

Commercial Harbor Craft Proposed Regulation Workshop



Port of Los Angeles

June 27, 2007



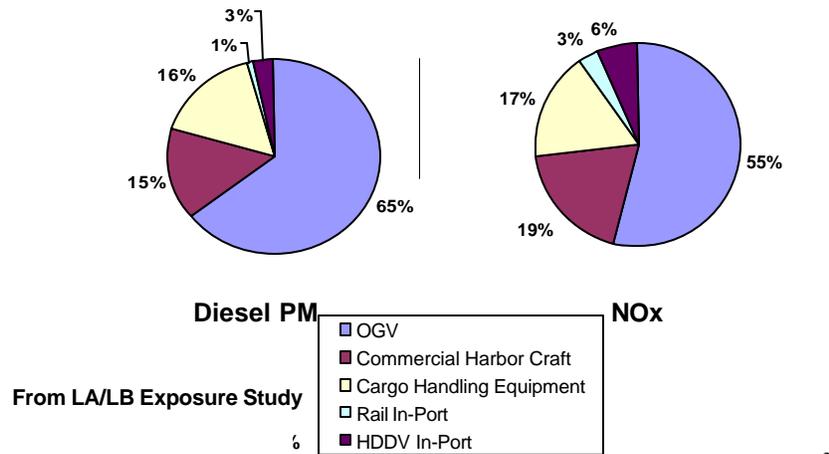
California Environmental Protection Agency

Air Resources Board

Overview

- ◆ Background
- ◆ Proposed Regulation
- ◆ Regulation Timeline
- ◆ State Repower Capacity
- ◆ Regulation Emission Reductions
- ◆ Other Issues

Commercial Harbor Craft Emissions Significant Contributor to Port Emissions

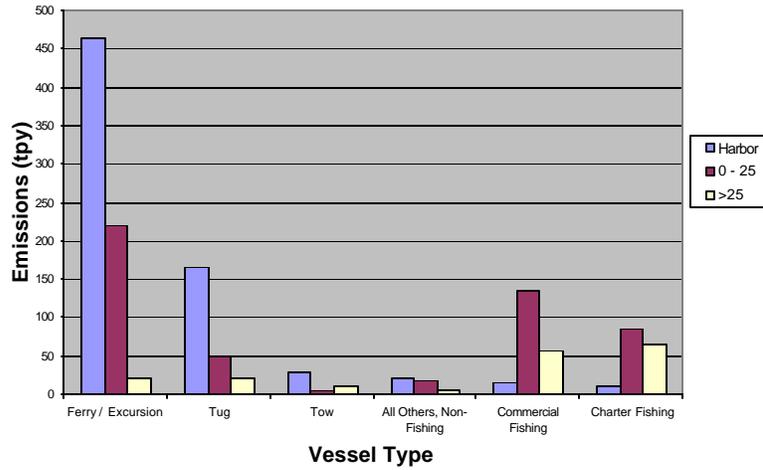


Health Risk Assessment

- ◆ Port POLA / POLB Health Risk Assessment
 - Commercial Harbor Craft third largest contributor to risk behind ocean going vessel hotelling and cargo handling equipment
- ◆ POLA / POLB CHC Emissions Cancer Risk
 - >200 cases per million risk 5,000 residents
 - >10 cases per million risk 1.5 million residents
 - Also, significant source of PM mortality

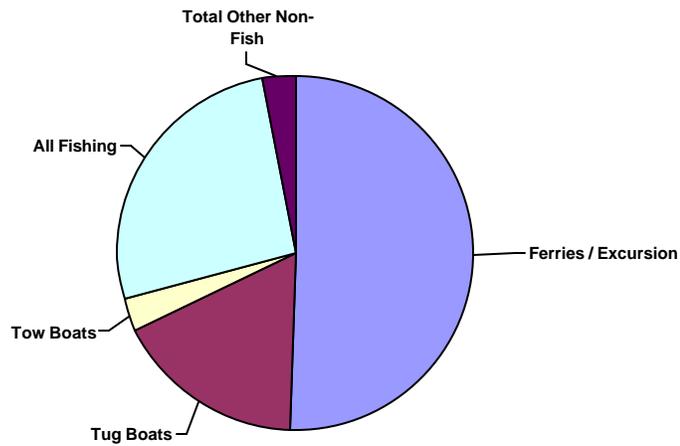
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PM Emissions and Proximity to Shore



