CALIFORNIA
AIR RESOURCES BOARD

Public Workshop for the Draft Proposed Amendments to the Commercial Harbor Craft Regulation

March 16, 2021, 9:00 AM Pacific Time (GMT-7)

Slides available for download at:
https://ww2.arb.ca.gov/our-work/programs/commercial-harbor-craft/chc-meetings-workshops

Today's Public Workshop

- Offered in both English and Spanish through Zoom platform
- 4th public meeting since 2018 to inform developments of proposed amendments
- Feedback throughout process has been valuable and reflected in modifications presented today
- Questions after presentation – type your question in the chat box, or raise your hand to request to speak

Commercial Harbor Craft (CHC) Workshop Agenda

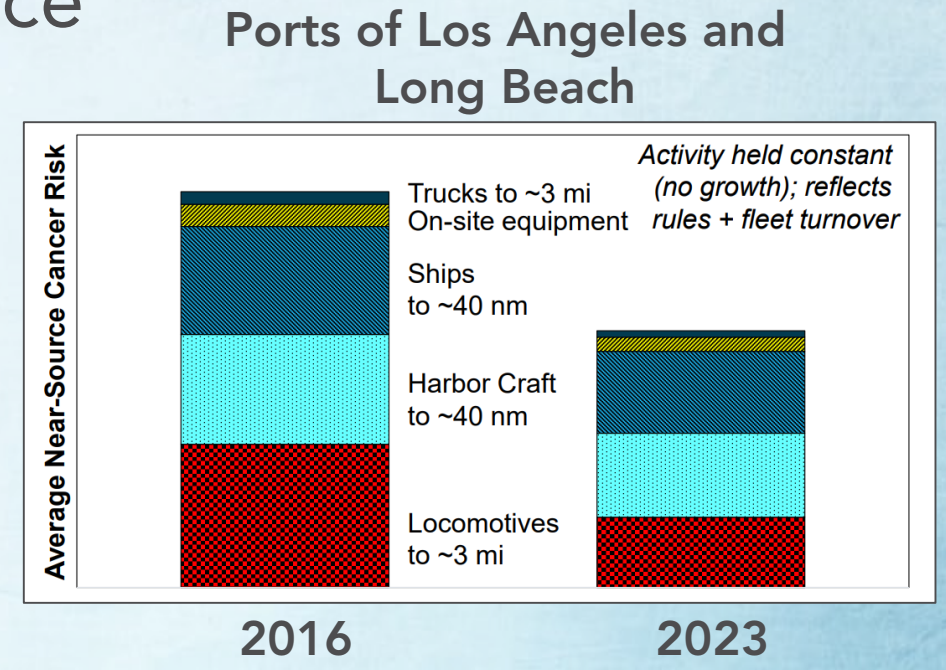
- Summary of Current Regulation and Amendments
- Modifications to Draft Proposal
- Preliminary Emission Inventory and Cost Analysis
- Next Steps
- Questions

Current Regulation (2009-2022)

- Requires CARB ultralow sulfur diesel (ULSD, 15 ppm), recordkeeping, and reporting
- Accelerates turnover of Tier 0 and 1 engines on excursion, ferry, crew and supply, barge, dredge, and tugboats to Tier 2 or 3 engines
- Additional stringency (e.g. Tier 4) required for new ferries carrying 75 passengers or more
- Some engines have been voluntarily replaced in advance of, or in addition to, regulatory requirements

Additional Harbor Craft Emission Reductions Are Needed

- Staff proposed in March 2018 to reduce emissions from harbor craft
- Amendments would:
  - Reduce community health risk
  - Attain regional air quality standards
  - Mitigate climate change
- Included in CARB's Community Air Protection Blueprint strategies for AB 617



Overview of Draft Proposed Amendments

- Zero-emission short run (< 3 nm) ferries and zero-emission capable new excursion vessels
- In-use performance standard: Tier 3 or 4 + diesel particulate filter (DPF) for most other in-use and new vessels
- Establishes Tier 2 minimum requirement on commercial fishing vessels
- New reporting, recordkeeping, fuel, opacity testing, and compliance fee requirements

Compliance Schedules – Zero Emission and Advanced Technology (ZEAT)

Marine Technology Type	Vessel Category Requirement	Phase-In Date
Zero Emission Capable Hybrid*	New Excursion Vessels	Jan. 1, 2025
Zero Emission	New and In-Use Short Run (< 3 nm) Ferries	Jan. 1, 2026

- Alternative compliance pathways provide additional opportunity to deploy ZEAT where feasible

*Required to derive 30 percent of annual work from a zero-emission tailpipe source, such as batteries or hydrogen fuel cell technology.

