

California Ship and Harbor Craft Regulation Update



Faster Freight Cleaner Air Conference
Los Angeles, California
February 25-27, 2008



California Environmental Protection Agency
Air Resources Board

Programs Driving California's Marine Vessel Program

- ◆ Diesel Risk Reduction Plan
 - 85% reduction by 2020
- ◆ Goods Movement Plan
 - Cleaner fuels, engines, add-on controls, operational controls
- ◆ Attainment of State and National Ambient Air Quality Standards
 - Most of California's population lives in nonattainment areas

Regulation Overview

- ◆ Adopted by Air Resources Board*
 - Ship Auxiliary Engine Fuel Rule (2005)
 - Shore-side Power Rule (2007)
 - Harbor Craft Rule (2007)
- ◆ Planned or Under Development
 - Ship Main Engine Fuel Rule (expected 6/08)
 - Vessel Speed Reduction Program
 - Clean Ship Program
 - Shore-side Power II
 - Harbor Craft Rule II

*Adoption date in parentheses

Adopted Regulations for Ships and Harbor Craft



Auxiliary Engine Regulation

Applies to Auxiliary Engines and Diesel-Electrics

Motor-Ship



Main Engine
for Propulsion
(not covered)



Auxiliary
Engines for
Electricity
(covered)



Diesel-Electric



Engines Provide Electricity for both
Propulsion & Shipboard Uses (covered)



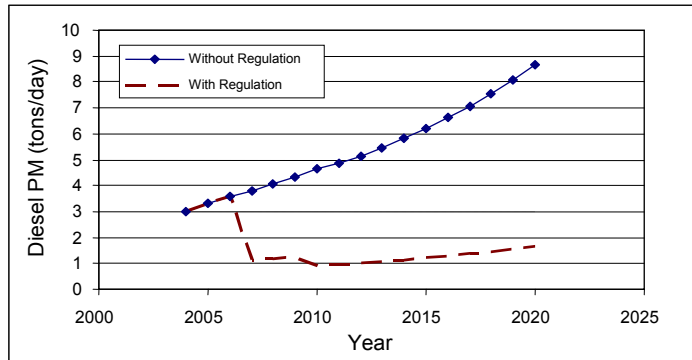
Auxiliary Engine Regulation

Use of Cleaner Distillate Marine Fuels within 24
Nautical Miles of California's Coastline

- ◆ Effective January 1, 2007
 - Use marine gas oil (up to 1.5% sulfur ISO limit)
 - Use marine diesel oil up to 0.5% sulfur limit
 - Use equally effective emission control strategies
- ◆ Effective January 1, 2010
 - Use marine gas oil with a 0.1% sulfur limit
 - Use equally effective emission control strategies
 - Fuel supply review in 2008

Auxiliary Engine Rule

Estimated Emissions of Diesel PM with and without the Regulation in the 24 nm Zone



Shore-side Power Regulation

Affected Ships and Berths

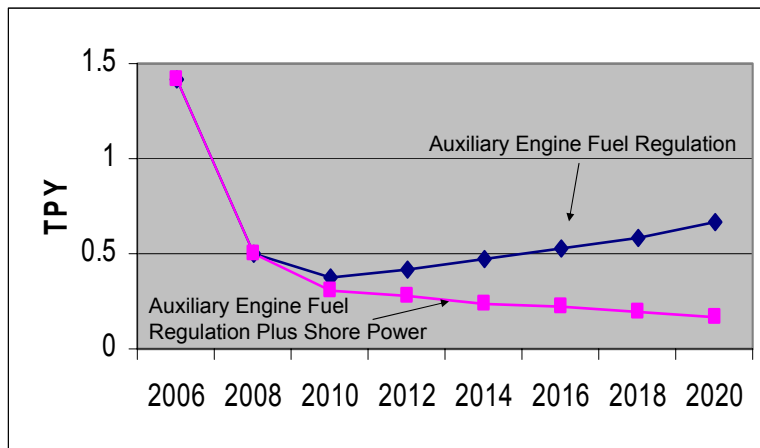
- ◆ Container ships, cruise ships, and reefers
- ◆ Affect fleets that make more than 25 visits to a port
- ◆ Affected berths at each port
 - Hueneme: 3 berths
 - Los Angeles: 23 berths
 - Long Beach: 23 berths
 - Oakland: 23 berths
 - San Diego: 3 berths
 - San Francisco: 1 berth