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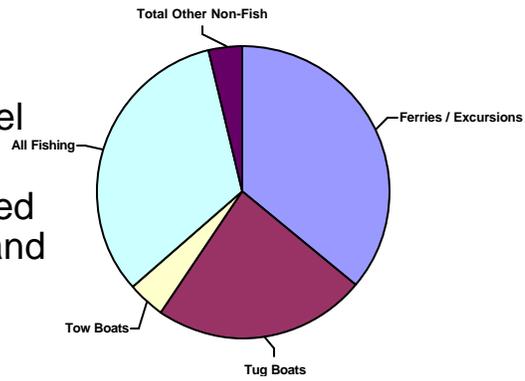
Commercial Harbor Craft Emission Sources (Original Ferry/Excursion Load Factor)



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Ferry / Excursion Engine Load Factor

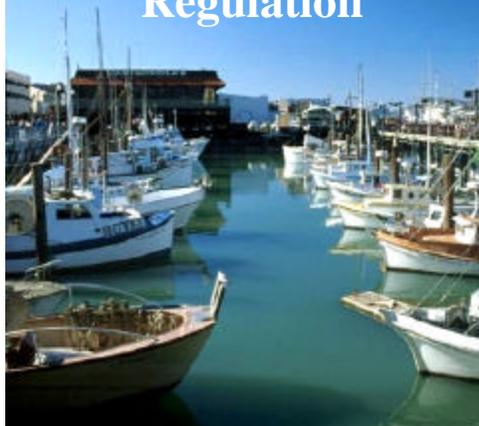
- ◆ Reviewed load factors for all vessel types
- ◆ No changes advised except for ferries and excursion vessels.
- ◆ Load factor to be reduced by about 40%.



Estimated Load Factor Change Impact

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Proposed Commercial Harbor Craft Regulation



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Require All CHC Vessels Statewide to Use CARB Diesel Fuel

- ◆ Require all commercial harbor craft to use CARB diesel for alternative diesel fuel
- ◆ Nov. 2004 Board adopted regulation requiring sale of CARB diesel to commercial harbor craft and intrastate locomotives
 - Jan. 1, 2006 SCAQMD
 - Jan. 1, 2007 Statewide

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Summary of Regulation Areas of Responsibility

Vessel Use	Reporting And Recordkeeping		"New" Requirements		"In-use" Requirements		
	Hour Meter	Initial Report	New Vessel	New Engine	Purchase of Engine	Purchase Of Vessel	Compliance Action
Ferry	v	v	v	v	v	v	v
Excursion	v	v	v	v	v	v	v
Tug	v	v	v	v	v	v	v
Tow	v	v	v	v	v	v	v
Fishing	v	v	v	v	v	v	
Work	v	v	v	v	v	v	
Crew	v	v	v	v	v	v	
Pilot	v	v	v	v	v	v	
Other	v	v	v	v	v	v	

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Exemptions

- ◆ Ocean-going vessels
- ◆ Recreation vessels
- ◆ Temporary replacement vessels
- ◆ Temporary emergency rescue and recovery vessels.
- ◆ Registered historic vessels
- ◆ Military tactical support vessels
- ◆ Vessel engines registered with the Portable Engine Registration Program

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Reporting and Recordkeeping Requirements for All Vessels

- ◆ Install non-resettable hour meter
- ◆ Reporting
 - Initial Reporting
 - New Engine and New Vessel Reporting
 - Compliance Reporting
 - (Ferry, Excursion, Tug and Tow Only)
- ◆ Recordkeeping
 - Initial Reporting Record
 - Yearly Engine Hours, General Use, % time from shore

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Reporting and Recordkeeping Forms

- ◆ ARB Reporting Form
- ◆ Electronic Forms Preferred
 - Data Base
 - On Board computer

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All New Harbor Craft Vessels

- ◆ Require most current EPA engine
 - Sell through provisions
 - Most current engine available when vessel is designed.

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Additional Requirements for All New Ferries

- ◆ Applies to passenger vessels with capacity of 75 or more passengers
- ◆ Require Tier II or Tier III EPA engine + combined PM and NOx reduction of 85%
- ◆ Or Tier IV engine

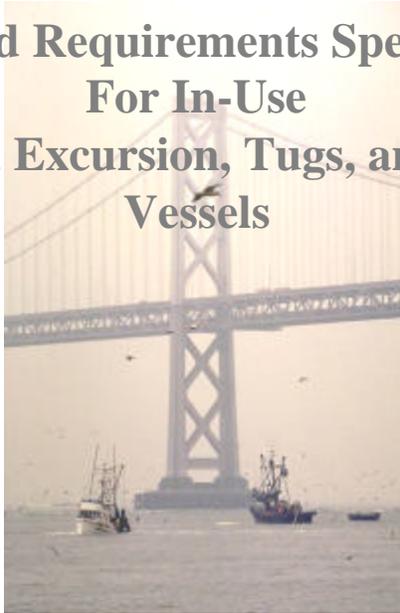
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Acquisition of In-Use Vessels and Engines

- ◆ Vessels
 - Sale and purchase of vessels currently being used in CA unrestricted
 - If not currently being used in CA, engines must meet current EPA engine standards
- ◆ Engines acquired for in-use vessels must meet most current EPA engine standards

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Proposed Requirements Specifically For In-Use Ferries, Excursion, Tugs, and Tow Vessels



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Basic Approach

- ◆ Replace older engines with new certified engines.
- ◆ Accelerate engine retirement
- ◆ Phase in schedule oldest and high use engines first
- ◆ Aftertreatment Option

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Why This Approach ?