Cleaner Combustion Performance Standard

- Cleaner combustion technology exists than is currently used to meet current Tier 3 or Tier 4 marine standards
- Marine engines certified by U.S. EPA, not CARB
- Proposal to require Tier 3 or Tier 4 (if certified) engine + diesel particulate filter (DPF)
- Most common Tier 4 + DPF performance standard: 1.3 bhp-hr NOx, 0.005 g/bhp-hr PM
- See Tables 7-9 in draft regulatory text for more detail

Compliance Schedules – Tier (3 or 4) + DPF

- Compliance dates dependent on engine model year, engine tier, and vessel category:
  - 2023 – 2025 for any Tier 0 or Tier 1 engines
  - 2024 – 2029 for Tier 2, 3, 4 engines on ferries (all except short run), pilot, and tug vessels
  - 2026 – 2030 for Tier 2, 3, 4 engines on research, excursion, and, commercial passenger fishing vessels (CPFVs)
  - 2028 – 2031 for Tier 2, 3, 4 engines on workboat, dredge, barge, and crew & supply vessels

Requirements for Commercial Fishing Vessels

- Unique offshore operations and industry economic considerations compared to other vessel categories
- Due to larger population (38 percent of fleet), emissions reductions are still needed
- Draft proposal would require Tier 2 or newer engine, phasing in between 2030 and 2032
- Later compliance schedule than other regulated in-use vessels to allow operators to maximize funding opportunities

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Now Proposing Renewable Diesel (R100)

- Current regulation has required use of ULSD since 2009
- New draft proposal requires using R100, a "drop-in" fuel that meets ASTM D975 specifications
- ~60 million gallons diesel per year consumed by CHC – staff confirmed availability and distribution
- Lower emissions: ~-12% NOx and ~-27% PM than ULSD, confirmed by CARB in-use emissions testing on an excursion vessel

New Performance Standards

- Performance standards posted in draft language in September 2020 unchanged
- Proposal now includes two additional performance standards:
  - Methane (CH_4) limit of 2.0 g/bhp-hr, achievable by modern spark-ignited natural gas engines
  - PM performance standard for Category 3 (>30 L/cylinder) engines: 0.01 g/bhp-hr (same as Category 2)
- Performance standards to be assessed using ISO 8178 and/or 40 CFR Part 1042, using ULSD test fuel (not R100).

Clarification of Combustion Engine Requirements on Vessels Deploying ZEAT

- Retaining low use compliance option for short-run ferries before triggering ZEAT requirements
- New proposal: backup engines on short-run ferries:
  - must meet Tier 3 or 4 standards (no DPF)
  - granted 20 hours/year, additional hours must be documented emergency operation (e.g. power outage)
- Engines on new excursion vessels:
  - must meet Tier 3 or 4 + DPF performance standards
  - Combustion engine power must be below 70% annually, unless documented emergency operation

Emergency Vessels and Operations

- Retaining "temporary emergency vessel" exemption, applying to police, fire, rescue, or spill response vessels temporarily moved into California during an emergency
- Retaining "dedicated emergency vessel" exemption, applying only to fire, police, and rescue vessel operations
- Creating new "emergency operation" definition for any vessel performing emergency work, such as charging ZEAT vessels during a power outage, performing rescue operations, or oil spill response
- Hours accumulated during emergency operation excludable from low use, hour-limited compliance extensions, and ZEAT requirements

Modified Requirements for Oil Spill Response Vessels

- Oil spill response activity critical to protecting public safety
- Spill response vessels may include dedicated workboats, or "vessels-of-opportunity", which could be other vessels in contract with an oil spill response organization
- Hours required for ongoing testing, maintenance, training, and certifications would remain subject to performance standards
- New proposal: include oil spill response cleanup, and responding to U.S. Coast Guard drills under "emergency operations" definition
- Proposed change provides certainty to oil spill response organizations complying through low use exceptions

Opacity Testing – Main Propulsion Engines

- Biennial (every 2 years) opacity testing of all main engines
- SAE J1667 snap acceleration test method:
  - 40% for all tier level engines without DPFs
  - 5% when equipped with a DPF
- Staff analyzed over 800 tests of engines in cargo handling equipment, and 60 tests on marine engines in harbor craft
- Opacity would be measured after DPF but before water muffler or any seawater injection into exhaust

