Impact of Shipping
Emissions/pollution from shipping

CO2
Nox
Sox
PM
Chemicals
Waste
Ballast water

Other Impacts
Underwater noise
Social impact – mainly from ship breaking
CO2

Primary environmental impact

- Global warming → ecosystem disruption and ocean rise
- Ocean acidification (carbon acid) → additional eco system disruption

CO2 from shipping

- 3 percent of global total
- Average 10 times as efficient as road transport
- No global reduction goal (EU has from 2018)
NOx

Primary environmental and health impact

- Acidification
- Particulate Matter (less PM than the case of SOx)
- Eutrophication
- Respiratory irritation (contr. ozon)

NOx from shipping

- 30 percent of total NOx emissions EU, 15 percent globally (2009)
- Forecasted to exceed all land based sources at 2020-2025
- (into force 2010-2016) Tier I, II, III – right direction but slow impact
- More stringent reg. on existing ships needed to break the trend
Shipping growth expected to offset regulated reduction EU

70% of shipping is within 400 km from shore
SOx

Primary environmental and health impact

- Acidification
- Particulate Matter

SOx from shipping

- Before SECA 2015 about 30% av EU total (all landbased sources)
- SECA 0,1 and global 0,5 - Potentially considerable positive (env.persp) impact
- Enforcement issues – sniffer drones, bridge sniffers, samples in port and possibly at sea (within territorial waters and contiguous zone)

Economic effect (corporate perspective) for low- resp. high value goods

Recent decrease of oil price in general → less economic impact
Marine fuel oil market adjustment over time → lower price on low sulphur fuels (development partly dependent on pace of new regulations and pace of supply capacity increase)
Relatively lower SOx and NOx share of total emissions globally
  - cleaner shipping in Asia and Africa?

...No
  - lower share because (often) of dirtier land based emissions and/or less near-land shipping activity
  - Europe waters are densely trafficked
PM

50,000 premature deaths yearly in Europe
Yearly cost of 6 billion Euros
(CEEH Scientific Report No 3)

PM10 – PM2.5 Micrometer

60-70% from ship emitted PM
is a direct result from bunker fuel quality
Air emissions

Heavily regulated on land.
Rules for ships since 2005
Chemicals

- Antifouling
- Stern tube oil
- External hydraulic fluids
- Gear oils
- Boiling-cooling water treatment
- Cleaning agents
- Refrigerants

Lower level of toxins today – still there – impact hard to assess
Waste & garbage

Cargo residues
Waste engine room oil
Refrigerators
Batteries
Engine parts
Barrels
Washing machines
Steel wire

Black and grey water

"Pool of Litter in the Pacific"
70% of all waste sinks to the bottom:
Out of sight but ...
Ballast water

- Invasive species
  - UV treatment
  - Chemical treatment
  - Combination with filtration

*Photo from: ocean.si.edu*
Underwater noise

Antropogenic sounds become problematic:

- When background sounds too loud
- Frequency overlaps with sounds of marine mammals

Photo from: adventuresinafricablog.wordpress.com
End of Life
Dirty profit

"Not enough clean capacity"

Demand has not been there, it will come as in any free market

If you can’t survive with fair market conditions, then should you?
- UN body for regulating shipping
- Decision making based on state sovereignty
- 169 countries are party
- Entry into force depends on national ratifications + certain proportion of world fleet
- Enforcement depends on efforts of the countries
Most ships fly ‘Flag of Convenience’

No clear connection between flag and nationality of owner

Panama 2014: 8,600 ships
No trend change

*If China, Panama, Liberia and Bahamas form a block in IMO, that will make it hard to introduce ambitious conventions*

*Source: CIA, 2010*
"Recent" legislations and discussions

SECA 2015
Global regulation sulphur 2025
NECA discussion
US EPA – General Vessel Permit 2013 (lubricants biodegr. min. tox. and nonbioacc.)
Ship breaking, some recent attention, China fleet good example
MRV EU, promotion for MRV adoption IMO
Methanol (bio), trial and evaluation – sweden prerequisites production, distribution and R&D competence
Hong Kong convention on ship recycling - ratification - not yet in force
Ballast Water Management Convention – ratification – not yet in force
Public attention sewage (grey and black water) Baltic Sea
Polar Code - ratification not yet started – criticism safety vs env. focus
Clean Shipping Index

Environmental Index for Shipping
based on the Clean Shipping Index criteria for:

- SO\textsubscript{x} and PM
- NO\textsubscript{x}
- CO\textsubscript{2}
- Chemicals
- Water and Waste

Keeping a holistic focus

Results in High, Medium or Low performance

www.cleanshippingindex.com
Clean Shipping Index

This is example data from Clean Shipping Index based on self-assessment by the shipping companies.