- ◆ Long life engines
- ◆ Expensive
- ◆ Retrofits challenging
 - Consequences of retrofits
 - One size fits one
 - Relatively small numbers
 - Economics highly variable
 - Multi-agency approvals

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Current U.S. EPA Marine Engine Standard Effective Dates

- ◆ Tier 0 Engines are unregulated (<2004)
- ◆ U.S. EPA has established Tiered Standards
 - Tier I (2004)
 - Tier II (2004-2007)

Not Yet Finalized

- ◆ Tier III (2009 small engines)
- ◆ Tier III (2012-2014)
 - Category 1* and 2 engines over 800 hp
- ◆ Tier IV (2016-2017)

* Modified Category 1 and 2 break point

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Average Emission Reductions for Engine Repowers

U.S. EPA Marine Tier	U.S. EPA Marine Tier	NOx Reductions	PM Reductions
Category 1			
Tier 0	Tier I	40 %	25 %
Tier 0	Tier II	60 %	65 %
Tier 0	Tier III	65%	75%
Tier I	Tier II	40 %	60 %
Category 2			
Tier 0	Tier I	46%	33%
Tier 0	Tier II	61%	63%
Tier 0	Tier III	69%	78%
Tier 0	Tier IV	91%	94%
Tier 1	Tier IV	82%	92%

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Statewide Ferries, Excursion, Tugs, and Tow Proposed Compliance Schedule

< 1975 (>1500 hours)	2009
<1975 (>300 - <1500 hours)	2010
1976-1985 (>1500 hours)	2011
1976-1985 (>300 - <1500 hours)	2012
1986-1995 (>1500 hours)	2013
1986-1995 (>300 - <1500 hours)	2014
1996-2000 (>1500 hours)	2015
1996-2000 (>300 - <1500 hours)	2016
2001-2002 (>300 hours)	2017
2003 (>300 hours)	2018
2004 (>300 hours)	2019
2005 (>300 hours)	2020
2006 (>300 hours)	2021
2007 (>300 hours)	2022

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South Coast Ferries, Excursion, Tugs, and Tow Proposed Compliance Schedule

Pre - 1979	2009
1980 - 1985	2010
1986 - 1990	2011
1991 - 1995	2012
1996 - 2000	2013
2001	2014
2002	2015
2003	2016
2004	2017
2005	2018
2006	2019
2007	2020

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Ferry, Excursion, Tug, and Tow Vessel Compliance Options

- ◆ Replace existing engines with most current U.S. EPA Marine engine.
- ◆ Demonstrate existing engine meets most current U.S. EPA Marine engine standard.

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Ferry, Excursion, Tug, and Tow Vessel Compliance Options (Cont.)

- ◆ Demonstrate pre-2004 engine has been rebuilt to a Tier I standard prior to 2008.
 - Rebuild date to be used as MY for determining compliance date.
- ◆ Install emission control strategy reducing PM or NOx by 25% or greater.
 - Extend compliance 1-5 years.
 - Not an option for MY 2005 and newer.

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Regulatory Extensions with ARB Approval

- ◆ Vessel near retirement
- ◆ Changes in Hours of Operation, Sales, and Change of Ownership
- ◆ No Suitable Engine Replacement
- ◆ Equipment Manufacturer Delays or Installation Difficulties
- ◆ Multiple Vessel – Same Year Compliance
- ◆ Considering variance per CA H&S Code 42350 - 42364

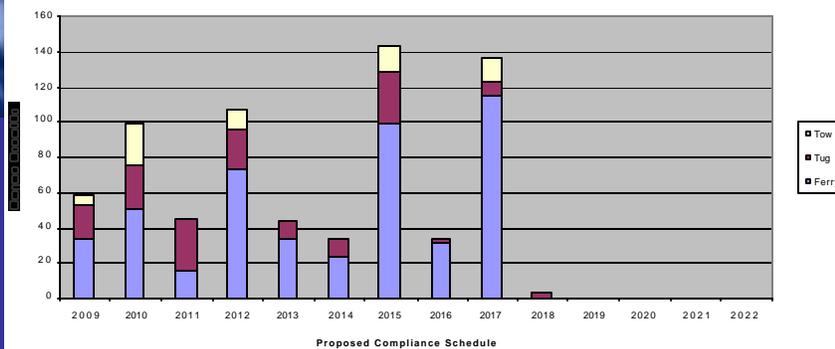
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Alternative Compliance Plan