Draft Proposed Procedure to Adapt SAE J1667 Method to Main Engines on Harbor Craft

Utilizing either full- or partial-flow meter:

1. Transit vessel to a safe location in open waters
2. Stop vessel, clutch-in with engines at idle
3. Transition controls from idle to full load within 2 sec
4. Record opacity measurement for 15 sec or until engines reach full power
5. Repeat test procedure five more times
6. Final opacity measurement will be the average of the 0.5-sec maximum of the last three accelerations

Selected Opacity Test Data Collected on Harbor Craft Main Engines (Jan-Mar 2020)

Test	Vessel Type	Main Engine Location	Tier	Steady-State (% Opacity)	Transient Acceleration (% Opacity)	Pass or Fail?
1	Tug	Center	0	0.0	2.9	Pass
2	Tug	Starboard	1	0.8	12.4	Pass
3	Tug	Port	1	0.0	14.1	Pass
4	Tug	Starboard	4	0.0	5.7	Pass
5	Tug	Port	4	0.0	6.3	Pass
6	Ferry	Starboard	2	1.2	66.4	Fail
7	Ferry	Port	2	1.2	14.4	Pass
8	Ferry	Starboard	3	1.2	12.4	Pass
9	Ferry	Port	3	1.2	14.1	Pass
10	Excursion	Starboard	2	1.2	2.3	Pass
11	Excursion	Port	2	1.2	1.9	Pass
12	Workboat	Starboard	3	2.3	25.8	Pass
13	Workboat	Port	3	1.9	19.1	Pass

Auxiliary Engines – No Periodic Testing

- Auxiliary engines would be subject to the same 40% and 5% opacity limits, but would not need to test biennially
- Auxiliary engines vary in configuration and application, increasing complexity and cost of self-testing requirement
- Proposal would allow CARB staff to test auxiliary engines upon receiving a complaint of excess visible emissions
- If at dock, CARB staff may either apply SAE J1667 method or using EPA Method 9 Visual Emissions Evaluation (VEE)

After Failing an Opacity Test

- Main engines: vessel owner/operator would have 30 days to repair, retest, and retain records
- Auxiliary engines: vessel owner/operator would have 30 days to repair and notify CARB
- No violations would be incurred if corrective action is taken to meet opacity limits
- CARB requesting input on need for case-by-case approval of properly functioning engines without DPFs that have opacity over 40%

Testing Certification and Smoke Meters

- Certification required for all individuals performing testing; owner/operators could self-test or hire third-party
- CARB to release training materials and/or work with California Council on Diesel Education and Technology (CCDET) on dedicated training course for applying SAE J1667 method to harbor craft
- Outreach with smoke meter manufacturers and existing testing companies is ongoing

