

# Public Workshop to Discuss Additional Requirements for the Commercial Harbor Craft (CHC) Regulation



**December 4, 2018  
Long Beach, CA**

**&**

**December 10, 2018  
Sacramento, CA**

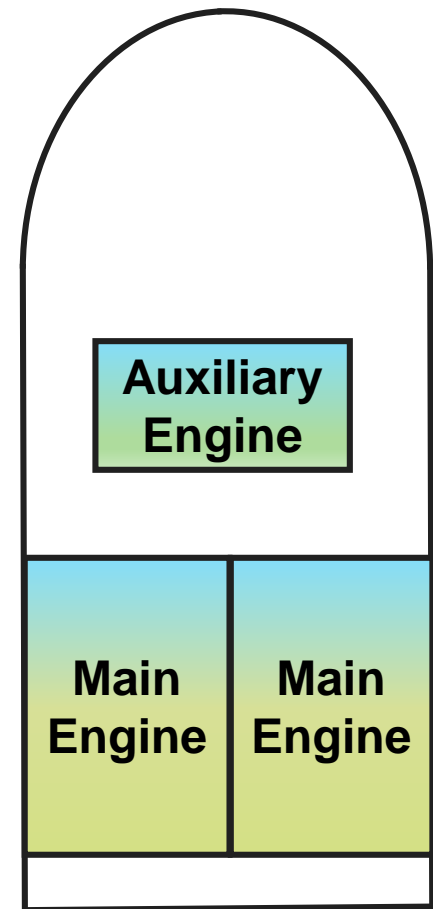


# Presentation Agenda

- **Section 1: Harbor Craft and Existing Requirements**
- Section 2: Need for Additional Emission Reductions
- Section 3: Updates to Emission Inventory
- Section 4: Health Analyses
- Section 5: Potential Regulatory Concepts
- Section 6: Incentives
- Section 7: Next Steps

# What are Commercial Harbor Craft?

- Also called “Harbor Craft”
- Include a wide variety of vessel types owned by private or public entities, excluding:
  - Ocean-going vessels
  - Recreational vessels
- Generally equipped with diesel engines, 2 main & 1 auxiliary



# Types of Harbor Craft



Towing



High-Speed Ferry



Tractor Tug



Ocean Going Tug



Pilot



Work Boat

# More Types of Harbor Craft



Dredge



Research



Crew and Supply



Excursion



Charter Fishing



Commercial Fishing

# Industry Has Reduced Emissions from Harbor Craft

- Since 2009, harbor craft owners have replaced older with newer, cleaner engines to comply with the existing Regulation
- Some harbor craft owners not subject to in-use requirements have voluntarily replaced older engines with newer, cleaner engines
- Many engine replacements have been funded by CARB's Carl Moyer Program administered through local air districts

# Requirements of Existing Regulation (2009-2022)

- Applies to compression-ignition (diesel-cycle) engines rated >50 horsepower (hp)
- Applies to all vessels operating in Regulated California Waters, within 24 nautical miles of the California Coast
- Specific vessel categories must repower or rebuild older Tier 1 and pre-Tier 1 engines to Tier 2 or Tier 3 standards
- New ferries must meet Tier 4 standards or use other controls
- All vessel categories: ongoing reporting, recordkeeping, ultra-low sulfur diesel requirements, and use of non-resettable hour meters