- ◆ Operators may comply using alternative emission control strategies.
- ◆ Must achieve equivalent or greater reductions
- ◆ Applications include a public review process

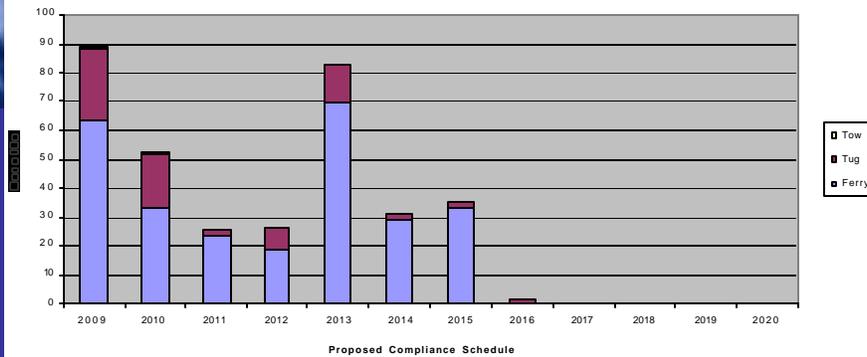
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Estimated Number of Propulsion Engines Replaced Per Year Statewide (not including SCQAMD)



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Estimated Number of Propulsion Engines Replaced Per Year SCAQMD Only



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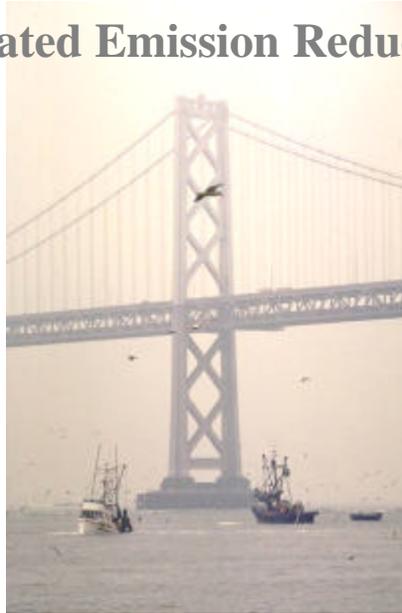
Statewide Engine Repower Capacity

Region of the State	Numbers of Engines
Northern California	76 - 101
Los Angeles Area	93 - 110
San Diego Area	48 - 60
Total Capacity Statewide	217 - 271

- ◆ Contacted 50+ marine vessel boat yards, vessels builders, or vessel repair facilities statewide

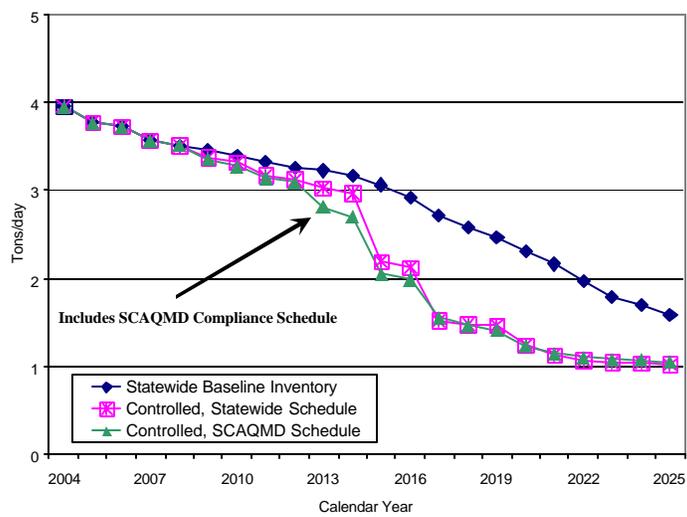
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Estimated Emission Reductions