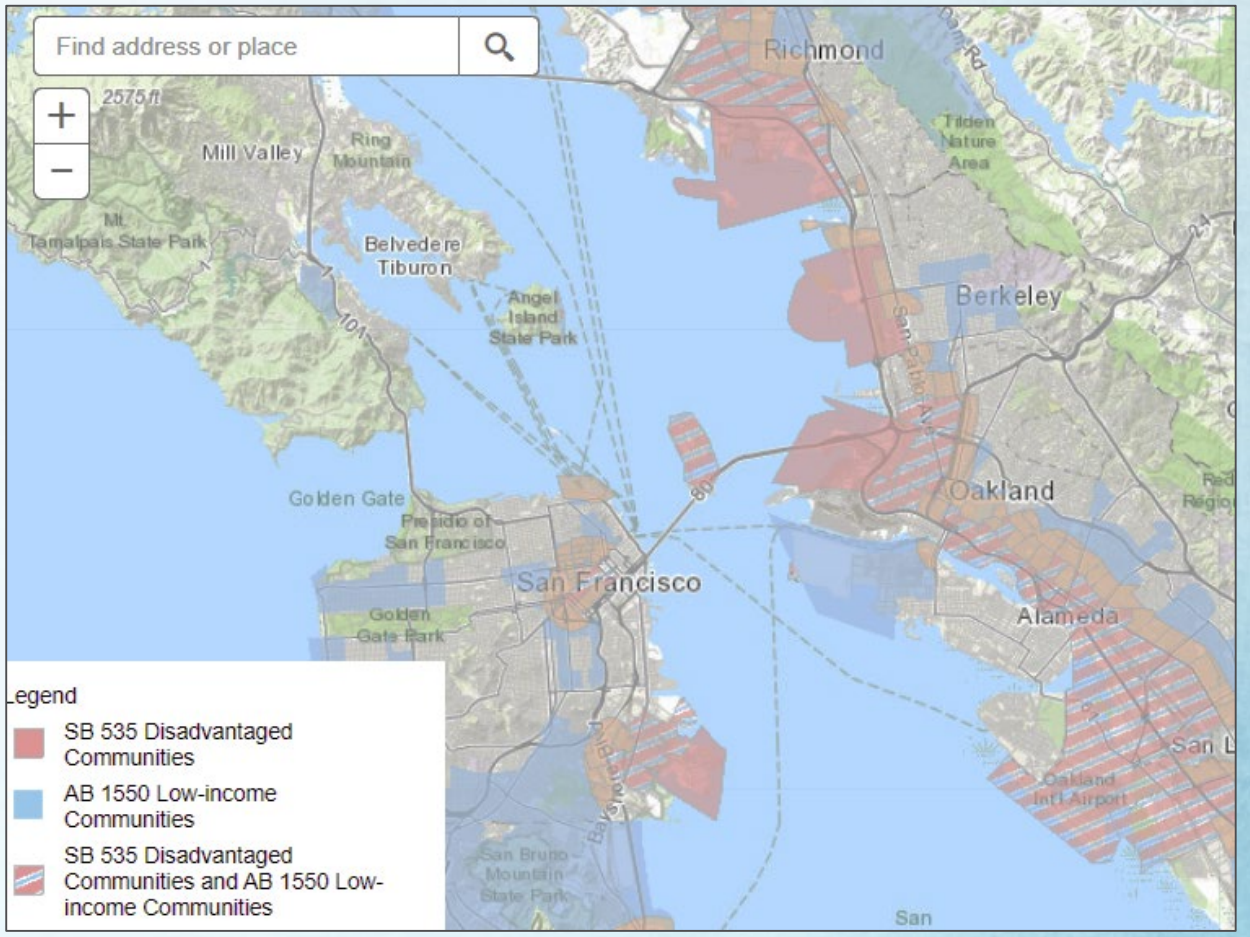
More Stringent Low Use Compliance in Disadvantaged Communities (DACs)

- Revised proposal lowers maximum hours for vessels operating in DACs, which are more heavily burdened by pollution

Engine Tier	Pre-Tier 1	Tier 1	Tier 2	Tier 3 or 4
Limits – All Other Areas (hours/year)	80	300	400	700
Limits – DACs (hours/year)	40	150	200	350

Definition of a DAC for Harbor Craft

- 25% most impacted communities as defined by CalEnviroScreen from the Office of Environmental Health Hazard Assessment
- Home base or regularly scheduled stops (ferries) would determine if a vessel operated in a DAC



https://ww3.arb.ca.gov/cc/capandtrade/auctionproceeds/communityinvestments.htm

Simplified Compliance Extensions

- September 2020 draft proposal included seven extensions with varying criteria and duration
- Revised proposal consolidates into three categories:
  - **Infrastructure** - *previously (E)(1)*
  - **Feasibility** - *previously (E)(2), (E)(6), and (E)(7)*
  - **Scheduling** - *previously (E)(3), (E)(4), and (E)(5)*
- Combining extensions: allowed between the three groups up to 6 years and no later than 12/31/2034

Extension for Infrastructure Delays

- Granted for unforeseen, temporary, or extenuating circumstances preventing use of shore power or supporting ZEAT infrastructure
- One-year extension, renewable once = 2 years maximum
- Proposal would allow combining with any other compliance extension group (feasibility or scheduling)

Extension for Feasibility

- 2 year renewable extensions, using any combination of:
  - Tier 4 engines or DPFs are not available
  - Engines or DPFs will not fit and replacement vessel cannot be afforded (limited to 6 years and by 2034*)
  - Vessel with Tier 4 engines have no fitment for a DPF, and operate below 2,600 hours/year (1,300 in a DAC)
- Engineering analysis of fitment would need to consider all possible modifications or vessel reconfigurations; extending vessel length would be considered not feasible.

