The Dry Bulk Shipping Market, Emissions & The Green Transition

Presentation to the International Dry Bulk Terminals Group
6 October 2020
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Clarksons Research

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Covid-19 & Seaborne Dry Bulk Trade
Decline this year comparable to 2009, but variation across commodities and signs of impact easing

Seaborne Dry Bulk Trade, bn tonnes

DryBulk Trade Growth By Commodity

Monthly Dry Bulk Trade Growth Indicator*

Source: Clarksons Research. *Based on a basket of trade covering c.80% of annual seaborne dry bulk trade. For further details see Shipping Intelligence Network.
Daily tracking of Port Call and ‘Idle’ statistics…

Global Bulkcarrier (65,000+ dwt) Port Calls (No. Calls, 7dma) *

Covid-19: Bulk Shipping Activity Indicators

Global large bulkcarrier port calls up 0.7% y-o-y so far this year

Global Bulkcarrier (65,000+ dwt) Port Calls (No. Calls, 7dma) *

‘Idle’ Fleet, % (dwt) ^

Source: Clarksons Research. *See Port Call Activity Tracker on SIN for further details. ^See timeseries on Shipping Intelligence Network for further details.
The Dry Bulk Shipping Market In 2020
Earnings weaker this year with historic pressure in 1H, but ‘windows’ of positive rates more recently...

Average Bulker Earnings, $/day

Bulker Earnings, $/day

Baltic Dry Index

Source: Clarksons Research, Baltic Exchange. *Year to end September.
Shipping vs Other Transportation Sectors
Shipping less affected than other industries; bulker impact less severe than in some sectors

‘Peak’ Activity Impact by Industry, % y-o-y

<table>
<thead>
<tr>
<th>Industry</th>
<th>Impact % y-o-y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulker* Port Calls (Global) - Aug</td>
<td>-2%</td>
</tr>
<tr>
<td>Deep Sea Port Calls (Global) - May</td>
<td>-9%</td>
</tr>
<tr>
<td>Air Cargo (Global) - May</td>
<td>-32%</td>
</tr>
<tr>
<td>HGV (UK) - April</td>
<td>-38%</td>
</tr>
<tr>
<td>Ferry Port Calls (Global) - May</td>
<td>-44%</td>
</tr>
<tr>
<td>Light Commerical (UK) - April</td>
<td>-59%</td>
</tr>
<tr>
<td>Passenger Cars (UK) - April</td>
<td>-66%</td>
</tr>
<tr>
<td>Cruise Port Calls (Global) - June</td>
<td>-88%</td>
</tr>
<tr>
<td>Passenger Air (Global) - April</td>
<td>-94%</td>
</tr>
<tr>
<td>Passenger Rail (UK) - April</td>
<td>-95%</td>
</tr>
</tbody>
</table>

Source: Clarksons Research, UK DfT, WorldACD, IATA. *Bulkers 65,000+ dwt.

Varying ‘Shape’ of Recovery, % y-o-y

jan-20 feb-20 mrt-20 apr-20 mei-20 jun-20 jul-20 aug-20

Bulkers* (Global)
Deep Sea Cargo (China)
Deep Sea Cargo (Global)
Air Cargo
Ferry
Cruise
Passenger Air

The Dry Bulk Shipping Market, Emissions & The Green Transition | Dry Bulk Terminals Group, 6 October 2020
The Green Transition, Emissions & Dry Bulk Shipping

Environmental pressures set to have a range of impacts on the dry bulk shipping sectors

“The Energy Transition”

• Impacts on the energy mix (and production)

• Impacts on seaborne dry bulk (coal) trade volumes

Emissions Targets & “The Fuelling Transition”

• Impacts on vessel fuel and technology choices

• Impacts on vessel trading patterns

• Impacts on infrastructure requirements (including at ports)
Clarksons Research Energy Transition Model
Gradual Transition (Base Case) vs Rapid Decarbonisation scenarios

Oil Production, m bpd

Coal Production, bn tonnes

Gas Production, bn cfd

CAGR - OIL 2011-19* 2020-30 2031-40 2041-50
Gradual Transition 1.2% 0.9% 0.1% -0.5%
Rapid Decarbonisation 1.2% -0.3% -1.9% -3.3%

CAGR - COAL 2011-19* 2020-30 2031-40 2041-50
Gradual Transition 0.5% -0.7% -0.9% -2.3%
Rapid Decarbonisation 0.5% -2.7% -3.8% -5.6%

CAGR - GAS 2011-19* 2020-30 2031-40 2041-50
Gradual Transition 2.7% 1.5% 1.3% 0.6%
Rapid Decarbonisation 2.7% 1.6% 0.3% -0.9%

Source: Clarksons Research. Assumes consumption = production.
Long-Term Dry Bulk Trade Growth Scenarios

Debate over long-term growth potential; coal and iron ore clearly face headwinds...