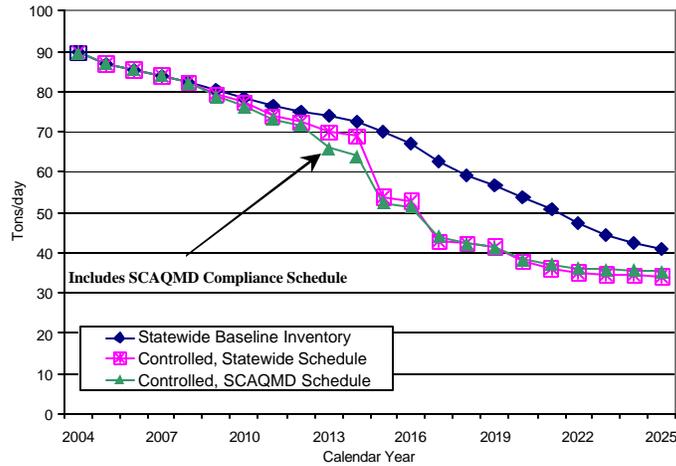
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Estimated Statewide Emission PM Reductions



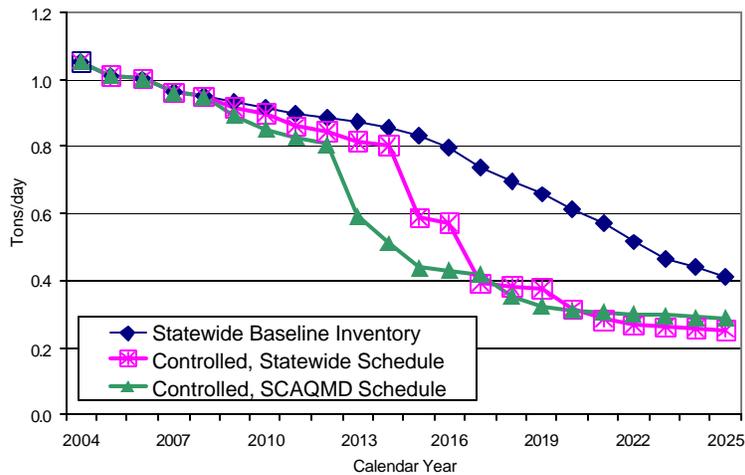
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Estimated Statewide Emission NOx Reductions



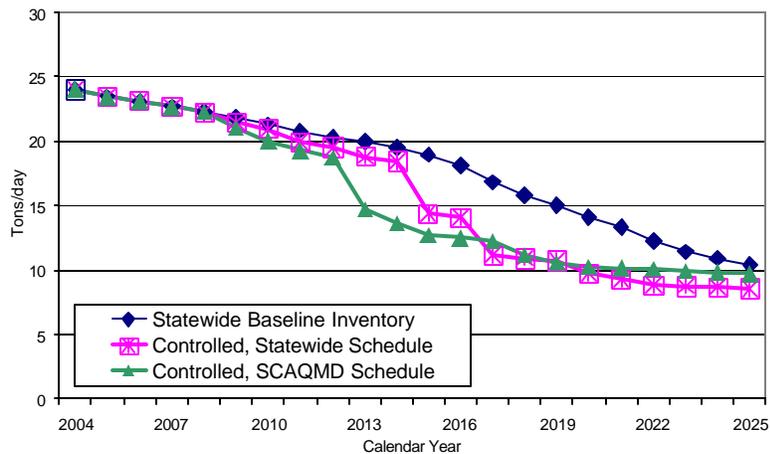
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Estimated South Coast PM Emission Reductions



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Estimated South Coast NOx Emission Reductions



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Regulation Timeline

- ◆ Early August 2007 - Release Initial Statement of Reasons
 - Start 45 day comment period
- ◆ September 2007 - Present to Board for consideration

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Outstanding Issues

- ◆ Ferry / Excursion Load Factors
- ◆ Ocean-Going Tugs
- ◆ Vessels visiting CA



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Sacramento
June 27, 2007



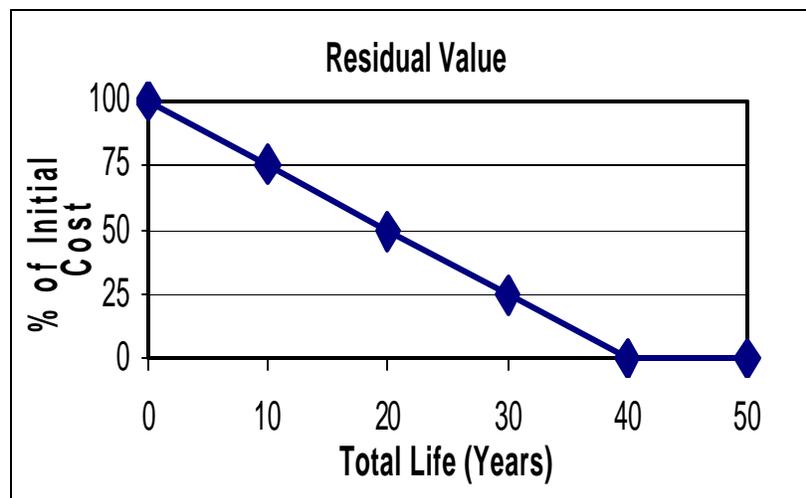
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Air Resources Board

