# Tracking "Green" Technology Uptake

## Timing & Technology? Our 10th Update of *Fuelling Transition* is now available on World Fleet Register

| | Alternative Fuel Type | | | | | | Alternative Fuel 'Ready' | | | Port Facilities | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LNG | Methanol | LPG | Battery Fitted | Other Alt. Fuel | TOTAL ALT. FUEL | Ammonia | Methanol | LNG | *No. Ports* | Active | Under Development |
| **Fleet** | 1,022 | 27 | 107 | 507 | 145 | 1,297 | 73 | 25 | 444 | ***LNG Bunkering*** | 188 | 82 |
| ***% Fleet No.*** | *0.9* | *<0.1* | *0.1* | *0.5* | *0.1* | *1.2* | *0.1* | *<0.1* | *0.4* | ***Methanol Bunkering*** | 10 | 11 |
| ***% Fleet GT*** | *5.3* | *0.1* | *0.3* | *0.3* | *0.4* | *6.0* | *0.4* | *0.1* | *3.3* | ***Shore Power Connection*** | 205 | 41 |
| **Orderbook** | 916 | 200 | 82 | 301 | 95 | 2,583 | 249 | 247 | 135 | | | |
| ***% Orderbook No.*** | *16.5* | *3.6* | *1.5* | *5.4* | *1.7* | *23.2* | *4.5* | *4.5* | *2.4* | | | |
| ***% Orderbook GT*** | *37.5* | *8.3* | *1.7* | *1.8* | *1.5* | *48.8* | *9.3* | *5.8* | *3.3* | | | |

Contact research.crs@clarksons.com for a demo or subscription options for *World Fleet Register* and the "Green" module of *Shipping Intelligence Network / World Fleet Register.*

*As pressures build globally to find solutions to moderate climate change, the Green Transition will cause fundamental change to shipping, trade, offshore and energy. We are committed to providing data and intelligence to help frame the critical decisions that stakeholders across our industry will need to make to facilitate the Green Transition. Clarksons Research will continue to support its clients to (i) understand, in commercial terms, upcoming technical regulation (ii) track technology uptake by the shipping industry (iii) analyse the impact of environmental policy, regulation and technology on market supply / demand, asset values, vessel earnings and companies and (iv) project scenarios for required investment, including newbuildings.*

Source: Clarksons Research. As of 1st January 2024, World Fleet Register. % basis fleet (c.108,000 vessels) above 100 GT. Please note: data based on reported equipment in merchant fleet, which may underestimate total uptake.

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| | Equipment Type | SOx Scrubbers* | Carbon Capture System | NOx SCR/EGRs | Wind Propulsion System | Air Lubrication System | Other ESTs | HVSC Systems | Auxiliary Batteries | Ballast Water Management Systems | 'Eco' Engine (Modern) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fleet | **No.** | 5,504 | 31 | 2,963 | 47 | 166 | 7,082 | 2,168 | 58 | 33,079 | 8,927 |
| Fleet | ***% No.*** | *5.1* | *<0.1* | *2.7* | *<0.1* | *0.2* | *6.5* | *2.0* | *0.1* | *30.5* | *8.2* |
| Fleet | **m GT** | 434.65 | 0.1 | 163.6 | 2.2 | 19.5 | 455.5 | 102.8 | 1.1 | 1,353.2 | 507.2 |
| Fleet | ***% GT*** | *27.2* | *<0.1* | *10.3* | *0.1* | *1.2* | *28.5* | *6.4* | *0.1* | *84.8* | *31.8* |
| Orderbook | **No.** | 741 | 22 | 1,977 | 47 | 268 | 1,196 | 569 | 60 | 3,737 | 2,853 |
| Orderbook | ***% No.*** | *13.4* | *0.4* | *35.6* | *0.8* | *4.8* | *21.5* | *10.3* | *1.1* | *67.3* | *51.4* |
| Orderbook | **m GT** | 51.1 | 1.6 | 109.0 | 1.1 | 30.9 | 59.4 | 28.2 | 2.3 | 204.5 | 172.0 |
| Orderbook | ***% GT*** | *23.6* | *0.7* | *50.4* | *0.5* | *14.3* | *27.5* | *13.0* | *1.0* | *94.5* | *79.5* |