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*Final extension date, December 31, 2034. Workboats would not be subject to 6 years or 2034 cap to compliance extensions

Extension for Scheduling Delays

- One-year, one-time extension for one of the following:
  - Equipment manufacturer or installation delays; or
  - Multiple engines with same compliance dates (e.g. 2 engines x 2 vessels, or 1 engine x 3 vessels); or
  - Multiple engines on same vessel with different compliance dates
- Any option would provide a one-year extension, and each engine is only able to receive 1 years of total extension from any of the three pathways above

Alternative Compliance Pathway (ACP)

- Reductions must be surplus relative to rule; using grid electricity while at dock, or R100 fuel would not be eligible
- Most common strategy likely fleet averaging, early compliance, and deploying ZEAT to show equal or greater emissions reductions
- Proposed emissions evaluation period from January 1, 2023 through December 31, 2034
- Would require greater reductions compared to: standard compliance schedule and potentially up to 2 years of any feasibility extension (with documentation)
- Applicant would need to demonstrate that DACs would not experience a higher burden than other communities

Extra Compliance Time After Deploying ZEAT

- Adopt ZEAT where not required = additional compliance time for another vessel in fleet and air basin after deploying:
  - 3 years for zero-emission capable hybrid
  - 7 years for full zero-emission
- Applies for repowers, replacements, and new builds
- Extra compliance time would be limited to:
  - Vessels with Tier 2 or cleaner engines
  - Vessels with home base outside a DAC, unless ZEAT generating extra compliance time is also deployed in a DAC
  - Granted to a single vessel, and limited to no later than December 31, 2034
- Extra compliance time: combinable with feasibility compliance extensions

Minor Updates to Labeling

- Draft proposal includes labeling with CARB assigned Unique Vessel Identifiers (UVI)
- Format "CARB " followed by 5 Arabic numerals:

Background:
- Color: Green
- RGB (0,255,0)
- 10" tall x 40"wide

Letters:
- Black
- 5" tall x 2.5"wide

- Painted or printed on both sides of pilot house
- Alternative coloring format available only for registered historic vessels

Facility Infrastructure Requirements

- Initial proposal: facilities to provide shore power connections for harbor craft by 2024 if receiving more than 50 visits/year
- Revised proposal creates new definition of facility operator for responsibility of installing shore power up to 99 kW
  - Facility operator: entity directing daily operations, also called "tenant" or "facility tenant"
- If shore power provided by source other than grid, proposal clarifies distributed generation emission limits must be met (0.03 g NOx/kWh, etc.)

Expanded Facility Obligations for Compliance

- Initial draft proposal requires facility operators to report quarterly a list of vessels visiting facility 7 days or more to CARB
- Updated draft proposal clarifies that marine oil terminals are facilities subject to reporting with no minimum visit threshold
- Facilities that schedule marine traffic would be responsible for compliance* of vessels that visit facility
  - Example: a marine oil terminal in contract with a tug or barge operator would be responsible for ensuring that contractor uses compliant vessels to visit the terminal

*Proposal is to limit facility responsibility for vessel compliance to in-use engine, vessel labeling, idling, and opacity test requirements only.

More Flexibility to Operators to Meet Engine Idling Requirement

- Initial proposal limited idling main engines or operation of auxiliary engines to 15 minutes at dock before shutting off engines or using shore power
- Stakeholder feedback indicated that for initial-start up, 15 minutes was insufficient to run necessary equipment checks
- Revised proposal would allow 30 minutes of main engine idling and auxiliary engine operation for initial-start up of each day or new working shift

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Emission Inventory Updates: Vessel Population

Vessel Category	Previous Population	Updated Population
Barge-ATB	19	19
Barge-Bunker	31	31
Barge-Other	88	88
Barge-Towed Petrochemical	22	22
Dredge	47	47
Commercial Fishing	1,199	1,199
Commercial Passenger Fishing	**508**	**352**
Ferry-Catamaran	32	32
Ferry-Monohull	19	19
Ferry-Short Run	15	15
Pilot Boat	10	10
Research Boat	25	25
Tugboat-ATB	19	19
Tugboat-Escort/Ship Assist	63	63
Tugboat-Push/Tow	147	147
Work Boat	481	481
Crew/Supply	167	167
Excursion	417	417
Total	**3,309**	**3,153**

Commercial passenger fishing vessel (CPFV) population reflects removal of uninspected "6-pack" vessels operated with Otto cycle engines

