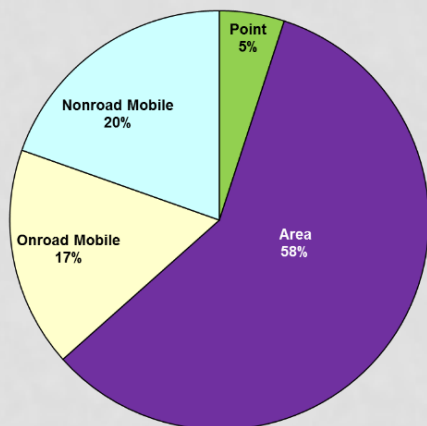
CURRENT CARB RULE DEVELOPMENT

<u>Existing Regulation</u>	<u>Proposed Regulation</u>
Container, reefer and cruise	Expands to ro-ro and tanker vessels
Ports and terminals have limited responsibilities	Shared requirements for vessels, ports, terminals, and third party providers
Compliance based on annual fleet average	Compliance based on individual visit
Covers 6 named ports	Includes more ports and terminals (~10)
Reduces aux. engine emissions	Also reduces tanker boiler emissions
Visit begins when vessel first ties to dock	Adjusting visit start time until after vessel is cleared to work

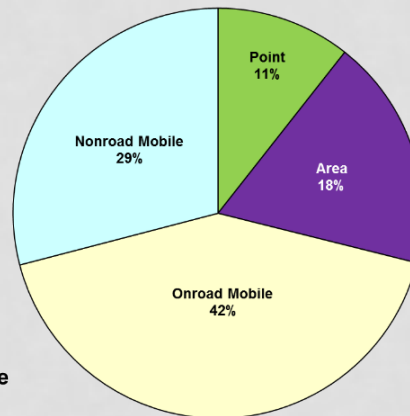
Credit to CARB

CONTRIBUTION OF MOBILE SOURCES TO AIR POLLUTION

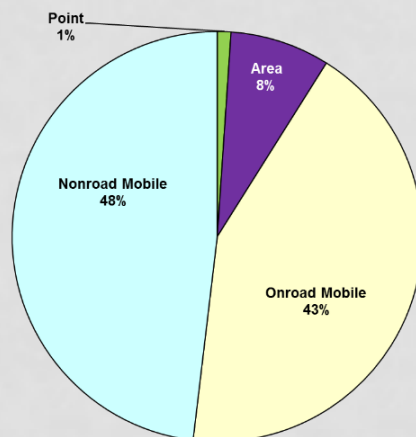
**New Jersey 2017 Volatile Organic Compounds
Projected Emissions Inventory
Tons Per Year**



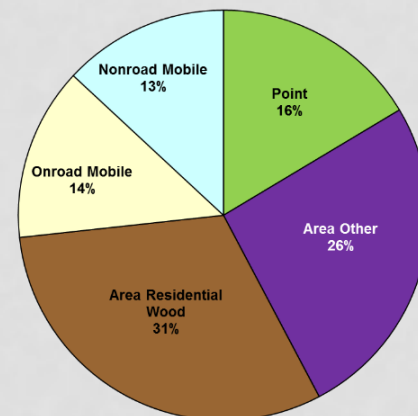
**New Jersey 2017 Nitrogen Oxides
Projected Emissions Inventory
Tons Per Year**



**New Jersey 2017 Carbon Monoxide
Projected Emissions Inventory
Tons Per Year**



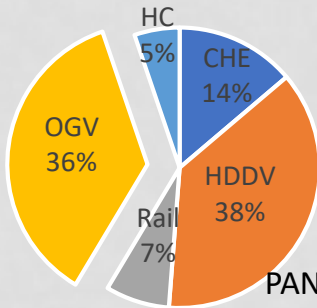
**New Jersey 2017 Fine Particulate Matter
Projected Emissions Inventory
Tons Per Year**



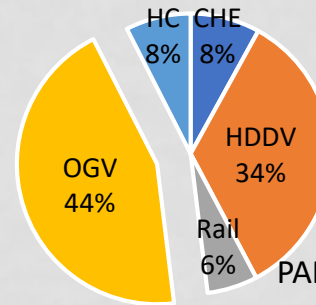
Note:
Area Source fugitive dust emissions are post-adjustment