Source: Clarksons Research. As of 1st January 2024, World Fleet Register. Please note: data based on reported equipment in merchant fleet, which may underestimate total uptake. *Figures exclude some scrubber orders still to be linked to individual ships. 'ESTs' denotes number of vessels with at least one EST onboard. Please note under-reporting of ESTs likely to be higher for vessels on order.

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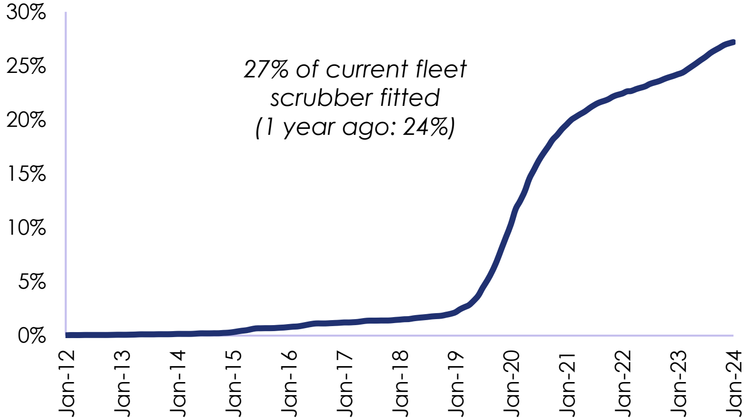
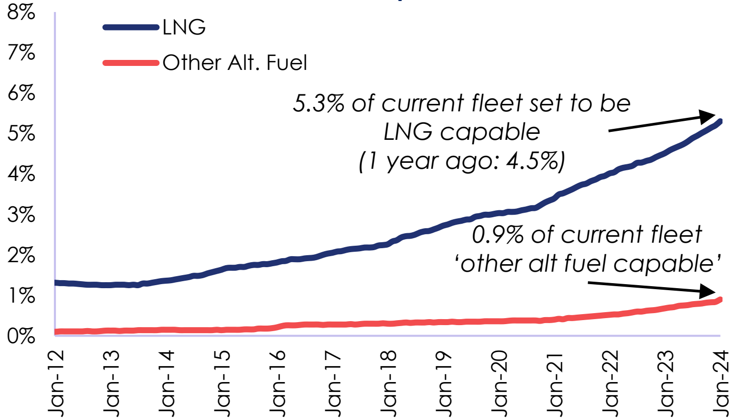
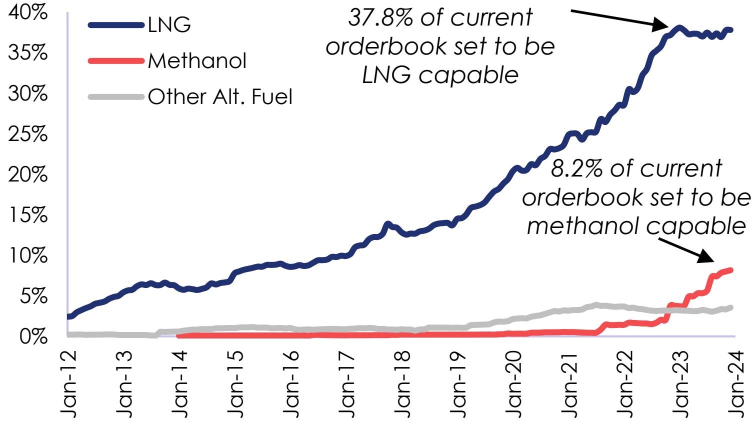
### SOx Scrubber Fitted Fleet, %GT