M/T FureWest

Balticborg

TransTimber
## Database usage

### Carrier Chart

#### Carrier List

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Reported</th>
<th>SOx</th>
<th>NOx</th>
<th>CO2</th>
<th>Chemicals</th>
<th>Water and waste</th>
<th>Weighted total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verified: 2 Carriers</td>
<td>92</td>
<td>29</td>
<td>0</td>
<td>51</td>
<td>32</td>
<td>64</td>
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<td>35</td>
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<td></td>
<td>100</td>
<td>6</td>
<td>9</td>
<td>38</td>
<td>44</td>
<td>46</td>
<td>28</td>
<td>28</td>
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<td>18</td>
<td>100</td>
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<td>18</td>
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<td>10</td>
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<td>35</td>
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<tr>
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<td>0</td>
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<td>26</td>
<td>71</td>
<td>18</td>
<td>18</td>
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</tr>
<tr>
<td>Not verified: 37 Carriers</td>
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<td>100</td>
<td>40</td>
<td>70</td>
<td>48</td>
<td>48</td>
</tr>
</tbody>
</table>
Verification

• Gradual verification of data

• Lloyd’s Register, DNV GL, RINA, Bureau Veritas, Korean Register and Class NK offer verification according to Clean Shipping Index

• The Clean Shipping Network requires from shipowners to verify at least 2 vessels

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CLEAN SHIPPING INDEX
CERTIFICATE OF VERIFICATION

VESSEL

Name of vessel TransTimber
Owner Transatlantic
IMO number IMO9343273

THIS IS TO CERTIFY
that the above-mentioned vessel has been verified by the undersigned according to the
Clean Shipping Index Verification Guidelines, Version 2.0 and that, upon completion of the
survey the undersigned is of the opinion that the vessel is in compliance with the self
assessment. The overall scoring in the database for this vessel leads to a classification of
Good performance according to the Clean Shipping Index.

2011-12-02
Date

Stefan Borggren
Surveyor

DNV
Classification Society, Member of IACS
## Verification method

### SOx and PM

<table>
<thead>
<tr>
<th>Scoring description</th>
<th>Verification assessment</th>
<th>Verification comments</th>
<th>Guideline for assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation only in ECAs</td>
<td>3</td>
<td>Enter comments here.</td>
<td>Office and onboard verification</td>
</tr>
<tr>
<td>Fuel quality = 2.5% S</td>
<td>0</td>
<td></td>
<td>Required documents: Bunker Delivery Notes, BDN summaries, Oil Record Book, International Air Pollution Prevention (APP) certificate</td>
</tr>
<tr>
<td>Fuel quality = 2.3% S</td>
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<td></td>
</tr>
<tr>
<td>Fuel quality = 2.0% S</td>
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<td>Fuel quality = 1.5% S</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fuel quality = 1.0% S</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel quality &lt; 0.5% S</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPG / LNG / Biogas</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOx/PM main engines

Operations in non-ECAs and ECAs (total yearly average)

### SOx/PM main engines

Operations in ECAs (total yearly average)

### Harbour bonus

No data

<table>
<thead>
<tr>
<th>Fuel quality = 0.1% S in main and auxiliary engines in harbour areas</th>
<th>3</th>
<th>Enter comments here.</th>
<th>Office and onboard verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data</td>
<td>0</td>
<td></td>
<td>Required documents: Bunker Delivery Notes, BDN summaries, Oil Record Book, International Air Pollution Prevention (APP) certificate</td>
</tr>
</tbody>
</table>

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**pre-2015 SECA figure**
Feedback reports

• Annual feedback reports to carriers:
  - General performance
  - Benchmarking info
  - Performance on specific routes
  - Improvement suggestions

• Ambition is to get carriers to improve and to verify their ships/company

www.cleanshippingindex.com
Current members of the Clean Shipping Network

Ports can access the index for specific carriers/ships
differentiated port dues
Currently 31 environmentally focused companies (cargo owners and forwarders) who want to be able to evaluate the sea transports with focus on environmental performance

- In the beginning they asked for 20% of owned fleet to be reported in the index
- Then 80% of owned fleet to be reported in the index
- Now the requirement is that at least 2 vessels should be verified according to the Clean Shipping Index.
- Future: the whole fleet is verified (carrier verification)
- Future: The cargo owners can put specific environmental requirements on the ship operators
Recent focus and activities

✓ Ship recycling focus
  - ship breaking statement from network
  - letter to carriers with beaching activities

✓ MRV (Monitoring Reporting Verification) (CO2)
  - CSI promoting MRV introduction in IMO (MEPC 11-15 May)
  - invited to support EU in method development

✓ Banks
  - loan interest rates for ship building affected by CSI data,
    for instance carrier’s general performance and/or expected
    performance on the new ships

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Ideas for the future

Separate PM from SOx scoring criteria   (done 2014/2015)

Alignment/collaboration with CCWG, ESI and others

Add social factors/criteria

Add performance of alliances in database

Increase transparency

Include Clean Tech suppliers in network

Include Insurance companies (P&I + Hull & contstr.)

Maritime authorities' CSI usage for dif. fairway dues
BSR’s Clean Cargo Working Group and CSI merger prospects
Advantages of merging

*Overall*

*Creating better driver for environmental improvements in the industry*

- Better efficiencies
  - Cost saving from eased reporting and verification
  - Management of the initiatives
- Better recruitment and funding potential
- Improved clarity in the market
- Greater industry-wide and stakeholder support
The cost of sustainable shipping - the cheap container transport Ex.

Energy efficiency decreased cost (direct or over time) – other measures for lower the environmental impact may cost.

CARGO OWNER PR potential, Consumer willingness to pay (organic food growth, good example)

Low cost green profiling and PR

→ Ex. 40-feet DV’-container 20000 SEK Bangladesh-Gbg, 70000 T-shirts
→ private customer price 149 SEK/T-shirt
→ freight 0,28 % av utpris

Lets say we double the freight rate - unthinkable purchase for Logistics dep.

→ Increased cost put on customer 0,42 SEK / T-shirt

Compare: Organic food common prices between 5-30 % more expensive than conventional
Thanks!