Shore-side Power Regulation Implementation Schedule

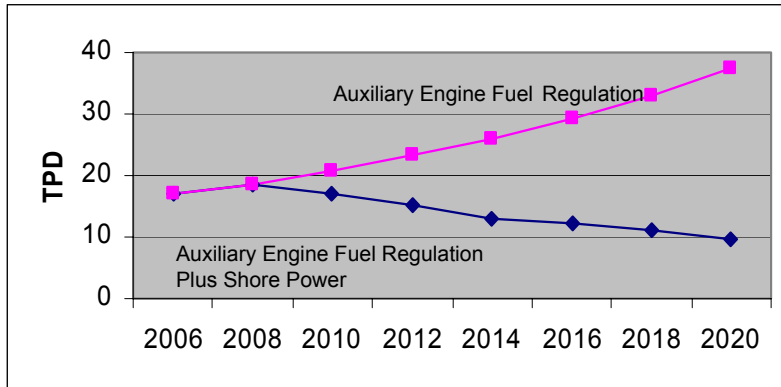
- ◆ **Two compliance options**
 - Grid-based power
 - Technology-neutral emission reduction
- ◆ **Both options required to achieve:**
 - 50 percent reduction in 2014
 - 70 percent reduction in 2017
 - 80 percent reduction in 2020
- ◆ **Provide flexibility in early years for alternative technologies**



Shore-side Power Regulation PM Reductions



Shore-side Power Regulation NOx Reductions



Commercial Harbor Craft Regulation Summary of Rule

- ◆ Emission reduction focus on ferries, excursions vessels, tugboats and towboats
 - In-use engine requirements
 - Oldest highest use engines must comply first
- ◆ All Commercial Harbor Craft
 - New vessel and engine requirements
 - Monitoring (hour meter), reporting, and recordkeeping

Commercial Harbor Craft Regulation In-Use Engine Requirements

- ◆ Existing ferries, excursion vessels, tug and towboats
- ◆ Tier 0 and Tier 1 engines replaced/rebuilt or retrofitted to meet Tier 2/3 emission std.
- ◆ Two compliance timelines
 - Statewide
 - South Coast
- ◆ Phased compliance schedule
 - December 31, 2009 - first compliance date

13

Commercial Harbor Craft Regulation Engine Compliance Schedule

- ◆ Statewide
 - Begin replacing engines by 2009
 - Replace all Tier 0 engines 2009-2016
 - Replace all Tier 1 engines 2017-2022
- ◆ Accelerated schedule for South Coast
 - Begin replacing engines by 2009
 - Replace all Tier 0 engines 2009-2013
 - Replace all Tier 1 engines 2014-2020

14

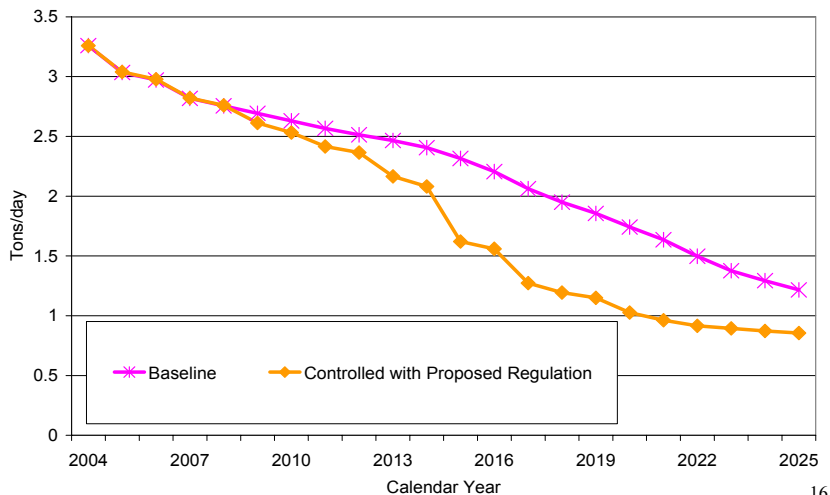
Commercial Harbor Craft Regulation New Vessel and Engine Requirements

