Overview

- POLA Environmental Ship Index (ESI) Incentive Program
- VSR
- Emission Reduction Technologies
- SBCAPCD Open Incentive Discussion
Environmental Ship Index (ESI)

- International clean ship indexing program
  - Web-based tool

- Assigns scores to vessels performing better than IMO rules
  - Before regulations
  - Beyond regulations

- Focus on priority pollutants
  - GHG reductions in the future

- Standard for ports to reward clean ships
Why Important to POLA?

- Promote internationally-accepted indexing system
- Contribute to CAAP goals
  - Standards
  - OGV 5 & 6
- Reward early action readiness for upcoming regulations
- Lead as North American catalyst
  - Incentives from multiple ports increases industry participation
Why Important to Industry?

- Participate in an internationally-accepted indexing system
- Recognition & rewarded for early action readiness for upcoming regulations
- Incentives from multiple ports
ESI, Who is Participating?

- 1,445 vessels enrolled
- 170 shipping lines are participating
- 16 ports offering incentives
- Five container lines calling the Port are participating in ESI
- In 2011, 12 vessels made 135 calls to the Port
- Two North American Ports will join ESI in 2012
ESI, Who is Participating?

[Bar chart showing participation by month and year, with SHIPS and COMPANIES categories]
ESI Incentive Providers

Port of Los Angeles
AutoritàPortualedi Civitavecchia
Brunsbüttel Ports GmbH
Green Award Foundation
Groningen-Seaports
Hamburg Port Authority
Port of Amsterdam
Port of Antwerp
Port of Ashdod
Ports of Bremen/Bremerhaven
Port of La Havre
Port of Oslo
Port of Rotterdam
Port of Zeebrugge
SEEHFEN KIEL GmbH & Co. KG
Tata Steel IJmuiden Terminals
Port of Los Angeles
Environmental Ship Index Program

Environmental Ship Index Incentive

- **ESI Score 40+** per call: **$1,250**
- **ESI Score 35-39** per call: **$1,000**
- **ESI Score 30-34** per call: **$750**
- **ESI Score 25-29** (7/1/12-12/31/12) per call: **$250**

Additive Incentive Opportunities - OGV5 & 6

- **Vessel with IMO Tier 3 Main Engine** per call: **$3,250**
- **Vessel with IMO Tier 2 Main Engine** per call: **$750**
- **Main Engine Demo Participation** per call: **$750**

OGV5 – Cleaner Engines
OGV6 – Engine Emissions Reduction Technology Improvements

Environmental Ship Index [http://esi.wpci.nl](http://esi.wpci.nl) and Port of Los Angeles Incentive Payment [http://www.portoflosangeles.org/environment/ogv.asp](http://www.portoflosangeles.org/environment/ogv.asp)

Registration
# Clean Ship Profile

<table>
<thead>
<tr>
<th>Vessel Particulars</th>
<th>ESI 25-29</th>
<th>ESI 30-34</th>
<th>ESI 35-39</th>
<th>ESI 40+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine rating lower than Tier I engine for NOx</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Lower sulfur than regulation Heavy Fuel Oil (HFO)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Lower sulfur than regulation Marine Gas Oil/Diesel Oil (MGO/MDO)</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleanest available MGO/MDO</td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Ship Energy Efficiency Management Plan</td>
<td></td>
<td></td>
<td>✔️ and/or</td>
<td>✔️</td>
</tr>
<tr>
<td>Shore power technology on-board</td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Los Angeles Harbor Department Incentive Payment Schedule

- **Quarterly Payments**
  - 7/1 – 9/30*
  - 10/1-12/31
  - 1/1 – 3/31
  - 4/1 – 6/30

* On a one-time basis only for the first quarter of the program, the Harbor Department will pay incentives for qualifying ship calls from July 1, 2012 to September 30, 2012, provided the vessel operator is both registered for ESI and enrolled with the Harbor Department by September 30, 2012.
ESI, Point Accumulation

- 200 NOx points
- 100 SOx points
- 10 CO2 points
- 35 On-Shore Power Supply
ESI, NOx Points

✓ Provide basic engine data to accumulate NOx points

Main & Auxiliary Engines
200 NOx Points Possible

Provide Engine Data
• kW rating of engines
• Max RPM
• NOx engine rating

Accrue NOx Points
• > IMO Tier I Standard
• IMO Tier I Standard is 17.1 g-NOx/kW-hr