Commercial Harbor Craft Cost Estimates

- ◆ Costs for Ferries, Excursion, Tugs,
and Tows
 - ◆ Estimate Costs for New Engine Replacement
 - ◆ Estimate Costs for Regulation.
 - ◆ Includes Residual Engine Value, Major and
Top End Rebuilds, and Time Value of
Money for Accelerated Turn-Over
- ◆ Reporting Costs for All Harbor Craft

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Marine Engine Life Expectancy

Vessel Type	Engine Type	Estimated Engine Life Expectancy (Years)	
		Useful Life	Total Life
Ferry /Excursion	Prop	20	40
Ferry /Excursion	Aux	20	40
Tug	Prop	21	42
Tug	Aux	22.5	45
Tow	Prop	30	60
Tow	Aux	25	50

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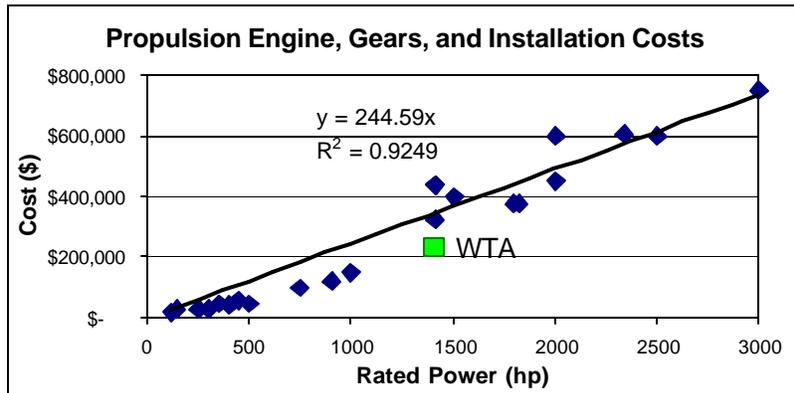
Harbor Craft Engine Costs

Replace Engines with Tier II or Tier III Engines

- ◆ Carl Moyer and POLA AIR Quality Mitigation Program 2005-6 for Propulsion Engines ~ \$245/hp
- ◆ POLA AIR Quality Mitigation Program 2005-6 for Auxiliary Engines ~ \$233/hp
WTA consistent with this data
- ◆ Tier III Engines estimate 20% increase in cost.

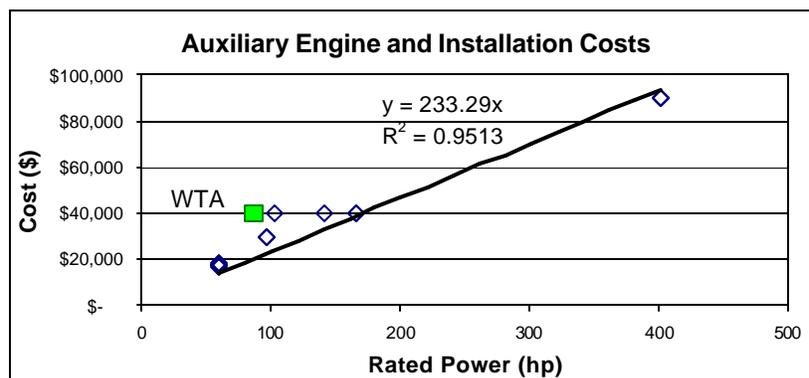
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Marine Propulsion Engine Replacement Costs



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Marine Auxiliary Engine Replacement Costs



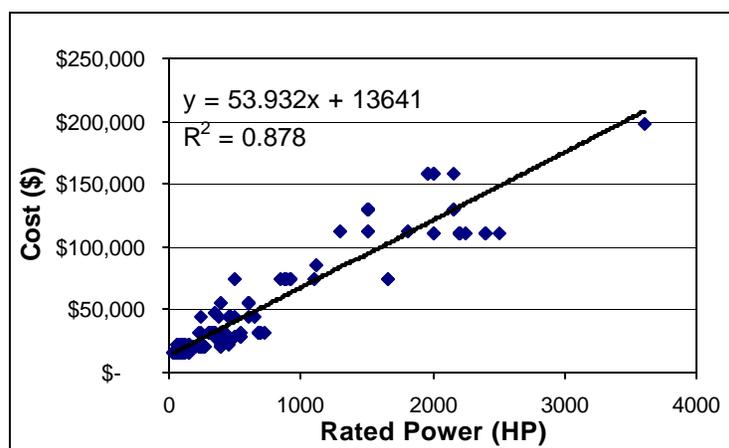
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Marine Engine Rebuild Frequency