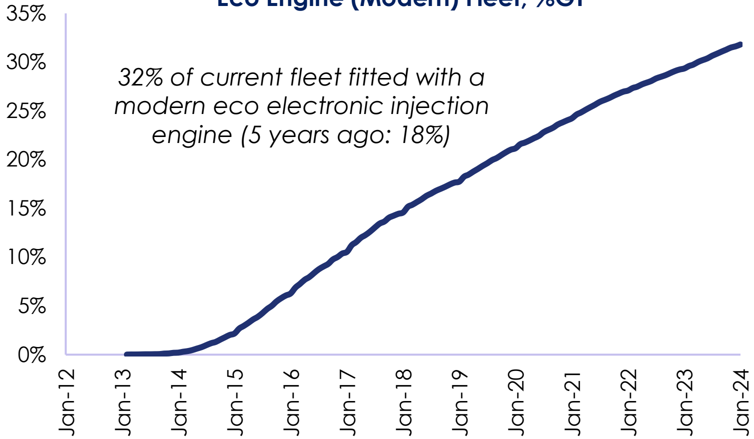

### Alternative Fuel Capable Fleet, %GT



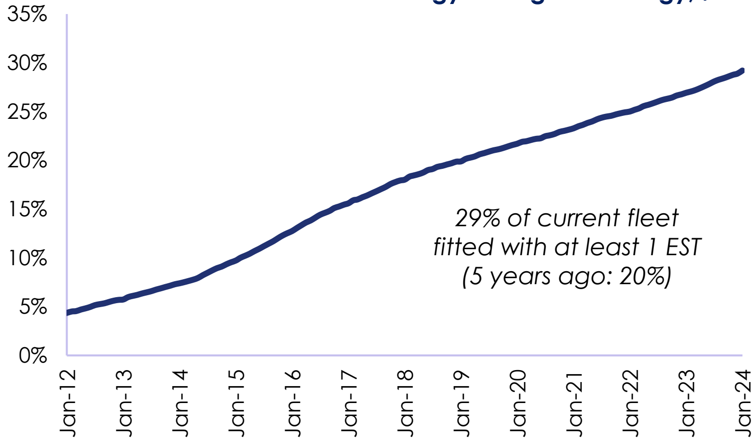

### Alternative Fuel Capable Orderbook, %GT



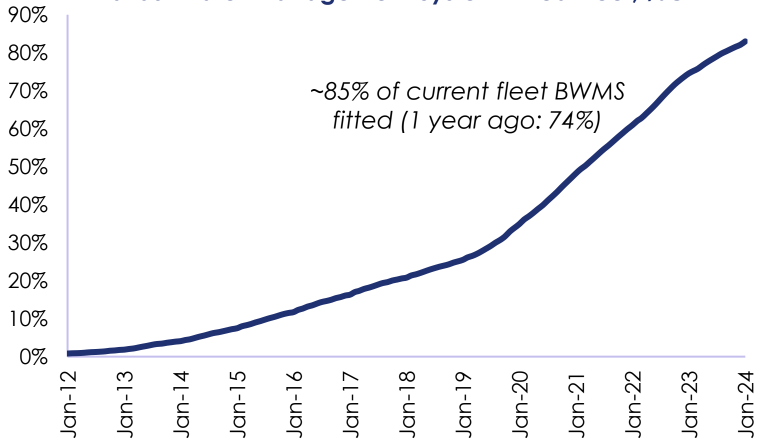

### Eco Engine (Modern) Fleet, %GT




### Fleet Fitted With At Least 1 Energy Saving Technology, %GT




### Ballast Water Management System Fitted Fleet, %GT

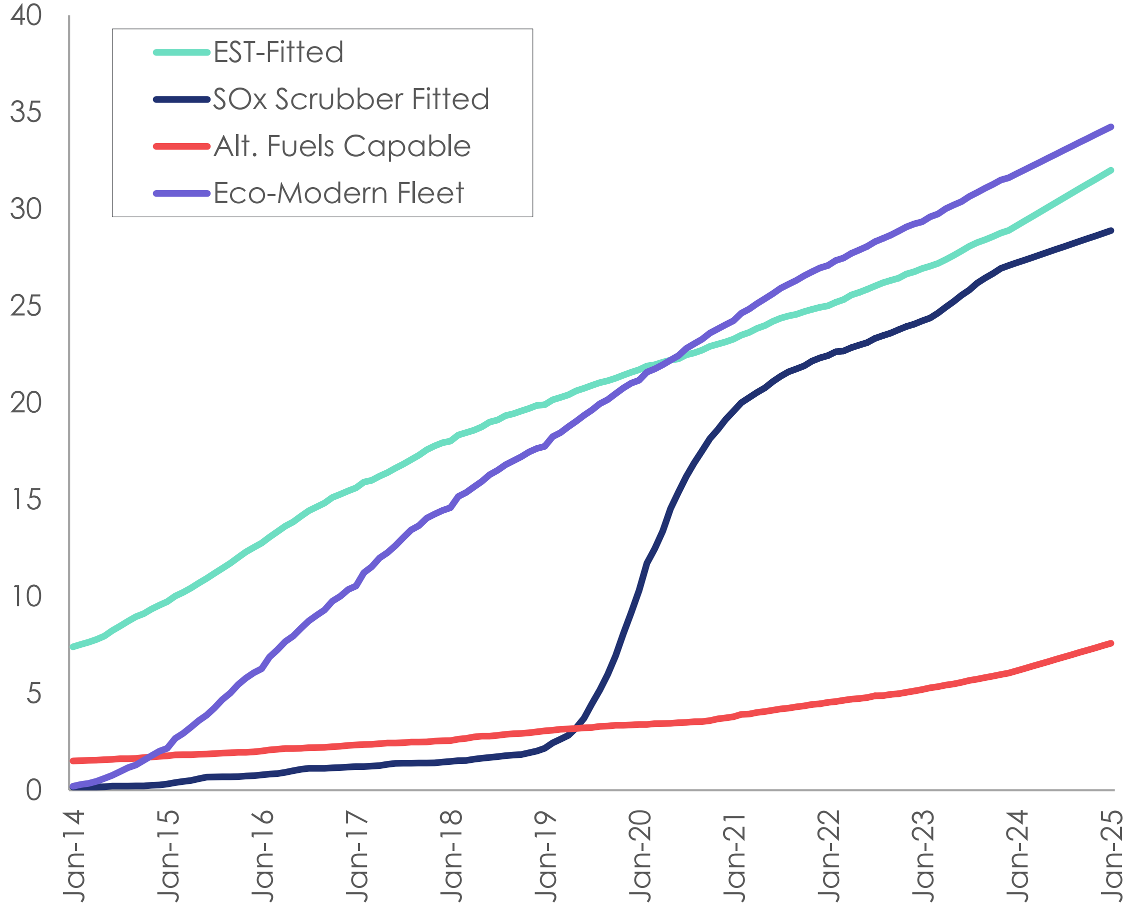



Clarksons Research. As of 1st January 2024, World Fleet Register.

# Progress In The Fuelling Transition

Although we are just at the start, progress is being made in the Fleet Transition. IMO 2030 short-term measures supporting retrofit of Energy Saving Technologies (ESTs)

## Environmental Technology Uptake: % Fleet (GT)




## Global Tonnage As Of Start January 2024:

- 27% Scrubber Fitted
- 32% “Eco”
- 6% Alternative Fuel
- 29% with at least 1 EST Fitted
- ~85% BWMS Fitted

