Harboring Pollution
Air Quality Impacts of Marine Ports

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NRDC

The Natural Resources Defense Council is a national, non-profit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment.

Founded in 1970, NRDC has more than 550,000 members nationwide, served from offices in New York, Washington, Los Angeles and San Francisco.
Why are Environmental & Community Groups Concerned?

- Ports are expanding → takes toll on Air & Water Quality.
- Shipping Industry Emissions growing & virtually unregulated.
Pollution Levels in one Port-side Community: West Oakland

“Black soot covers my window sills, my blinds, and my heating vents. It is a constant cleaning dance to even control it. No wonder, that my four grandchildren, my son and myself have asthma.

There is also a Head Start and three child care centers in my building where many of the children also suffer from asthma.”
Health Effects of Diesel Exhaust

- Cancer
- Particulate Related Mortality
- Asthma & Respiratory
- Other Health Hazards

Diesel Exhaust: NOx, PM, > 40 air toxics
Container Ports vs. Other Industry

NOx Emissions (tons/day)

PM10 Emissions (tons/day)

## Harboring Pollution
### The Dirty Truth about U.S. Ports

<table>
<thead>
<tr>
<th>Environmental Criteria</th>
<th>Oakland</th>
<th>NY/ NJ</th>
<th>Los Angeles</th>
<th>Houston</th>
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<tbody>
<tr>
<td>Air Quality</td>
<td>B-</td>
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<td>C+</td>
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<tr>
<td>Water Quality</td>
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<td>Land Use</td>
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<td>Community Relations</td>
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<tr>
<td>Overall Grade</td>
<td>B-</td>
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Harboring Pollution
Strategies to Clean Up U.S. Ports

- Reviews measures to clean up diesel emissions from largest port sources
- Reviews existing policy and regulations covering marine ports
- Recommends measures that ports should implement and policies that agencies should adopt
Largest Emission Sources within Ports

- Marine Vessels, Trucks & Cargo Handling Equipment together account for over 90% of emissions at ports.

PM Emissions

- Marine Vessels: 44%
- Heavy Trucks: 31%
- Cargo Equipment: 24%
- Trains: 2%
- Onsite Operational & Employee Vehicles: <1%

NOx Emissions

- Marine Vessels: 34%
- Heavy Trucks: 39%
- Cargo Equipment: 23%
- Trains: 4%
- Onsite Operational & Employee Vehicles: 1%
Recommended Mitigation Measures:
What CAN be done at ports

Marine Vessels

- **Shore-side Power**
  - Ex: LA; Juneau, Alaska; Sweden

- **Cleaner Marine Fuels**
  - Ex: Long Beach/Orient Overseas Container Lines

- **Cleaner Ships**
  - Ex: > 100 ships w/ SCR in N. Europe

- **Harbor Craft Retrofits & Re-powers**
  - Ex: Repowers common, testing various exhaust controls on ferries
  - C/E: ~ $500 per ton NOx

- **Ship Speed Limits**
Mitigation Also Needed on the Land-Side: Container Handling Equipment

- **Alternative Fuels for New Purchases**
  - Ex.: LA, Propane Yard Tractors; Barcelona, Virginia, Hybrid Straddle Carriers
  - C/E: $3,500 - $6,600 per ton NOx

- **Cleaner Fuels**
  - Ex: LA, Long Beach, Houston – Emulsions; Oakland, Helsinki, Malmo-Copenhagen – LSD

- **Retrofits & Re-powers**
  - Ex: LA, Long Beach – DOCs w/ Emulsions; Oakland – DOCs w/ LSD & Repowers; Goteborg, Sweden – DPFs
  - C/E: $1,000 - $5,000 per ton NOx

- **Automation**
  - Rotterdam, Singapore
Incentivize Cleaner New Truck Purchases
- Ex: Gateway Cities, Oakland
- C/E: ~ $ 8,000 per ton NOx

Retrofits for Existing Vehicles
- Ex: Oakland
- C/E: $3,000 - $40,000 per ton NOx

Make Cleaner Fuels Available to Off-site Trucks
- Ex: Oakland, emulsions

Minimize unnecessary idling
- Ex: California, Lowenthal Bill
- C/E: ~$2,000 per ton NOx

Transfer more container transport to rail:
Invest in on-dock rail & freight improvements.
- Note: Rail is 3x more efficient than trucking, but also needs to be cleaned up.
Cleaner New Purchases and Re-powers: Natural gas and diesel-electric hybrids
- C/E: ~$12,000 per ton NOx

Idling Controls
- C/E: $3,000 per ton NOx

Cleaner Fuels for Locomotives
Port Pollution Can be Reduced: W. Coast Examples

CHINA SHIPPING CONTAINER TERMINAL IN LOS ANGELES

- Shore-side Power
  - 80% of ships will plug-in to electric power while at berth.

- Alternative fuel yard equipment
  - All yard tractors will run on natural gas or propane
  - All other yard equipment (e.g., top picks) will have diesel oxidation catalysts and use emulsified diesel fuel

- Port will pay $10 million to Gateway Cities Program to fund replacement of old trucks with newer cleaner ones.

PORT OF OAKLAND ALSO HAS AIR QUALITY PLAN
Policy Recommendations

- Need National Regulations over ports, to address competitiveness issues among U.S. ports.

- U.S. regulators should coordinate with Canada & Mexico on marine port policies.

- Cleaning up the dirtiest engines and largest sources should be the priority; start with ships.

- Ports should add environmental fees to existing container fees to cover mitigation.

- Detailed policy recommendations listed in our *Harboring Pollution* Report.
Conclusions

- Most port related emission sources are poorly regulated; there is much work to be done.
- If ports implement the diesel control measures that we recommend, NOx would be reduced by 1/3 and PM by over ½.
- Mitigation only goes so far in some cases caps on cargo throughput, or at the very least, efficiency improvements rather than expansion, should be considered.