- ◆ Majority of Engines:
 - ◆ Major Rebuild every 10 years
 - ◆ Top End or Minor Rebuild every 5 years
In Between Major Rebuilds
- ◆ EMD Engines:
 - ◆ Major Rebuild every 14 years
 - ◆ Minor Rebuild every 7 years
- ◆ Two Caterpillar Models (D397, D398):
 - ◆ Major Rebuild every 8 years
 - ◆ Minor Rebuild every 4 years

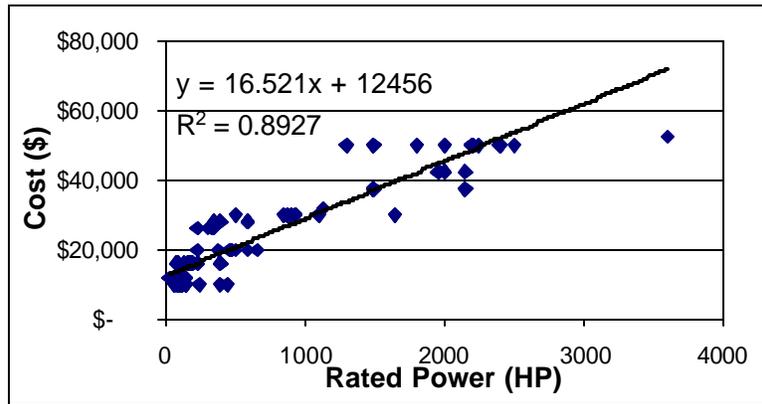
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Major Rebuild Cost Equation



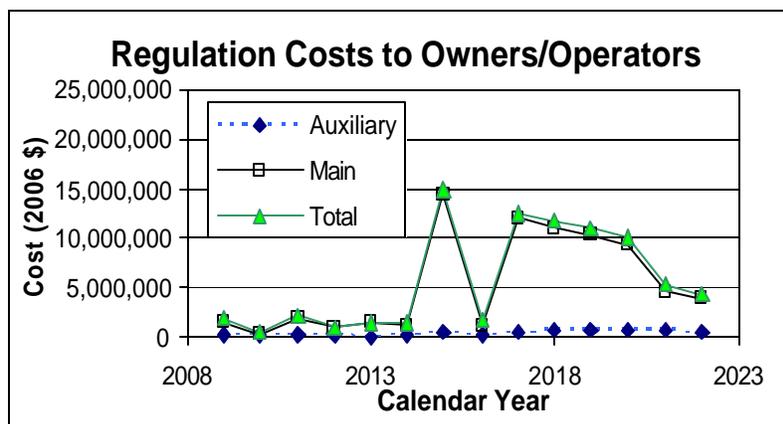
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Top End Rebuild Cost Equation



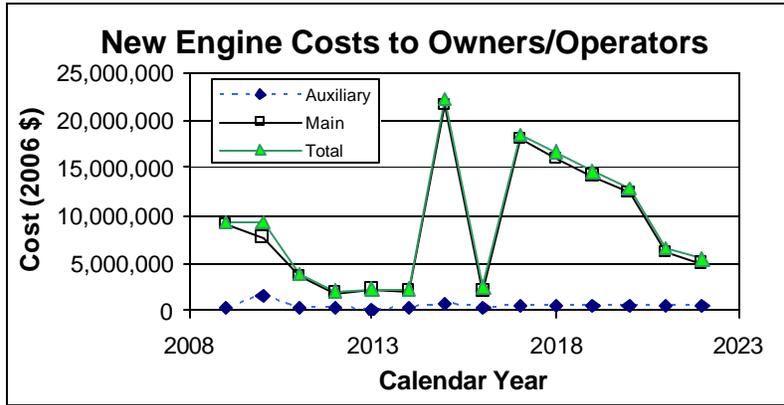
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California Costs



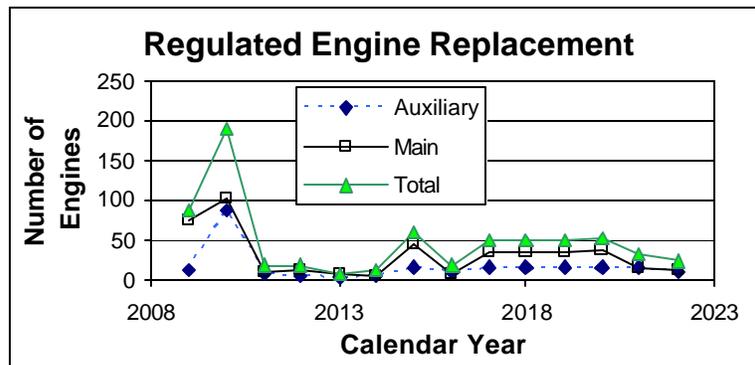
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California Costs