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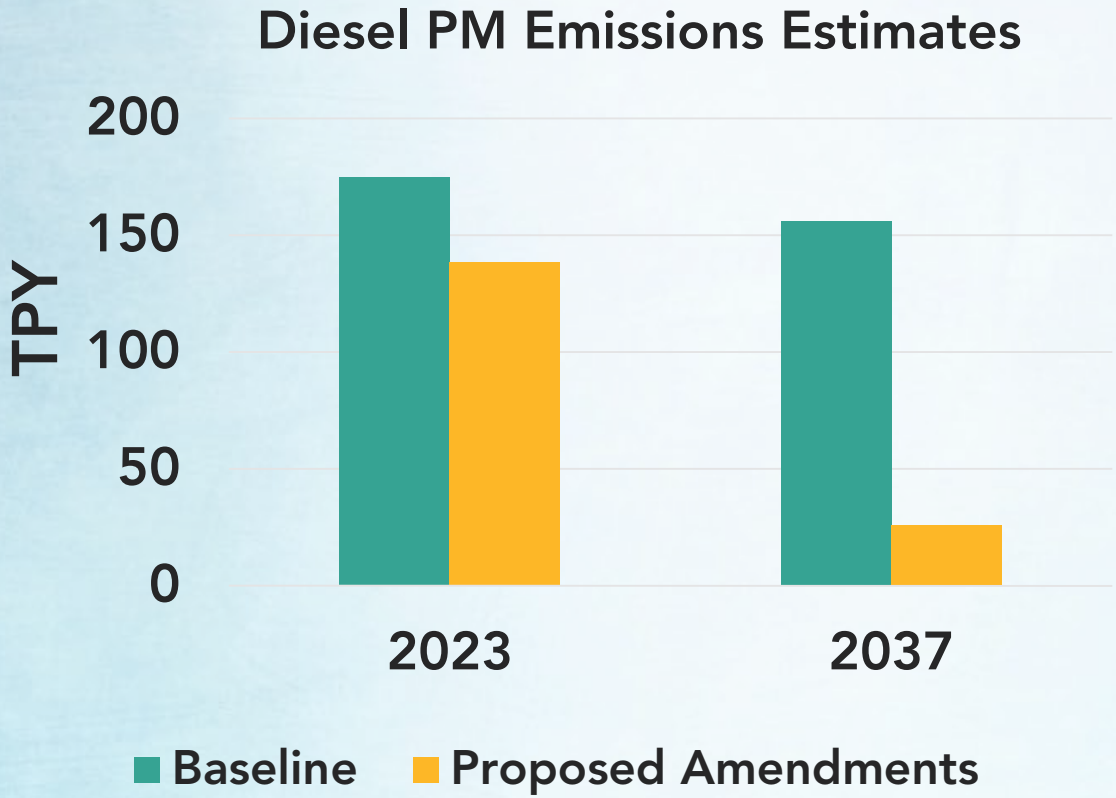
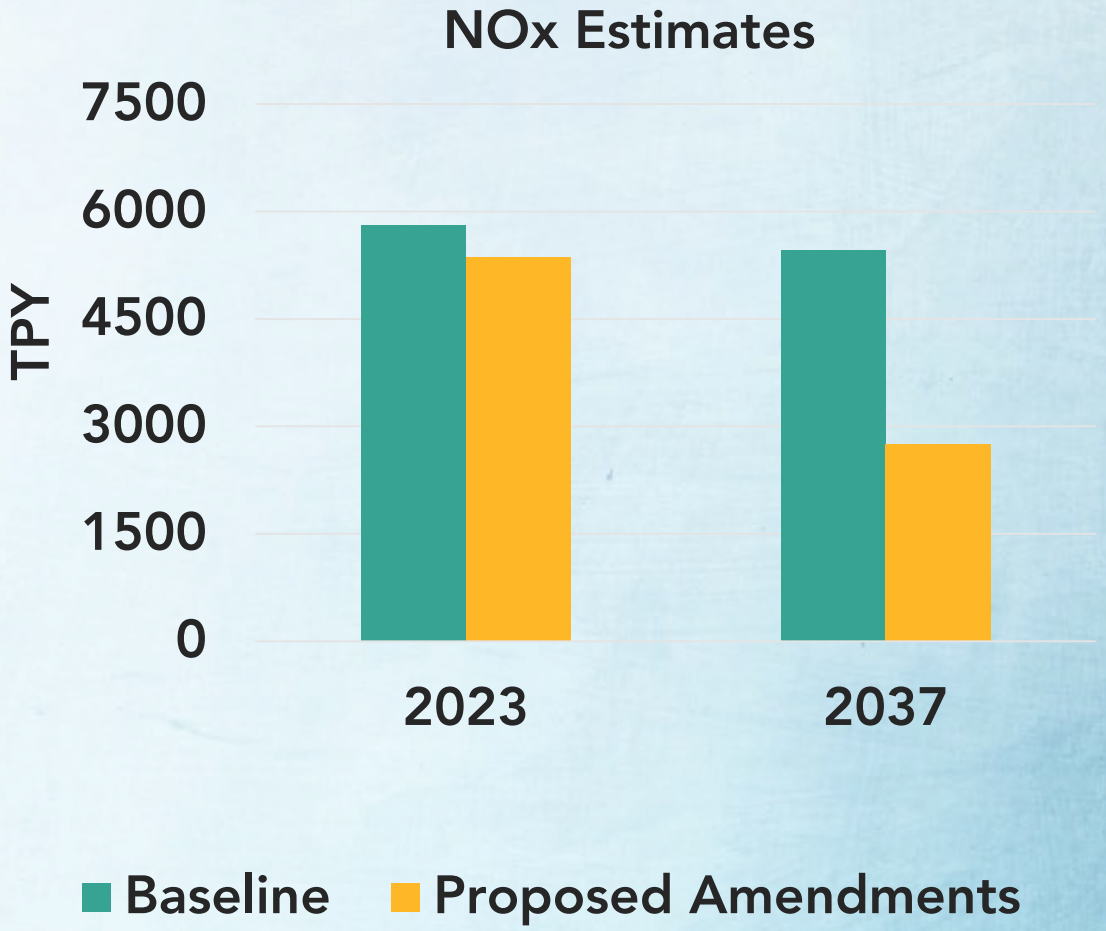
Preliminary Statewide Emission Inventory for Harbor Craft