EIAPP
• IMO Standard vs. Engine Certification

17.1 = 0 NOx pts.
14.5 ~ 30 NOx pts.
8.55 ~ 100 NOx pts.
0 = 200 NOx pts.
**ESI, SOx Points**

✓ Provide bunker note delivery receipts for heavy fuel oil (HFO) & marine gas oil/marine diesel oil (MGO/MDO) to accumulate SOx points

<table>
<thead>
<tr>
<th>Sulfur Level</th>
<th>SOx Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;3.5% Sulfur</td>
<td>30 pts.</td>
</tr>
<tr>
<td>2.7% Sulfur</td>
<td>~7 SOx pts.</td>
</tr>
<tr>
<td>1.0% Sulfur</td>
<td>0 SOx pts.</td>
</tr>
<tr>
<td>&gt;0.5% Sulfur</td>
<td>0 SOx pts.</td>
</tr>
<tr>
<td>0% Sulfur</td>
<td>30 SOx pts.</td>
</tr>
</tbody>
</table>

100 SOx Points Possible

- 30 pts. HFO >3.5% Sulfur
- 35 pts. MGO/MDO 0.5% - 1.0% Sulfur
- 35 pts. MGO/MDO >0.5% Sulfur

- 3.5% S HFO = 0 SOx pts.
- 2.7% S HFO ~ 7 SOx pts.
- 1.0% S MGO/MDO = 0 SOx pts.
- >0.5% S MGO/MDO = 0 SOx pts.
- 0% S HFO = 30 SOx pts.
- >0.5% S HFO = 35 SOx pts.
- 0% S MGO/MDO = 35 SOx pts.
- 0.7% S MGO/MDO ~ 10 SOx pts.
- 0.1% S MGO/MDO ~ 28 SOx pts.
ESI, CO2 Points

If the vessel has a Ship Energy Efficiency Management Plan (SEEMP) then vessel accumulates 10 CO2 points

10 CO2 Points Possible

SEEMP?  Yes
• 10 pts.
ESI, Bonus Points

☑️ If vessel is has onshore power supply (OPS) on-board vessel, vessel receives 35 bonus points

35 Bonus Points Possible

OPS?  Yes
• 35 pts.
ESI Next Steps

2013-2014? Develop EEOI element for ESI – coordination with shipping lines

2014-2016? Rollout the various elements to EEOI

Environmental Ship Index: http://esi.wpci.nl
Port of Los Angeles: http://www.portoflosangeles.org/environment/ogv.asp
Vessel Speed Reduction (VSR)

- One of Many Options for Reducing Ship Emissions
  - Fuel Switch
  - On-Shore Power
  - Vessel Speed Reduction (VSR)
  - Emission Reduction Technologies
  - Energy Efficiency Measures
  - ...

- Pollutant Consideration & Effectiveness
  - Port Domain Perspective
    - NOₓ, PM₂.₅, PM₁₀, DPM, & SOₓ – Good Option for Reducing Regional & Local Health-Based Emissions/Impacts
VSR 101

Advantages of VSR

- Reduces all pollutants
- All ships can do it
- Short implementation time frame
- Utilizing AIS data a program can be verified
- Administration of VSR compliance can mostly be automated (POLA, POLB, PANYNJ, etc) = low administrative support costs
- Reductions have been studied & estimating methods CARB & EPA accepted
VSR 101

Ship Energy Profile

<table>
<thead>
<tr>
<th>Energy Demand (MW)</th>
<th>Berth</th>
<th>Shanghai</th>
<th>Menuv Depart</th>
<th>Trans</th>
<th>Trans Pacific</th>
<th>Menuv Arrival</th>
<th>Berth LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Factors Influencing Magnitude of Benefits

- Geographical Domain & Geography
  - Reduction Magnitudes from Slow Steaming Varies by Port
  - Coastal Ports – Good Potential to Reduce Open-Water Portion of Ship Transit Emissions
    - Limited by Geography & Domain Extent
    - Limited by Transitional Areas
  - Inland Ports – Limited Effect on Constrained Waterway Transit Emissions
    - Vessel Safety is Paramount
    - Speed Typically Already Reduced Due to Constrained Waterways
    - Pilot Time Limits