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California Costs



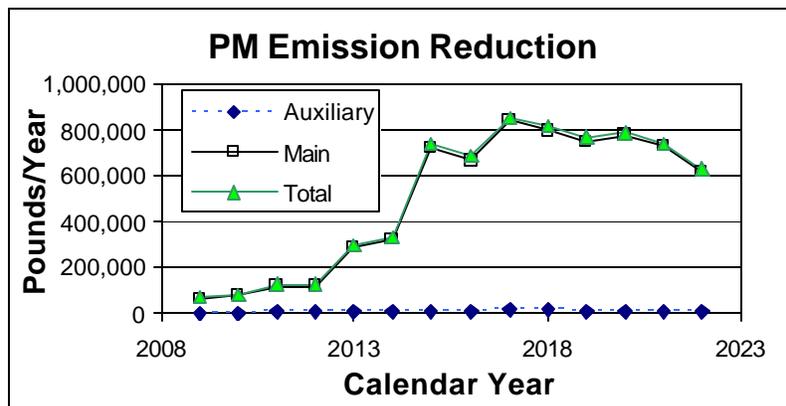
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California Costs

Vessel	Engine	Early Replacement Cost (Option 1)	New Engine Cost	Reporting Cost
Ferry / Excursion	Aux	\$1,800,000	\$2,900,000	\$58,000
	Prop	\$29,400,000	\$53,700,000	\$96,000
	Sum	\$31,200,000	\$56,600,000	\$154,000
Tug	Aux	\$1,700,000	\$2,900,000	\$26,000
	Prop	\$30,900,000	\$60,500,000	\$33,000
	Sum	\$32,600,000	\$63,400,000	\$59,000
Tow	Aux	\$400,000	\$500,000	\$5,000
	Prop	\$4,700,000	\$8,100,000	\$10,000
	Sum	\$5,100,000	\$8,600,000	\$15,000
Total F, E, T, & T	Aux	\$3,900,000	\$6,300,000	\$89,000
	Prop	\$65,000,000	\$122,300,000	\$139,000
	Sum	\$68,900,000	\$128,600,000	\$228,000
All Vessels				\$889,076

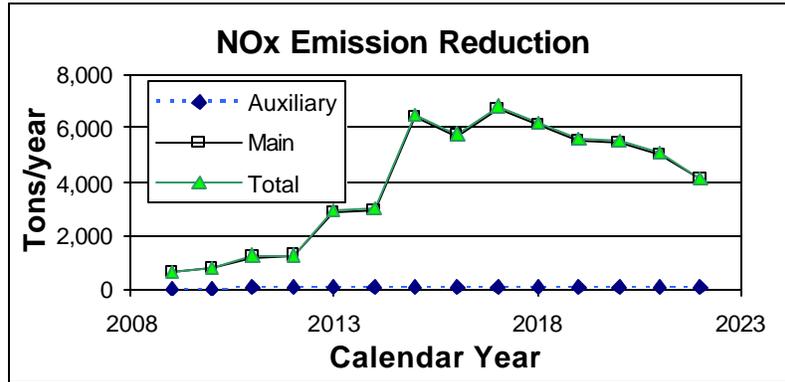
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California Emissions Reduced



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California Emissions Reduced



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Cost Effectiveness

**Engine Remaining Life, Major, and Top End
Cost Effectiveness (1/2 2006 \$/PM lb)**

Aux	Main	Total
\$15	\$5	\$5

**Engine Remaining Life, Major, and Top End
Cost Effectiveness (1/2 2006 \$/NOx ton)**

Aux	Main	Total
\$2,300	\$600	\$620

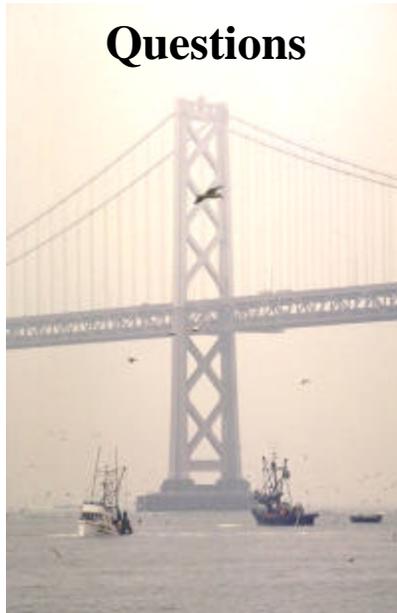
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Commercial Harbor Craft Team Contact List

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Questions



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