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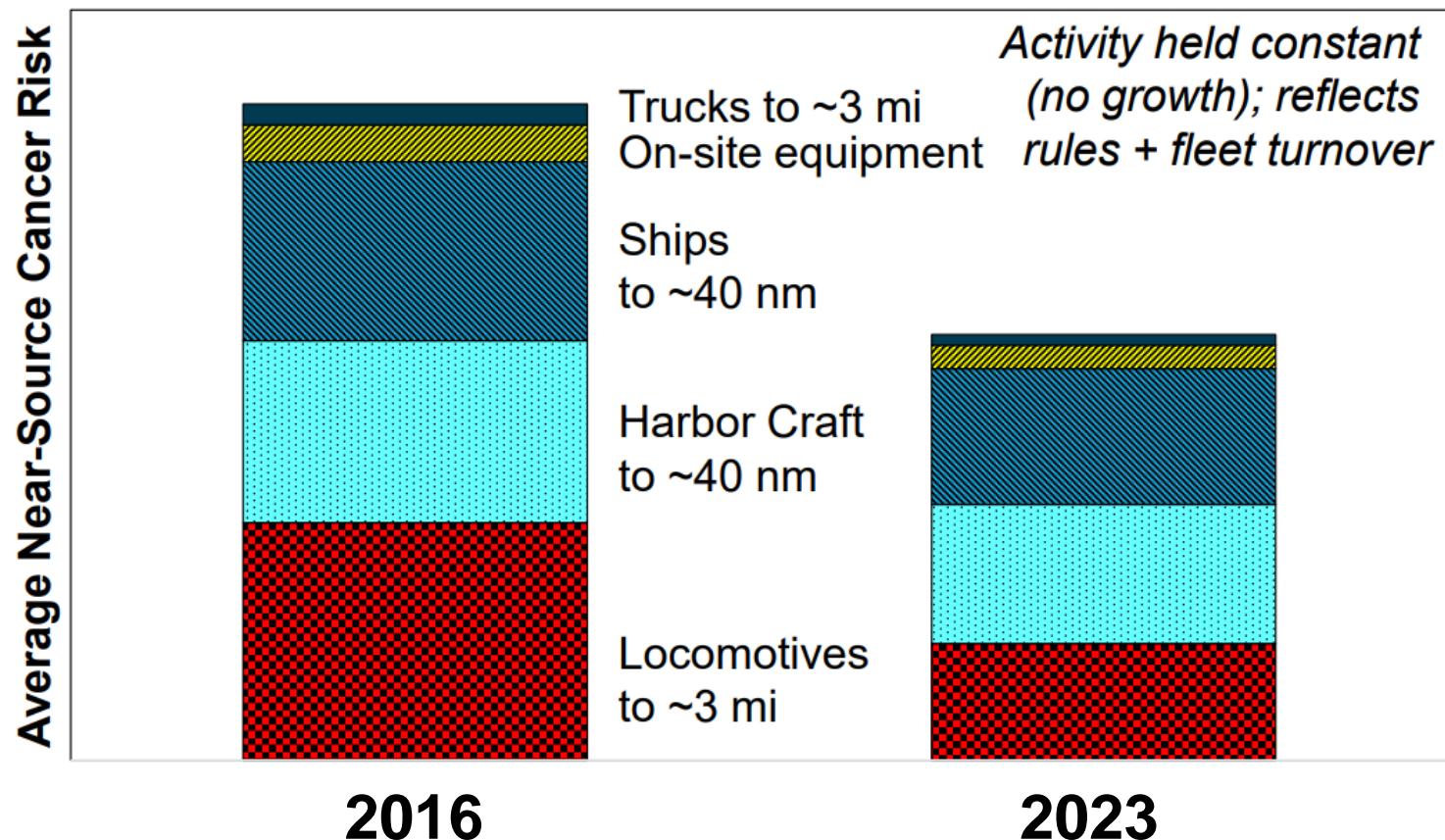
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# Why does CARB Need Additional Requirements for Harbor Craft?

- In March 2018, CARB staff proposed to reduce emissions from all freight sources, including harbor craft, to control:
  - Diesel PM to minimize community health risk
  - NOx and PM<sub>2.5</sub> to attain regional air quality standards, especially in South Coast and Bay Area
  - GHGs to mitigate climate change
- Staff anticipate Board consideration of additional proposed harbor craft requirements in 2020

# Ports of Los Angeles and Long Beach: Harbor Craft a Top 3 Source of Diesel PM Cancer Risk



# Community Health Protection

- AB 617 added emphasis on community health impacts
- Impacted communities say more action is needed now to reduce emissions from vessels
- Residents and community groups are concerned about visible smoke emissions observed from newer vessels and engines