Long Term Dry Bulk Trade, bn tonnes

- Iron Ore
- Coal
- Grain
- Minor Bulk

Base Case adding 0.9bt by 2030 compared to 1.2bt in 2010s

1990s: 3.5% growth p.a.
2000s: 5.1% growth p.a.
2010s: 3.5% growth p.a.

1990s: 3.5% growth p.a.
2000s: 5.1% growth p.a.
2010s: 3.5% growth p.a.

Base Case CAGRs:
- Iron ore 0.0%
- Coal -0.1%
- (Steam coal -0.4%)
- Grain 2.6%
- Minor bulk 2.1%

2020s: Key Themes
- Peaking Chinese steel production & iron ore imports?
- Steam coal trade peaked/starting to ease back?
- Grain trade and minor bulk trade become the major drivers of growth, but maturing?

Source: Clarksons Research.
IMO 2020 Global Sulphur Cap: SOx Scrubber Trends

20% of fleet capacity scrubber-fitted; retrofitting easing back, remaining programme ‘vulnerable’

**Bulker Fleet by Scrubber Status, % (dwt)**

- **Fitted**: 20% (1,213 vessels, 181.3m dwt, including 40% of Capesize capacity)
- **Pending**: 3% (186 vessels, 24.5m dwt)
- **Orderbook**: 42% (159 vessels, 26.7m dwt)

**Bulker Fleet ‘Under Retrofit’, % (dwt)**

Source: Clarksons Research, as at start-September. *World Fleet Register.*
Shipping’s Decarbonisation – CO₂ Emissions Goals

Shipping CO₂ emissions ~2.3% of global total; bulkcarriers ~20% of shipping’s CO₂ total

In April 2018, MEPC 72 adopted resolution MEPC.304(72) on the initial IMO strategy on the reduction of GHG emissions from ships. The strategy sets out three main targets for the shipping industry, all compared to a baseline of 2008:

1. Reduce average CO₂ intensity of shipping industry by 40% by 2030
2. Reduce average CO₂ intensity of shipping industry by 70% by 2050
3. Reduce total annual CO₂ emissions by at least 50% by 2050

There are 4 key variables which will have a significant impact on the shipping industry’s carbon output going forwards, and its ability to meet the IMO’s targets:

**Trade**
- Pace of growth in volumes?
- Length of average haul – regional blocs/de-risking supply chains/re-shoring

**Speed**
- How much do vessel speeds need to fall?

**Fuel Efficiency Gains**
- Uptake of Energy Saving Technologies (ESTs*)
- ‘Eco-isation’ of the fleet
- Efficiency gains from upsizing

**Fleet Composition (Fuel Types)**
- Share of LNG fuelled vessels required?
- Share of “zero-carbon” vessels required?
- Future demand for oil fuelled vessels?

Bulkcarrier CO₂ emissions >30% above 2000 (and ~5% above 2008) though more than twice as much cargo being moved.
Long-Term Bulkcarrier Speed Trend

~18% slow down in average speeds since 2008; slight drop (~1%) this year so far

Source: Clarksons Research. For more details see Shipping Intelligence Network or World Fleet Register.
The Bulkcarrier Fleet Technology Transition

‘Eco’ fleet/orderbook, significant scrubber uptake, limited alternative fuel interest so far; plenty to do…

‘Eco’ characteristics/equipment uptake, % dwt

- Eco: 100% (100% Fleet, 100% Orderbook)
- Scrubber: 42% (27% Fleet, 20% Orderbook)
- Alt. fuel: 0% (0% Fleet, 2% Orderbook)
- BWMS: 45% (45% Fleet, 2% Orderbook)
- HVSC: 2% (2% Fleet, 2% Orderbook)