CONTRIBUTIONS AT THE PORT – THE OCEAN-GOING VESSELS

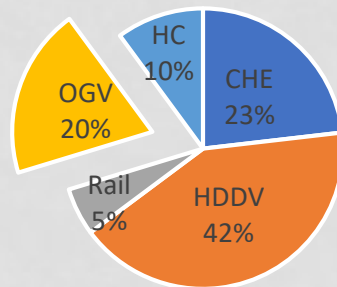
PANYNJ 2018 VOC TPY



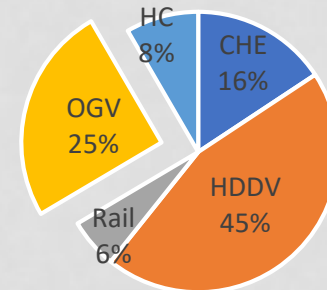
PANYNJ 2018 NO_x TPY



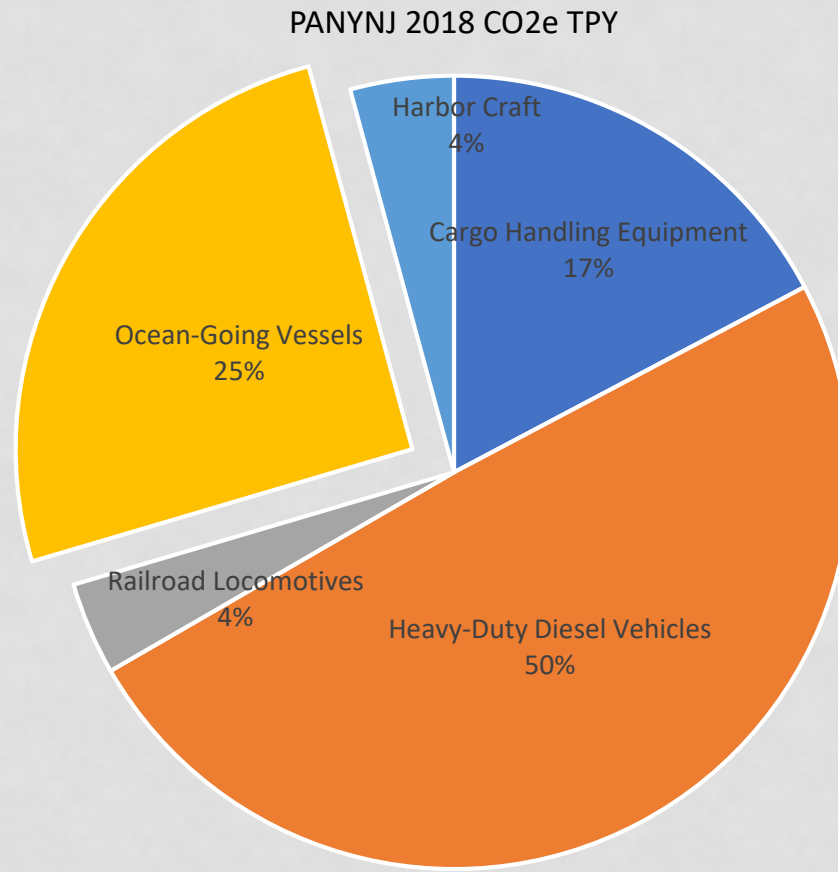
PANYNJ 2018 CO TPY



PANYNJ 2018 PM_{2.5} TPY



GHG CONTRIBUTIONS AT THE PORT



ROLE OF OCEAN-GOING VESSELS

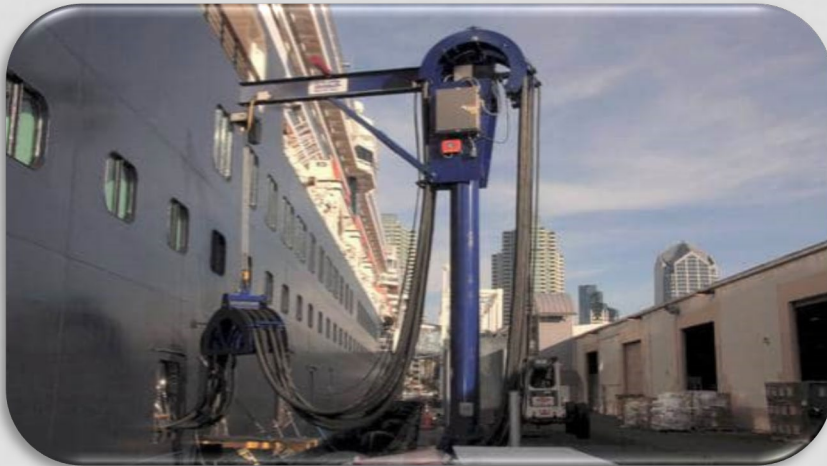
- Large commercial vessels moving cargo over water
- Operate auxiliary engines and boilers at berth and at anchor
 - Generate emissions of NO_x, PM, diesel particulate matter (DPM), ROG, GHG, black carbon, and other pollutants
- Types of vessels include container, refrigerated cargo (reefer), cruise, roll on-roll off (ro-ro), tanker, bulk, and general cargo
- Average vessel stays range from <24 hours to >5 days