- ◆ All harbor craft vessel types
- ◆ New build vessels
 - Install engine meeting the most current new engine standard
 - Ferries have additional BACT requirement
- ◆ Replacement engines on in-use vessels
 - Install engine meeting the most current new engine standard

15

Projected PM Reductions With and Without the Regulation

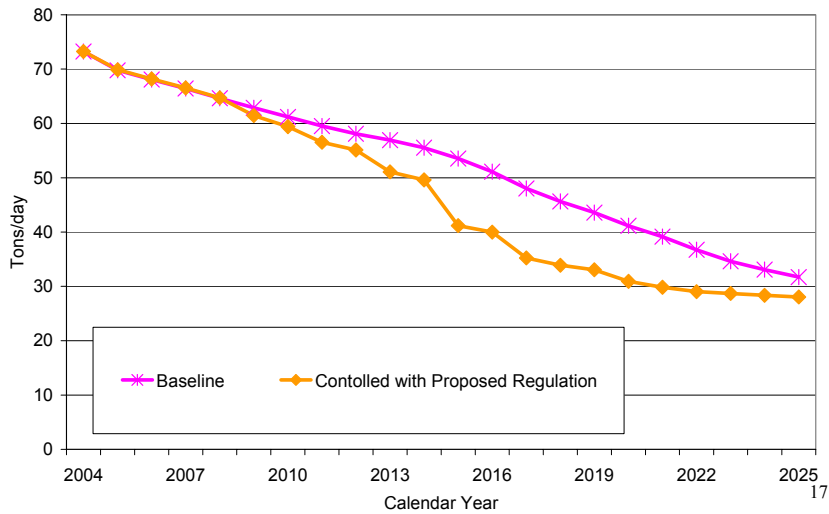
Commercial Harbor Craft Statewide PM Emissions



16

Projected NOx Reductions With and Without the Regulation

Commercial Harbor Craft Statewide NOx Emissions



Ship & Harbor Craft Regulations Planned or Under Development



Proposed Ship Main Engine Fuel Rule Current Draft Proposal

- ◆ Similar to Ship Auxiliary Engine Regulation (use of low sulfur distillate fuel within 24 nm)
- ◆ Two step implementation
 - MGO; or MDO to 0.5% sulfur (2009)
 - MGO/MDO to 0.1 or 0.2% (2012)
- ◆ Auxiliary Boilers Included in Rule
- ◆ Board Hearing Expected in June

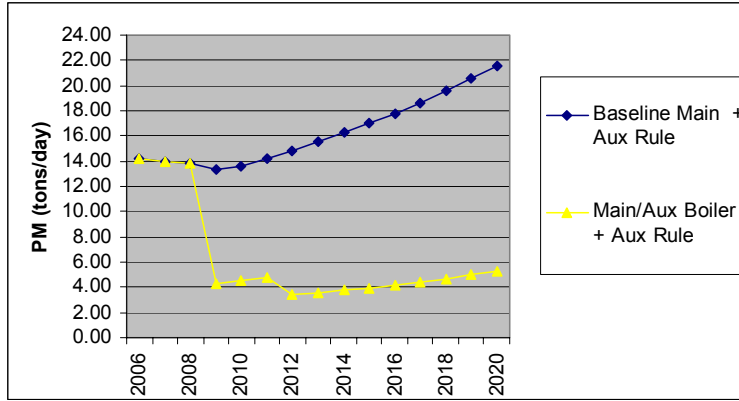


Proposed Ship Main Engine Fuel Rule Technical Investigations

- ◆ Lifecycle Analysis of GHG impacts
- ◆ Analysis of fuel properties at low sulfur levels
 - DNV data on fuel properties
 - Lubricity testing of distillate fuel samples
 - Bench testing of fuel pumps with low viscosity and/or low lubricity distillate fuel
- ◆ Long-term Impacts of Fuel Switching
- ◆ Fuel Availability Analysis

