



**Public Workshop to Discuss  
Reducing Emissions from  
In-Use Commercial Harbor Craft**

**Emission Reduction Strategies for  
Commercial Harbor Craft**

March 23, 2004

California Environmental Protection Agency

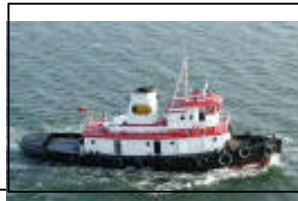


**Air Resources Board**

**Possible Emission Reduction  
Strategies for NO<sub>x</sub> and PM**

**Fuels**

- Cleaner diesel
- Alternative diesel fuels
- Alternative fuels
- Fuel/water blends



**Control Technologies**

- DOC, DPF, SCR
- Engine modifications
- Repower

**Operational Changes**

- Cold Ironing
- Reduce Idling

# Fuels

## Clean Fuel Options

- Cleaner Diesel
- Alternative Diesel Fuels
  - Fischer-Tropsch
  - Biodiesel
- Alternate Fuels
  - Natural Gas
- Fuel/Water Blends



## Clean Fuel Issues

- Availability
- Cost
- Compatibility
- Infrastructure
- Safety
- Verification

# Effectiveness of Control Technologies



Effectiveness	PM Reductions	NOx Reductions
Diesel Particulate Filters	✓ 90%	
Diesel Oxidation Catalysts	✓ 30%	
NOx Adsorbers, Lean NOx Catalysts		✓ 20-50%
Selective Catalytic Reduction		✓ 90%
Engine/Combustion Modifications	✓ May affect NOx	✓ May affect PM
Repower	✓	✓

# Comparative Costs of Control Technologies



Comparative Costs	PM Reductions	NOx Reductions
Diesel Particulate Filters	✓ Higher	
Diesel Oxidation Catalysts	✓ Lower	
NOx Adsorbers, Lean NOx Catalysts		✓ Lower
Selective Catalytic Reduction		✓ Higher
Engine/Combustion Modifications	✓ Lower	✓ Lower
Repower	✓ Higher	✓ Higher

# Control Technologies - Issues



## Control Technology Issues

- Effectiveness
- Availability
- Cost
- Compatibility
- Emission Reduction Verification

# Operational Changes

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## Options

- Cold Ironing/ shore power
- Reduce idling

## Operational Issues

- Infrastructure
- Availability
- Cost
- Compatibility
- Safety

# Emission Reduction Strategies for Commercial Harbor Craft

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