- Vessel Related Factors
  - Average Speeds Prior to Program Start
  - Large Auxiliary Loads are Primary Constraining Factor
  - Fleet Mix & Next Port
<table>
<thead>
<tr>
<th>Port</th>
<th>Driver</th>
<th>Evaluated VSR Program?</th>
<th>Active VSR Program?</th>
<th>Start Distance (nm)</th>
<th>Implementation Method</th>
<th>Innovations/Challenges/Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Los Angeles</td>
<td>NOx/DPM</td>
<td>❍</td>
<td>❍</td>
<td>2001</td>
<td>20/40 Vol/Inc</td>
<td>Dockside work gang assignment moved to VSR boundaries</td>
</tr>
<tr>
<td>Port of Long Beach</td>
<td>NOx/DPM</td>
<td>❍</td>
<td>❍</td>
<td>2001</td>
<td>20/40 Vol/Inc</td>
<td>Marine exchange/USCG participation; Green Flag Program</td>
</tr>
<tr>
<td>Port San Diego</td>
<td>NOx</td>
<td>❍</td>
<td>❍</td>
<td>2009</td>
<td>20 Vol/Inc</td>
<td>Set Cruiseship Speed to 15 knots &amp; all others 12 knots</td>
</tr>
<tr>
<td>Port of Oakland</td>
<td>NOx</td>
<td>❍</td>
<td>❍</td>
<td></td>
<td></td>
<td>Ships already slow to 10 knots @ Bay Bridge; Strong currents</td>
</tr>
<tr>
<td>Port of Seattle</td>
<td>PM</td>
<td>❍</td>
<td>❍</td>
<td></td>
<td></td>
<td>Ships gradually slow naturally; Added costs; Strong currents</td>
</tr>
<tr>
<td>Port of Tacoma</td>
<td>PM</td>
<td>❍</td>
<td>❍</td>
<td></td>
<td></td>
<td>Ships gradually slow naturally; Added costs; Strong currents</td>
</tr>
<tr>
<td>Port Authority of NY &amp; NJ</td>
<td>NOx</td>
<td>❍</td>
<td>❍</td>
<td>2010</td>
<td>20 Vol/Inc</td>
<td>Set VSR speed limit to match right whale</td>
</tr>
<tr>
<td>Port of Houston Authority</td>
<td>NOx</td>
<td>❍</td>
<td>❍</td>
<td></td>
<td></td>
<td>Ships in nonattainment area already constrained by ship channel</td>
</tr>
</tbody>
</table>
VSR Example

- San Pedro Bay Ports (SPBP) Developed First VSR Program
  - Implementation Date: October 2001
  - Implementation Approach: Voluntary/Incentive
  - Status: Ongoing
  - Vessel Types: All
  - Drivers
    - Extreme NOx Nonattainment
    - Coastal Ports w/Beneficial Geographical Domain
    - Public, Regulatory, & Board Pressure to Reduce NOx
  - Participants in Development of Program:
    - Port of Los Angeles (POLA)
    - Port of Long Beach (POLB)
    - Marine Exchange
    - US Coast Guard
    - California Air Resources Board (CARB)
    - South Coast Air Quality Management District
    - Pacific Merchants Shipping Association (PMSA)
VSR Example

- SPBP VSR Program
  - VSR Program Domain
VSR Example

- SPBP Vessel Speed Reduction (VSR) Program –
  - Compliance History
VSR Examples

Port of San Diego Vessel Speed Reduction Zone

- Cargo vessels: 12 knots or less
- Cruise ships: 15 knots or less

Legend
- Point Loma Reference Location: 32° 39'54", 117° 14'33" W
- 20 Nautical Mile Vessel Speed Reduction Zone

- Del Mar
- Mission Bay
- Point Loma
- Cruise Ship Terminal
- Tenth Avenue Marine Terminal
- National City Marine Terminal
- San Diego Bay
- Rosarito
- Pacific Ocean
- U.S.A., Mexico

Nautical Miles
0 3 6 9 12
VSR Examples

- Verrazano Narrows Bridge
- COLREGS Line
- Ambrose Channel
- 20 nm Arc Point (40.508, -73.965)

Legend
- Participation Zone (VSR Zone)
- Participation Zone (Non-VSR Zone)
VSR Examples
Emission Reduction Technologies

- Clean Air Action Plan
  - Technology Advancement Program
  - Emission Inventory Improvement
  - OGV 6 Measure

www.cleanairactionplan.org/default.asp
Thank You!

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