Updates to the Cost Analysis

- Incorporated a substantial number of additional and revised cost inputs and categories from stakeholder feedback received since September 2020
- Updated engine and vessel population inventory using same dataset as emission inventory
- Modified proposal changes being incorporated into analysis

Summary of Annualized Costs for the Standardized Regulatory Impact Assessment (SRIA)

Year	Total Annualized Costs (Rounded Values)
2023	$36,000,000
2024	$43,000,000
2025	$57,000,000
2026	$68,000,000
2027	$80,000,000
2028	$88,000,000
2029	$92,000,000
2030	$106,000,000
2031	$112,000,000
2032	$118,000,000
2033	$126,000,000
2034	$130,000,000
2035	$128,000,000
2036	$130,000,000
2037	$130,000,000
2038	$130,000,000
Total Cost	**$1.6 billion**

Preliminary Totals 2023-2038

- Estimated total cost: $1.6 billion

Preliminary Cost Effectiveness

- Cost per weighted ton*: $24,200/ton

**Reductions in NOx + ROG + 20 x PM divided by cost*

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Summary of Benefits for the Standardized Regulatory Impact Assessment (SRIA)

Year	Total Monetized Benefits (Rounded Values)
2023	31,970,000
2024	58,700,000
2025	85,840,000
2026	116,530,000
2027	135,780,000
2028	150,210,000
2029	164,890,000
2030	190,210,000
2031	214,240,000
2032	232,010,000
2033	241,850,000
2034	244,590,000
2035	247,070,000
2036	247,020,000
2037	246,150,000
2038	243,920,000
Total Valuation	**$2.9 billion**

Preliminary Totals 2023-2038

- Avoided Premature Deaths: 288;
- Avoided Hospitalizations: 99;
- Avoided ER Visits: 149

- Valuation of avoided adverse health outcomes: $2.9 billion

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- Revised draft regulatory text will be posted to web site within about two weeks
- **Staff requesting final comments on revised concepts and draft regulatory text by Friday, April 16, 2021**

- Department of Finance to release SRIA in August 2021
- Formal rulemaking to begin with official 45-day comment period on October 1, 2021
- Public board hearing scheduled November 18-19, 2021

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Contact Information

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CARB Commercial Harbor Craft Website:
https://ww2.arb.ca.gov/our-work/programs/commercial-harbor-craft