Source: Clarksons Research, see World Fleet Register for further details. BWMS = Ballast Water Management System. HVS = High Voltage Shore Connection.
Alternative Fuels: Current Uptake By Shipping Sector

LNG gaining traction, limited bulker uptake, uncertainty over longer-term ‘solution’, many pros & cons

Fleet (100+ GT) Using Alternative Fuels

- LNG (c.580)
- LPG (1)
- Methanol (12)
- Ethane (6)
- Hydrogen (0)
- Biofuels (19)
- Battery/Hybrid (c.140)

Orderbook (100+ GT) Set To Use Alternative Fuels

- LNG (c.360)
- LPG (31)
- Methanol (10)
- Ethane (14)
- Hydrogen (3)
- Biofuel (8)
- Battery/Hybrid (94)

Source: Clarksons Research, Data As Of September 2020. World Fleet Register.

‘Biofuel’ includes vessels reported to be using or designed for biofuels; many other vessels in the fleet are also capable of using biofuel blends. All ethane fuelled vessels are ethane/LPG or ‘multigas’ carriers.
## Energy Saving Technologies (ESTs): Key Examples

Clarksons Research tracking uptake

<table>
<thead>
<tr>
<th>Equipment Group</th>
<th>Technologies</th>
<th>Example Projects</th>
<th>Fuel Savings (Marketing claim)</th>
<th>Vessels Equipped (Fleet &amp; Orderbook All Vessel Types)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Room</td>
<td>Waste Heat Recovery System</td>
<td>ABB, Calnetix Hydrocurrent</td>
<td>3-8%</td>
<td>&gt;38</td>
</tr>
<tr>
<td></td>
<td>Exhaust Gas Economiser</td>
<td>Alfa Laval, Wartsila, Kangrim, Miura, Osaka, Others</td>
<td>4-6%</td>
<td>&gt;1,515</td>
</tr>
<tr>
<td>Propeller</td>
<td>Propeller Duct</td>
<td>Becker Mewis Duct, other in-house shipyard designs</td>
<td>3-8%</td>
<td>&gt;1161</td>
</tr>
<tr>
<td></td>
<td>Pre-Swirl Stator</td>
<td>DSME Pre-Swirl, Wartsila Energoflow</td>
<td>4-6%</td>
<td>&gt;8</td>
</tr>
<tr>
<td></td>
<td>Rudder Bulb</td>
<td>Rolls-Royce Promas, Wartsila Energopac, other in-house shipyard designs</td>
<td>3-5%</td>
<td>&gt;268</td>
</tr>
<tr>
<td>Deck Equipment</td>
<td>Flettner Rotors</td>
<td>Norsepower Rotor Sail (Maersk), Anemoi Wind Engine</td>
<td>7-10%</td>
<td>&gt;8</td>
</tr>
<tr>
<td></td>
<td>Rigid Sail</td>
<td>DSIC</td>
<td>8-30%</td>
<td>&gt;2</td>
</tr>
<tr>
<td></td>
<td>Wind Kite</td>
<td>Airseas Seawing</td>
<td>Up to 20%</td>
<td>&gt;0</td>
</tr>
<tr>
<td></td>
<td>Solar Sail</td>
<td>Eco Marine EnergySail</td>
<td>Up to 20%</td>
<td>&gt;0</td>
</tr>
<tr>
<td>Hull</td>
<td>Air Lubrication System</td>
<td>Silverstream, DSM ALS, Mitsubishi MALs, Samsung SAVER Air</td>
<td>5-10%</td>
<td>&gt;71</td>
</tr>
<tr>
<td></td>
<td>Bow Enhancement</td>
<td>Ulstein X-Bow, Damen Sea Axe, Kawasaki SEA-Arrow, other in-house shipyard designs</td>
<td>4-10%</td>
<td>&gt;252</td>
</tr>
</tbody>
</table>

Source: Clarksons Research, August 2020. Data coverage is not comprehensive and may underestimate total uptake.
### Dry Bulk Ports & ‘Eco’ Facilities

Tracking ‘eco’ facilities at dry bulk ports...