# CARB Regulatory Authority

- HSC 39650 et seq. – direct CARB to regulate toxic air contaminants from non-vehicular sources to reduce public exposure/risk
- HSC 43013 and 43018 – direct CARB to control criteria air pollutants from mobile sources to attain air quality standards
- HSC 38500 et seq. (AB 32) and HSC 38566 (SB 32) – direct CARB to reduce greenhouse gases to specific levels to combat climate change

# Rulemaking is a Public Process

- Rulemaking is iterative – staff request public input at every step of the process
- Staff will hold additional public workshops during rule development
- Staff will post draft documents, reports, and analyses as they become available
- Key rulemaking documents (reports, analyses, and regulatory text) will be posted for 45-day public comment period prior to Board Hearing

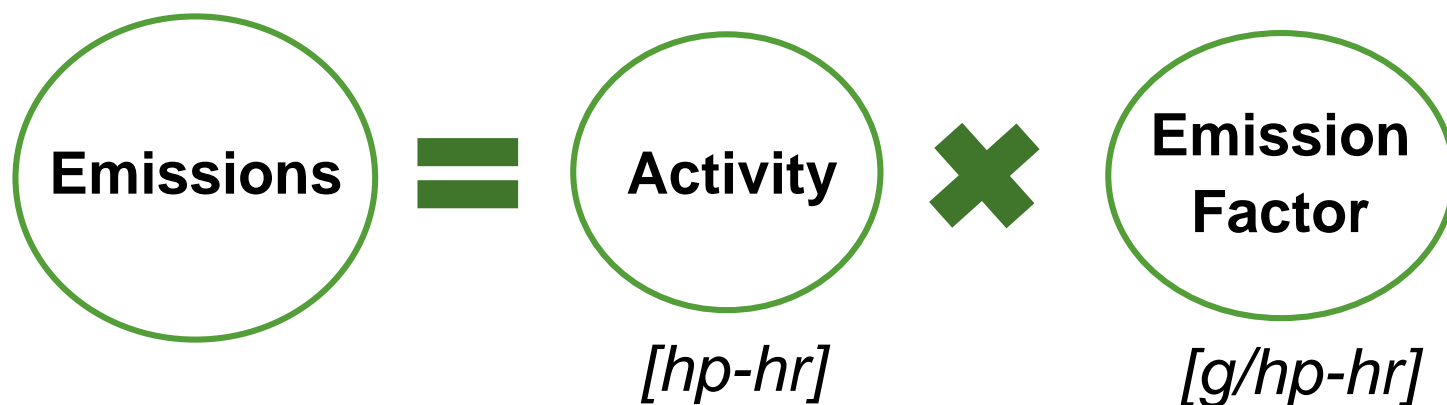
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# Harbor Craft Emissions Inventory

- Basis for developing proposed regulatory concepts, health analyses, and cost effectiveness
- Inventory quantifies diesel PM, PM<sub>2.5</sub>, NO<sub>x</sub>, and GHGs from harbor craft statewide
- Staff currently refining emission inventory to support rule development