PORT CALLS

- PANYNJ receives 3,000 ship calls per year w/ a mix of types
 - Container ships are the most common
 - Tankers the least (less than 100)
 - Each ship calls on the port an average of 10 times per year
 - Length of stay varies widely from 18 hours for auto carriers to over 100 hours for bulk ships; Container ships average 30 hours
- Other facilities in NY harbor see another 1,000+ calls

EMISSIONS CONTROL TECHNOLOGIES

Shore Power



Capture and Control Systems



Potential Strategies: Alternative fuels,
On-board Technologies

COSTS FOR SHORE POWER

- Shore power retrofit averages \$1 Mil per ship
- Each shore power installation averages \$7.2Mil/berth
 - Varies due to pier size and type of ships served

EMISSIONS CAPTURE CAPITAL COSTS

- Emissions capture systems can be land based or barge/ship based.
 - Land based systems average \$3.7Mil
 - Water based systems average \$5.8Mil
 - The above figures include an annual operation and maintenance cost of \$125,000 (Wharf) and \$150,000 (barge)

SHORE POWER VS. EMISSIONS CAPTURE

- Shore Power

- Eliminates nearly all local emissions from ship
- Reduces total GHG emissions
- More expensive
- Requires ship retrofit
- Requires large power available at berth

- Emissions Capture

- Reduces local ship emissions
- Water based systems increase total GHG emissions due to power needed to run scrubbing equipment; land based have small GHG reduction
- Lower installation costs
- Can service nearly all ships without ship retrofit
- Major space issues