<table>
<thead>
<tr>
<th>Region</th>
<th>All Ports</th>
<th>Dry-Bulk Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Ports</td>
<td>Development Projects</td>
</tr>
<tr>
<td>North America</td>
<td>799</td>
<td>38</td>
</tr>
<tr>
<td>South &amp; Central America</td>
<td>526</td>
<td>20</td>
</tr>
<tr>
<td>North West Europe</td>
<td>1,796</td>
<td>26</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>777</td>
<td>30</td>
</tr>
<tr>
<td>Africa</td>
<td>119</td>
<td>19</td>
</tr>
<tr>
<td>Middle East/ISC</td>
<td>278</td>
<td>50</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>1,459</td>
<td>145</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,754</td>
<td>328</td>
</tr>
<tr>
<td><strong>LNG facilities</strong></td>
<td>123</td>
<td>91</td>
</tr>
<tr>
<td><strong>HVSC</strong></td>
<td>136</td>
<td></td>
</tr>
</tbody>
</table>

See Port & Infrastructure Intelligence Monthly and Sea/net for more detail.

Source: Clarksons Research, September 2020.

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**Bulkcarrier Port Calls in 2019**

- **Total Port Calls**: 313,828
- **Asia Pacific**: 53%
- **North America**: 8%
- **South America**: 10%
- **Middle East/ISC**: 9%
- **NW Europe**: 7%
- **Africa**: 3%

**Handysize**: 34%
- **Panamax**: 21%
- **Capesize**: 12%
- **Handymax**: 33%

**Handymax**: 33%

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15
Bulkcarrier Calls At Ports With ‘Eco’ Facilities Increasing
Proportion of total bulkcarrier port calls made at ports with LNG bunkering or HVSC facilities

Source: Clarksons Research. Data as of September 2020. See Port & Infrastructure Intelligence Monthly and Sea/net for more detail.
Port calls data basis all instances of vessels entering and leaving a defined port location, excluding instances where vessel not recorded as travelling at less than 1 knot, and combining multiple consecutive instances at the same port where the vessel has not left a buffered shape around the port.
**Green Transition: Stalling Or Amplification Of Pre-Covid-19 Trends?**

Wide range of potential impacts on Energy Transition, Technology, Regulation & Infrastructure

<table>
<thead>
<tr>
<th>Stalling?</th>
<th>Amplification?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stimulus prioritises economic activity, low oil &amp; gas pricing, financial stress.</td>
<td>• Strong pre-Covid-19 trend, society pressures for sustainability is “amplified”, integrated into Covid-19 recovery.</td>
</tr>
<tr>
<td>• Delays to planned IMO meetings including Marine Environment Protection Committee (MEPC).</td>
<td>• Increased demolition of older vessels and accelerated fleet renewal are likely.</td>
</tr>
<tr>
<td>• CAPEX spend under pressure from weak earnings.</td>
<td>• Low newbuild prices may drive shipyards to push additional green technology on newbuild vessels.</td>
</tr>
<tr>
<td>• Disruption at yards has led to special survey waivers, delaying repair work and upgrades e.g. retrofitting of BWMS.</td>
<td>• Weak markets may provide suitable window for owners to undertake retrofit work on vessels.</td>
</tr>
<tr>
<td>• Potential for owners to focus on business continuity, profitability and employment of vessels.</td>
<td>• Lower trade volumes and idling of ships could have short-term impact on emissions.</td>
</tr>
<tr>
<td>• Low fossil fuel prices weakening incentive to transition to alternative fuels or fit energy saving technologies (ESTs).</td>
<td>• Owners may be able to make clearer decisions on technology after delaying newbuilding programmes e.g. choosing LNG fuel in 1-2 years when bunkering network is more developed.</td>
</tr>
<tr>
<td>• Operational difficulties mean some countries have suspended inspections on compliance with regulation such as IMO 2020.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Clarksons Research
Key Takeaways
Covid-19 impacts, the ‘Green Transition’, emissions reduction targets

1. **Covid-19 impacts** - similar magnitude trade “shock” to global financial crisis, but sharper and impacts now “easing”; less severe impact than in other transportation/shipping sectors; 1H vessel earnings deeply depressed, some “windows” of improvement in 2H

2. **“Energy Transition”** - putting pressure on future dry bulk trade growth scenarios

3. **“Green Transition” & Emissions Targets** - “plenty to do”: “fuel transition”, alternative fuels, ESTs, trading patterns, infrastructure & port facilities

4. **Post Covid-planning** - environmental trends (including emissions control) generally “amplified”
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