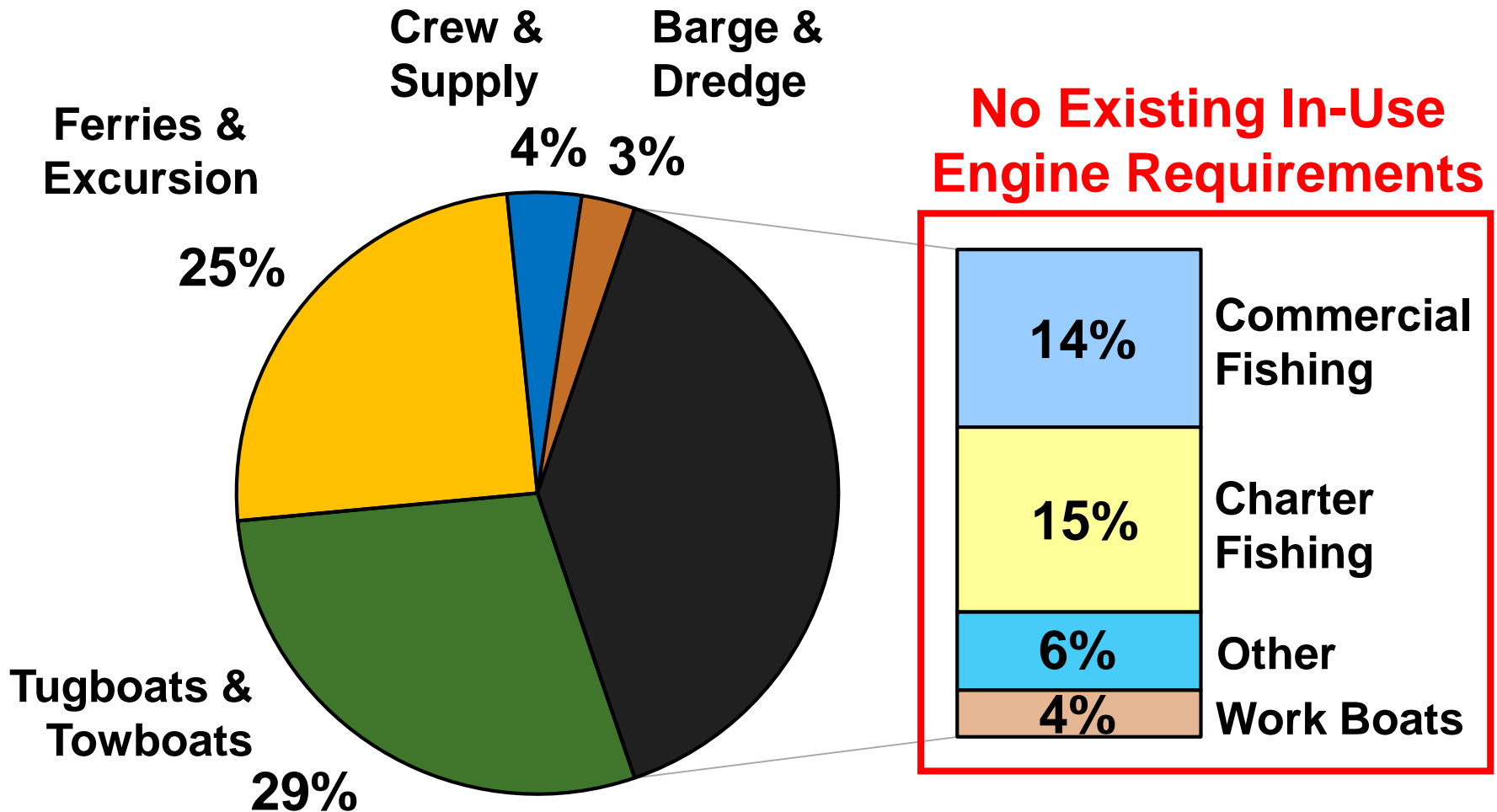
# Overview of Methodology



- Vessel population from U.S. Coast Guard and CA ports
- Engine population and info from CARB reporting forms
- Emission factors assumed equal to certified emission levels as reported by U.S. EPA
- Load factors from fuel use reported in 2004 CARB surveys
- Other inputs from CARB's OFFROAD model: correction for cleaner CARB fuel, engine deterioration



# Statewide Diesel PM Emissions by Vessel Type with Full Implementation in 2023



# Statewide Diesel PM, NOx, and CO<sub>2</sub> Emissions by Selected Region with Full Implementation in 2023

	Statewide	Bay Area	South Coast	All Other Regions
<b>Diesel PM</b> [TPY]	233	85	66	82
<b>NOx</b> [TPD]	19.9	8.0	5.9	6.0
<b>GHG</b> [MT CO <sub>2</sub> /yr]	1,900	846	480	574
<b>Vessels</b> [#]	3,096	1,060	564	1,472

