



# At-Berth Ocean-Going Vessel Regulation

Workshop  
November 9, 2007

California Environmental Protection Agency



Air Resources Board

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## Questions Via E-mail

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# Topics

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- ◆ **Introduction**
- ◆ Hotelling Emissions
- ◆ Proposed Regulation
- ◆ Benefits
- ◆ Costs

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# Introduction

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- ◆ Need for reductions at ports
  - Goods Movement Emission Reduction Plan
  - Diesel Risk Reduction Plan
  - South Coast SIP
  - AB 32

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## Introduction (Continued)

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- ◆ Goals
  - Reduce NOx and diesel PM hotelling emissions by 80 percent
  - Affect all ports and all types of ships
- ◆ Meetings
  - Five workgroup
  - Four workshops
- ◆ At-Berth Ocean-Going Vessel Regulation
  - Focus on container, passenger, and reefer ships
  - Other ship categories will be considered in future rulemaking

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## Topics

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- ◆ Introduction
- ◆ **Hotelling Emissions**
- ◆ Proposed Regulation
- ◆ Benefits
- ◆ Costs

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## Hotelling Emissions

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- ◆ Hotelling emissions refer to emissions released from ship's auxiliary engines when the ship is tied to the berth
- ◆ Hotelling emissions are projected to increase due to growth in goods movement and cruise activity

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## Hotelling Emissions (Continued)

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- ◆ Projected NOx increases

	2006	2014	2020
Container, Passenger, and Reefer Ships	17.5	26	37.3
Other Ship Categories	3.6	5	6.4
Totals	21.1	31	43.7

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## Hotelling Emissions (Continued)

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- ◆ Projected PM increases

	2006	2014	2020
Container, Passenger, and Reefer Ships	1.4	0.47	0.67
Other Ship Categories	0.35	0.09	0.11
Totals	1.75	0.56	0.78

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## Hotelling Emissions (Continued)

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- ◆ Emissions from container, passenger, and reefer categories represent 80+ percent of total hotelling emissions
- ◆ Growth will result in significant emission increases.

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## Topics

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- ◆ Introduction
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- ◆ **Proposed Regulation**
- ◆ Benefits
- ◆ Costs

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## Proposed Regulation

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- ◆ Applicability
  - Container ships
  - Passenger ships
  - Reefer ships
- ◆ Exempt
  - Government vessels
  - Steamships

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## Proposed Regulation

(Continued)

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- ◆ Two major compliance options for ship fleets
  - Limited auxiliary engine operation
  - Emission reduction option

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## Proposed Regulation

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- ◆ Affects a fleet
  - Port specific
    - Hueneme
    - Los Angeles / Long Beach is one port
    - Oakland
    - San Diego
    - San Francisco
  - Fleet refers to ships owned or under direct control of an owner or company

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## Proposed Regulation

(Continued)

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- ◆ Limited auxiliary engine operation
  - 50% visits by 2014
  - 80% visits by 2020
- ◆ Pro
  - Simple to implement
  - Simple recordkeeping
- ◆ Con
  - Must have utility power available at the berth

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## Proposed Regulation

(Continued)

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- ◆ Emission reduction option
  - Achieve reduction in emissions of diesel PM and NOx for all ships in fleet
  - Emission reductions based upon the percent difference between controlled and uncontrolled levels
  - Different milestones depending upon how reductions are achieved

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## Proposed Regulation (Continued)

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- ◆ Emission reduction option (utility power)
  - 50% emission reduction by 2014
  - 80% emission reduction by 2020
- ◆ Emission reduction option (alternative power or alternative controls)
  - 20% emission reduction by 2010
  - 40% emission reduction by 2012
  - 60% emission reduction by 2014
  - 80% emission reduction by 2016

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## Proposed Regulation (Continued)

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- ◆ Emission reduction option (mix of alternative power, grid power, and alternative controls)
  - 20% emission reduction by 2012
  - 50% emission reduction by 2014
  - 80% emission reduction by 2020

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## Proposed Regulation (Continued)

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- ◆ Pro
  - Provides flexibility
- ◆ Con
  - Significant recordkeeping

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## Proposed Regulation (Continued)

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- ◆ Examples of projects for emission reduction option
  - Shore-power different group of ships
  - Distributed Generation for electrical power
  - Alternative control techniques

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## Proposed Regulation (Continued)

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- ◆ Requirement for shore power
  - Limited auxiliary engine operation
    - Use grid power
    - Alternative source that is as clean central station power plant equipped with BACT

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## Proposed Regulation (Continued)

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- Emission reduction option
  - Before 2014, emissions no greater than a spark-ignited engine manufactured to current standards
  - CO<sub>2</sub> emissions no greater than natural gas resources used by utility
  - After 2014, spark-ignited engine equipped with BACT

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## Proposed Regulation

(Continued)

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### ◆ Terminals

- Plan document due in 2009 to Executive Officer indicating how requirement is satisfied
  - Must work with utility, port, and carriers
- Follow-up reports