Preliminary Estimates of Emissions Reductions

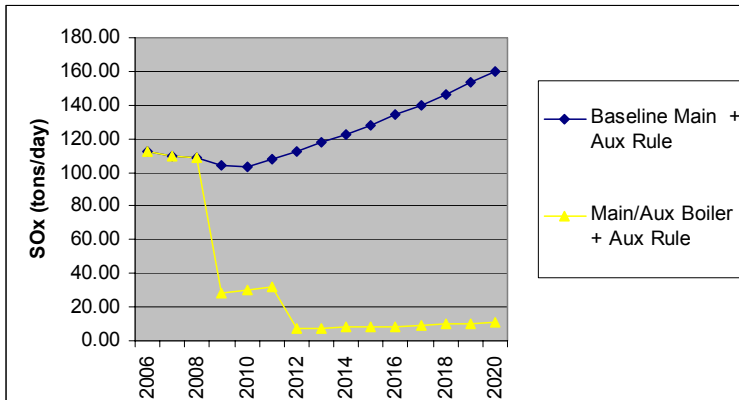
**PM Emissions for Main Engine by S%
(Includes Auxiliary Rule)**



Main Rule includes main engines and auxiliary boiler
s24 NM Boundary

Preliminary Estimates of Emissions Reductions

**SOx Emissions for Main Engine by S%
(Includes Auxiliary Rule)**



Main Rule includes main engines and auxiliary boilers
24 NM Boundary

Clean Ship Program Concept

- ◆ Develop a program to bring cleaner new build or retrofitted ships to California ports
- ◆ Program to reduce PM and NOx per Goods Movement Plan
 - Potential technologies: SCR, scrubbers, water injection, HAM, SAM, fuel emulsification, slide valves, electronically controlled fuel injection, lube oil control, DOC's
- ◆ Will also address greenhouse gases (GHG's)
 - Potential technologies: advanced hull and propeller design, improved antifouling coating programs, waste heat recovery, vessel speed reduction, weather routing, wind assistive devices

Clean Ship Program Concept Goods Movement Plan Reductions Schedule



	Ship Visits by Year		
	2010	2015	2020
30% Lower than Current Standards	20%	50%	40%
Best Available Controls	--	25%	50%

Vessel Speed Reduction Program

- ◆ Existing voluntary program since 2001
 - Vessels slow to 12 knots within 20 nm of the ports of Los Angeles/Long Beach
- ◆ ARB study underway to determine whether to expand VSR
- ◆ ARB staff to present findings to Board in early 2008

Shore-side Power Regulation II Remaining Ship Categories

- ◆ Evaluating options for ship categories not covered under existing shore-side power rule
 - Bulk vessels
 - General cargo
 - RORO
 - Tankers



Commercial Harbor Craft Rule II

Remaining Harbor Craft Categories

- ◆ Evaluating options for crew/supply boats, and pilot boats
- ◆ Coastal Districts interested in further reductions
- ◆ Not focusing on charter fishing and commercial fishing vessels

What about Greenhouse Gas Emission Reductions?

- ◆ California Global Warming Solutions Act of 2006
 - 25% reduction by 2020 (1990 level)
 - 80% below 1990 level by 2050
- ◆ Early Action Items for Marine Vessels
 - Shore-side Power Rule
 - Vessel Speed Reduction Program
- ◆ Scoping Plan Development
 - Goods movement “sector analysis” will include measures for marine vessels

CARB Marine Vessel Contacts

Regulation	Manager	Email Address
Ship Fuel Rules, Clean Ship Program, GHGs	Peggy Taricco, Manager Technical Analysis Section	ptaricco@arb.ca.gov (916) 323-4882
Ship Cold-Ironing Regulation	Mike Waugh, Manager Program Assistance Section	mwaugh@arb.ca.gov (916) 445-6018
Ship Vessel Speed Reduction Program	Robert Krieger, Manager Emissions Evaluation Section	rkrieger@arb.ca.gov (916) 323-1202
Commercial Harbor Craft Regulations	Cherie Rainforth, Manager Control Strategies Section	crainfoth@arb.ca.gov (916) 327-7213