# Minimal Emission Reductions Expected from 2023 to 2031 Without Additional Requirements

<b>Expected Change in Emissions from 2023 to 2031</b>	
Diesel PM	-23%
NOx	-13%
GHG	-5%

# Planned Near-Term Updates to Data for Emission Inventory

- CARB contract with UC Berkeley, UC Riverside, and University of Southern California
  - GPS logging of selected vessels to understand where vessel activity is concentrated
  - Emission factor updates from in-use testing using Portable Emissions Measurement Systems (PEMS)
- Vessel and engine specification updates through outreach to owners, operators, ports, and other harbors
- Engine load factor updates through fuel or electronic engine logging provided by owners/operators

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# Health Analyses

## Potential excess cancer risk

- Health risk assessments
  - Two locations, **Bay Area** and **San Diego**
  - Will consider Maximum Exposed Individual Resident (MEIR) cancer risk (chances per million) and population exposed to cancer risk levels
- Draft report for public comment in advance of formal rule proposal

## Non-cancer effects

- Staff will estimate and monetize regional impacts

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# Proposed Concepts for Additional Reductions

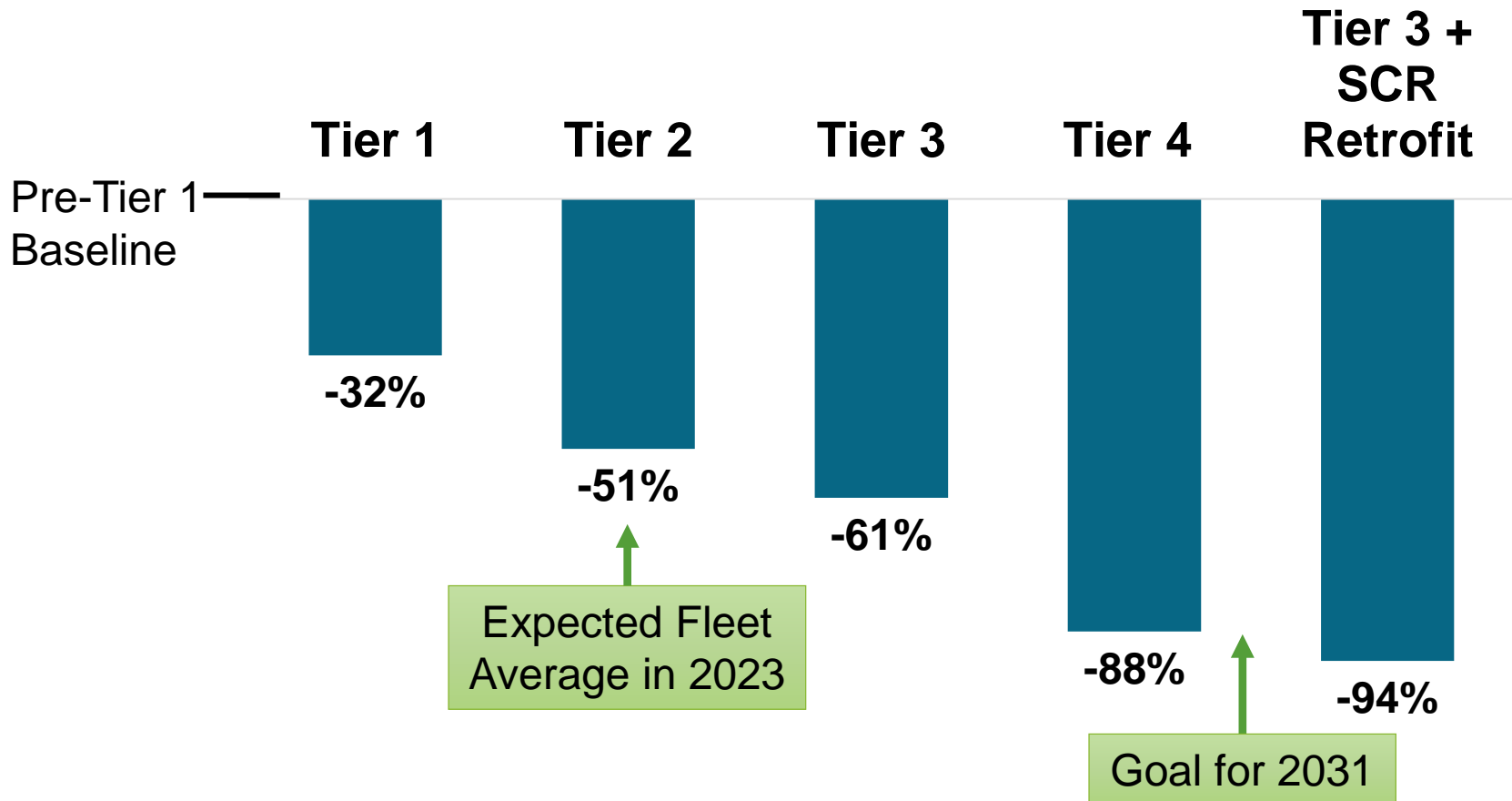
- More stringent in-use requirements to achieve NO<sub>x</sub>, PM and GHG emission reductions
- In-use requirements for additional vessel categories
- In-use requirements for engines less than 50 horsepower
- Annual opacity testing requirements
- Facility requirements