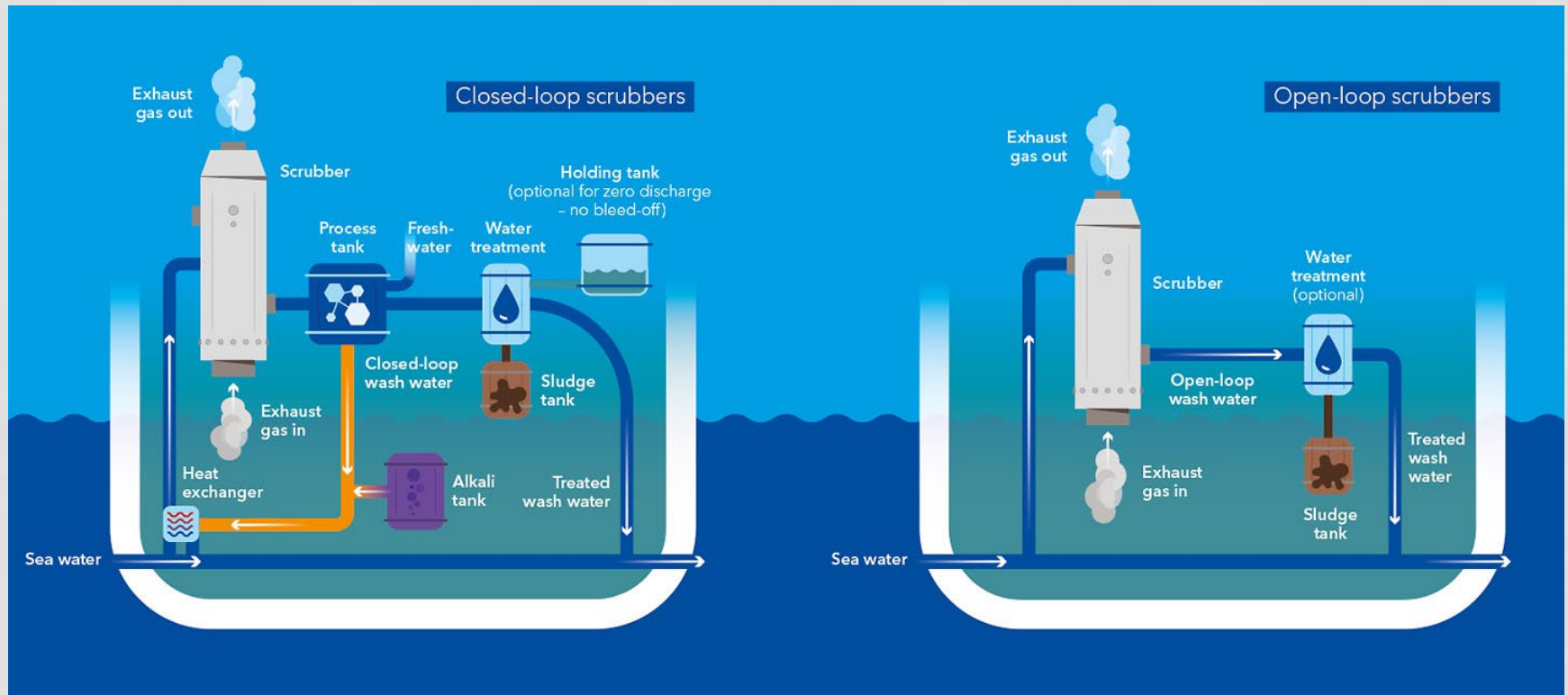
Credit to CARB

POTENTIAL EMISSIONS BENEFITS

- Based on CA experience; NJ results likely similar but will vary based on inventory of ships calling and what portion able to use shore power; note that for some categories at some ports, CA saw a net increase in GHG emissions due to the higher use of water-based emissions capture systems

Grand Total Percent Reduction					
Year	DPM	PM2.5	NOx	ROG	GHG
2021	12.0%	4.8%	9.5%	8.9%	2.2%
2023	18.5%	7.6%	14.6%	13.8%	3.5%
2025	36.6%	15.2%	28.8%	27.5%	5.4%
2027	44.7%	26.9%	38.1%	37.2%	3.7%
2029	51.5%	35.7%	45.5%	44.9%	2.5%
2031	51.6%	35.6%	45.9%	45.0%	2.9%

SCRUBBERS



STAKEHOLDER FEEDBACK OPPORTUNITIES

- Are there any questions about this material or potential application to NJ?
- Specific issues for consideration and discussion are on subsequent slides.

DISCUSSION ISSUES

- Issues for discussion:
 - Schedule
 - How much lead time does the industry need?
 - Implementation Issues
 - Electrical infrastructure for shore power or land-based emissions capture
 - Space for land-based or water-based equipment
 - Upgrades needed to utilize low sulfur fuels
 - Cost effectiveness based on # of calls
 - Industry assistance
 - Will industry organizations help us with outreach and education to appropriate parties?
 - Regulated Parties
 - Enforcement

COMMENTS

Please send comments and/or technical support information to:

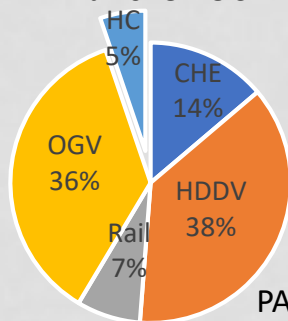
NJAirrulesmobile@dep.nj.gov

Use the following heading in the subject line of the email: Oceangoing Vessels

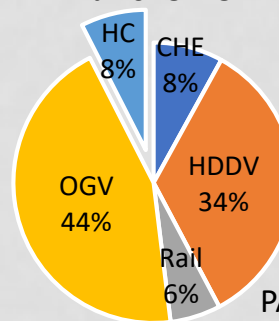
By October 14, 2020

CONTRIBUTIONS AT THE PORT – HARBOR CRAFT: TUGS & TOWS

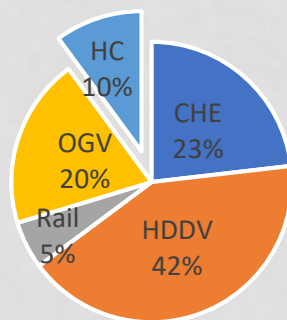
PANYNJ 2018 VOC TPY



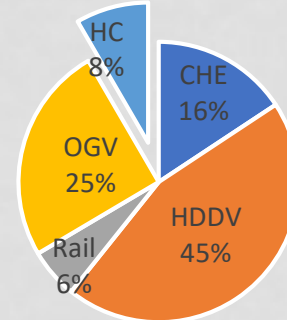
PANYNJ 2018 NOx TPY



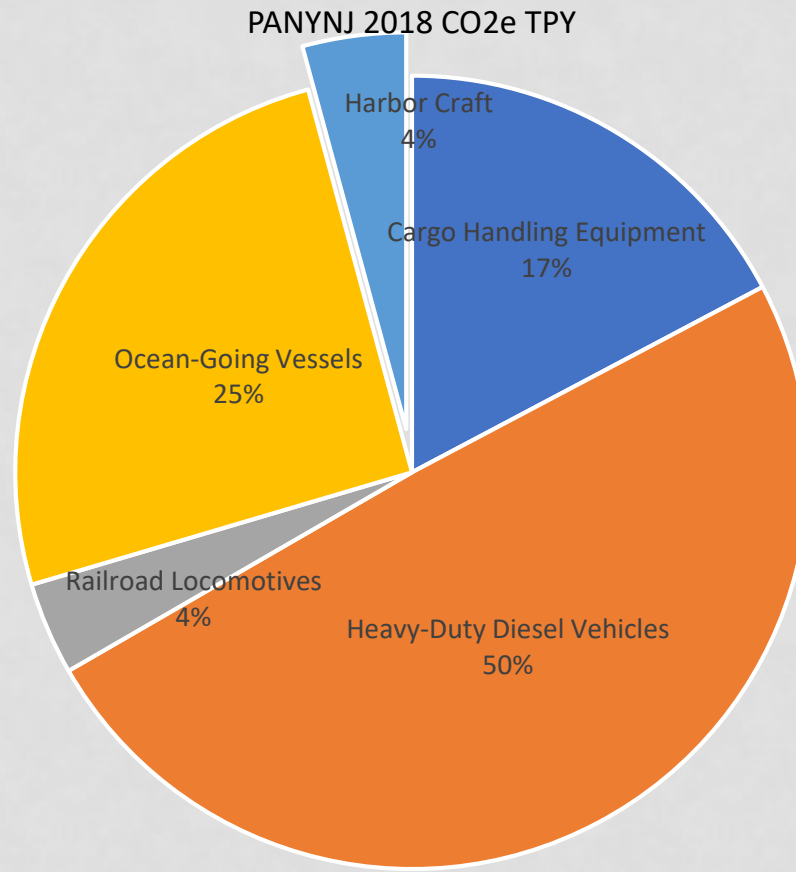
PANYNJ 2018 CO TPY



PANYNJ 2018 PM2.5 TPY



GHG CONTRIBUTIONS AT THE PORT



HARBOR CRAFT INVENTORY

- Tugs – guide and maneuver OGV to berth
 - 40-50 operating in harbor
 - 2-4 needed per ship depending on size
 - Two major owner/operators
 - Generally newer and larger
- Tows – move barges for fueling, lightering, and trash
 - 100s operating in harbor
 - Usually work alone
 - Over 2 dozen owner/operators
 - Generally older and smaller
- Ferries – passenger service; several already repowered

CURRENT CARB REGULATIONS

- Adopted in 2007; amended in 2010
- Applies to tugs, tows, and ferries
- Requirements
 - Must use ULSD
 - New boats must have most recent tier engine
 - Replacement engines must be tier 2 or 3 (4 in some cases)

CURRENT CARB RULE DEVELOPMENT

- Add several new boat types
 - Pilots
 - Research vessels
 - All tank barges
 - Charter fishing
- Improved engine requirements for repowers
 - Tier 3 and 4 only; no more tier 2
 - Tier 4 + DPF for some applications
- Possible hybrid or zero emissions power systems for new boats
- Phase in starting in 2023.

REDUCTION STRATEGIES FOR HARBOR CRAFT

- Improved fuel quality, primarily reduced sulfur content
- Engine replacement on in-use boats
- Tier 3 or 4 engines or zero emissions power systems for new boats
- Exhaust aftertreatment retrofits

STAKEHOLDER FEEDBACK OPPORTUNITIES

- Are there any questions about this material or our regulations?
- Specific issues for consideration and discussion are on subsequent slides.

DISCUSSION ISSUES

- Issues for discussion:
 - Schedule
 - How much lead time does the industry need?
 - Implementation Issues
 - Which reduction approach works best for tugs vs. tows?
 - Industry assistance
 - Will industry organizations help us with outreach and education to appropriate parties?
 - Regulated Parties
 - Enforcement

COMMENTS

Please send comments and/or technical support information to:

NJAirrulesmobile@dep.nj.gov

Use the following heading in the subject line of the email: Harbor Craft

By October 14, 2020