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## Proposed Regulation

(Continued)

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### ◆ Major Changes

- Terminals responsible for plan for applicable shore-side upgrades
- Revised timeline for fleets using alternative controls, or alternative power

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## Topics

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- ◆ Introduction
- ◆ Hotelling Emissions
- ◆ Proposed Regulation
- ◆ **Benefits**
- ◆ Costs

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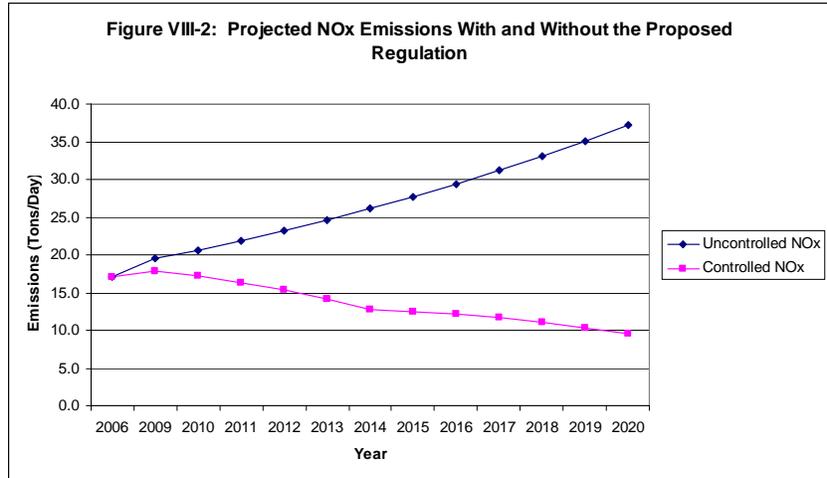
## Benefits

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- ◆ Emission Reductions in 2020
  - PM: 0.5 tons per day
  - NOx: 27.8 tons per day
  - CO2: 330 to 660 metric tons per day
- ◆ Cumulative Reductions 2006 to 2020
  - PM: 1,100 tons
  - NOx: 62,000 tons
  - CO2: 800,000 to 1,600,000 metric tons

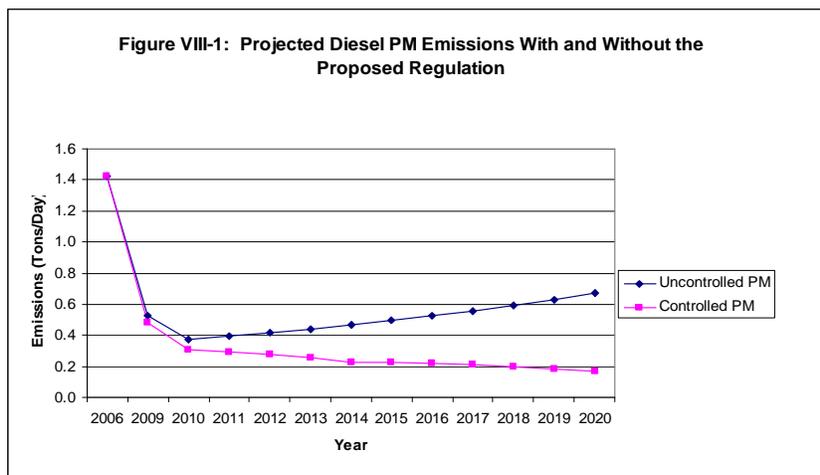
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# Benefits (Continued)



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# Benefits (Continued)



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## Benefits

(Continued)

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### ◆ Health Benefits

– Premature deaths avoided:	280
– Hospital admissions avoided:	170
– Respiratory impacts avoided:	8,200
– Bronchitis impacts avoided:	680
– Work loss days avoided:	49,000
– Minor restricted activity days avoided:	280,000

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## Topics

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- ◆ Introduction
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- ◆ Benefits
- ◆ **Costs**

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## Cost Effectiveness

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- ◆ Costs expressed as 2006 dollars
- ◆ Overall costs: \$1,800,000,000
- ◆ Components of costs
  - 78 berths at six ports
  - 750 ships initially and 700 replacement container ships

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## Cost Effectiveness (Continued)

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- ◆ Overall cost-effectiveness
  - NO<sub>x</sub>: \$12,800 per ton reduced
  - PM: \$700,000 per ton reduced

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## Cost Effectiveness (Continued)

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- ◆ NOx cost effectiveness by terminal
  - Container: \$11,000 to \$32,000  
(POLA/POLB)
  - Container \$11,500 to \$71,000  
(Oakland)
  - Passenger: \$13,000 to \$47,000
  - Reefer: \$16,000 to \$30,000

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## Cost Effectiveness (Continued)

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- ◆ PM cost effectiveness by terminal
  - Container: \$400,000 to \$1,100,000  
(POLA/POLB):
  - Container \$400,000 to \$2,500,000  
(Oakland)
  - Passenger: \$440,000 to \$1,600,000
  - Reefer: \$600,000 to \$1,000,000

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# Contacts

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