# Proposed Concept: More stringent in-use requirements to achieve reductions

- Existing regulation has accelerated turnover to mostly Tier 2 and 3 engines, with some Tier 4 (new ferries)
- Under this proposal, engines on vessels subject to in-use requirements would need to either:
  1. Retrofit Tier 2 and 3 engines with a Verified Diesel Emission Control Strategy (VDECS);
  2. Repower with Tier 4 engines; or,
  3. Adopt approved zero- or near-zero emission technology.

# NOx Emission Trends for Harbor Craft Engines and Future Retrofits from a Pre-Tier 1 Baseline



Trends based on NOx emissions from a pre-Tier 1 baseline of 11 g/bhp-hr, and marine engine standards for a 1000-hp Category 1 engine. Retrofit assumed to achieve an 85% reduction from Tier 3 standards.

# Tier 4 Feasibility Study

- CARB-funded study by Cal Maritime Academy to evaluate feasibility of Tier 4 and VDECS retrofits
- For each participating vessel, identify or assess:
  - Available Tier 4 or equivalent control options
  - Vessel changes necessary to accommodate equipment
  - Vessel stability analysis by naval architect
  - Cost information on procurement, installation, maintenance, or vessel replacement
- Report release in mid-2019

# Zero Emission and Other Advanced Technologies

- Emerging technologies to help achieve 2031 emission targets for NO<sub>x</sub>, PM<sub>2.5</sub>, diesel PM, and GHG
- Goal: simplify process for emerging technologies to be approved as a compliance pathway
- Hybrid diesel-electric vessels would reduce fuel use and emissions; a few hybrid tugs operate today
- Battery-electric technology now deployed in marine sector; hydrogen fuel-cell under development today
- Alternative fuels such renewable diesel and liquefied natural gas (LNG) likely not standalone pathways

# Zero/Near-Zero Emission Vessels



Red and White Fleet  
“*Enhydra*” - battery  
electric plug-in hybrid  
excursion vessel – built  
and operational today



Golden Gate “*Water-Go-Round*” Zero Emission  
hydrogen fuel cell ferry  
demonstration – under  
construction today

# Proposed Concept: In-use requirements for additional vessel categories

Vessel Category	Existing In-Use Engine Requirements	Proposed In-Use Engine Requirements
Ferries, Excursions	Yes	Yes
Crew and Supply	Yes	Yes
Barge and Dredge	Yes	Yes
Tanker Barges	Not Included	Yes
Tugboat, Towboat	Yes	Yes
Pilot Vessels	No	Under Evaluation
Workboats	No	Under Evaluation
Charter Fishing	No	Under Evaluation
Commercial Fishing	No	*
Research, Others	No	Under Evaluation

\*Likely no; however, health impacts still under evaluation

# Proposed Concept: In-use requirements for engines less than 50 horsepower

- Existing CHC regulation in-use requirements do not apply to engines below 50 horsepower
- Staff estimate 23 percent of auxiliary engines are rated below 50 horsepower
- Emissions from engines under 50 horsepower contribute approximately 8 percent of total auxiliary engine PM emissions
- Under proposed concept, all engines on applicable vessel categories would be subject to in-use requirements, regardless of engine power rating

# Proposed Concept: Annual Opacity Testing Requirement

- Every engine would need to meet opacity limits using a defined procedure
- Opacity test limits and procedure under development – will consider original engine certification and engine/retrofit configuration
- Vessel owners or operators could become certified to self-test, or hire a certified tester





# Proposed Concept: Facility Requirements

- Facilities include ports, terminals, marinas, harbors, and private land with docks: any entity that accepts payment for allowing a vessel to dock on a regular and ongoing basis
- Facility responsibilities would increase vessel compliance
- Concept requirements for facilities:
  - Facilities must allow installation and maintenance of on-site infrastructure to support zero and near-zero emission vessels
  - Electronic verification of vessel compliance status in CARB's freight reporting system (currently under development)
  - Report to CARB which vessels permanently or regularly dock

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# Incentives

- Incentives critical to achieve additional reductions beyond regulatory requirements, while providing investments into needed technologies
- **Carl Moyer Program (\$78 million in FY 18/19)**
  - Fundable projects include engine repowers, verified hybrid systems, and hybrid/zero-emission technology infrastructure
  - Over 2,000 engines upgraded from Tier 0/1/2 to Tier 3 or 4 with \$145 million through 2017
- **AB 617 Community Air Protection Funds (\$245 million in FY 18/19)**
  - Projects will be implemented under Carl Moyer Program
  - Focus on emission reductions in communities most impacted by air pollution

# Incentives (Continued)

- **Volkswagen Mitigation Fund**

- Expected available in 2019, funds must be used by 2027

- **Combustion Freight and Marine (\$60 million)**

- Tier 4 or Hybrid Ferry, Tugboat, and Towboat Repowers

- **Zero Emission Freight and Marine (\$70 million)**

- Zero-Emission Ferry, Tugboat, and Towboat Repowers

- Other local air district programs, port programs including San Pedro Ports Technology Advancement Program (TAP) offer additional opportunities

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# Solicitation of Regulatory Alternatives

- Staff are seeking early feedback on alternatives to proposed concepts
- Stakeholder input is important for Standardized Regulatory Impact Assessment
  - SRIA is required for “major regulations,” pursuant to SB 617 and the California Environmental Quality Act (CEQA)
- CARB encourages public input on alternatives that:
  - Yield the same or greater benefits than proposed regulatory concepts; or
  - Do not yield, or are less likely to yield, the same level of benefits than proposed regulatory concepts

# Ongoing Activities

- Collect survey information from vessel owners/operators, facilities, engine manufacturers, and VDECS manufacturers – early 2019
  - To support environmental and economic analyses
- Complete contracts in progress – early-mid 2019
  - Vessel activity and emissions characterization by UC Berkeley
  - Tier 4 engine and retrofit feasibility study by Cal Maritime
- Outreach to VDECS manufacturers and processing of technology applications – ongoing through 2019

# Key Milestones

- Additional Public Workshops in 2019
  - Discussion of refined regulatory concepts, emission inventory, solicitation of additional feedback
- Staff will post advance materials or draft documents for public input
- Staff Report and Proposed Regulation Order Posted for 45-Day Public Comment Period prior to Board Hearing
  - Includes Staff Report (Initial Statement of Reasons), Proposed Regulation Order, Draft Environmental Analysis, Standardized Regulatory Impact Assessment, Health Risk Assessment
- Board Hearing – 2020



# Contacts

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CARB Commercial Harbor Craft Website:

<https://www.arb.ca.gov/ports/marinevess/harborcraft.htm>