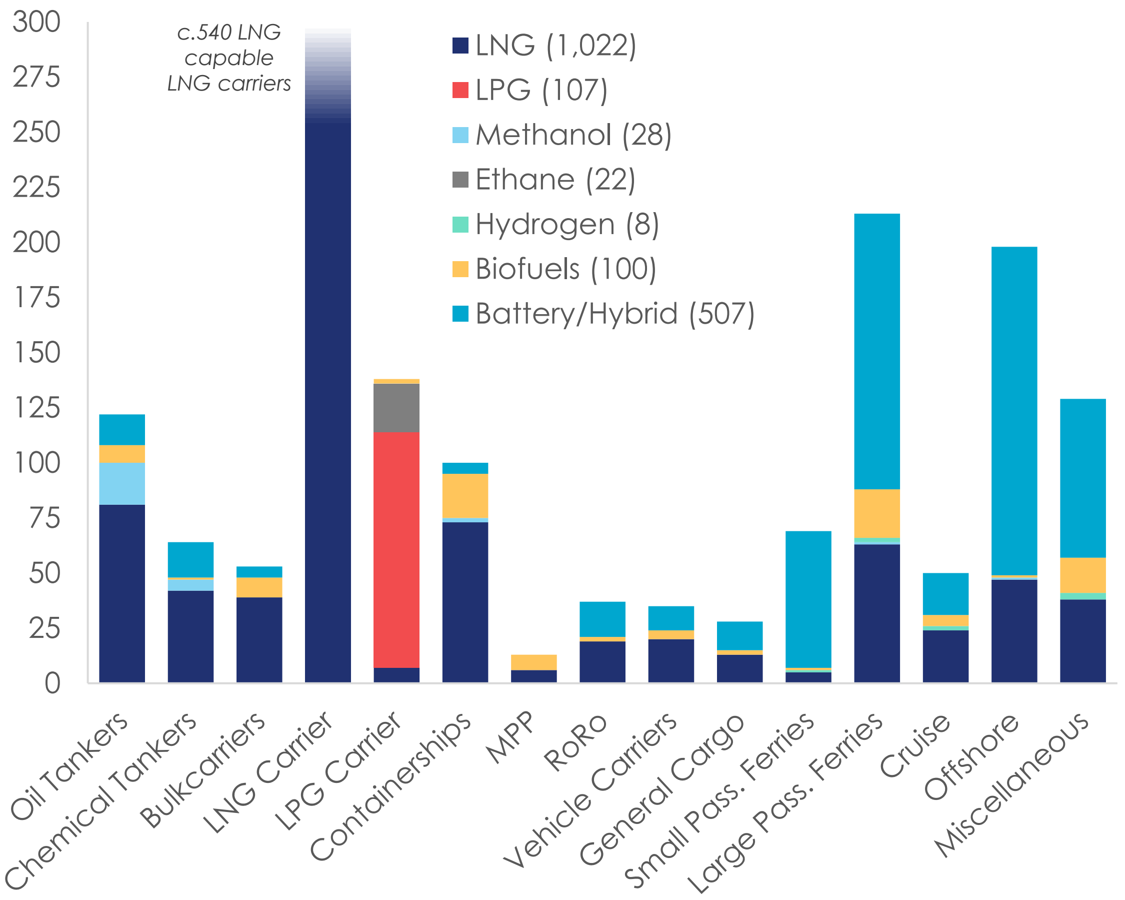
- But based on current fleet, c.45% of tanker, bulker and container tonnage would be CII D or E rated by 2026
- And average age of the main fleets is now increasing (Bulkers is now ~12.0 years vs ~9.6 years five years ago / Tankers is ~12.9 years vs ~10.6 / Container is ~14.2 years vs ~12.2)
- Increasingly ‘tiered’ markets

*Projected numbers also include additional estimates of retrofits not yet publicly reported. Source: Clarksons Research, January 2024. Modern “Eco” ordered >=2012 with electronic main engine. Source: World Fleet Register, Shipping & Shipbuilding Forecasting Forum.

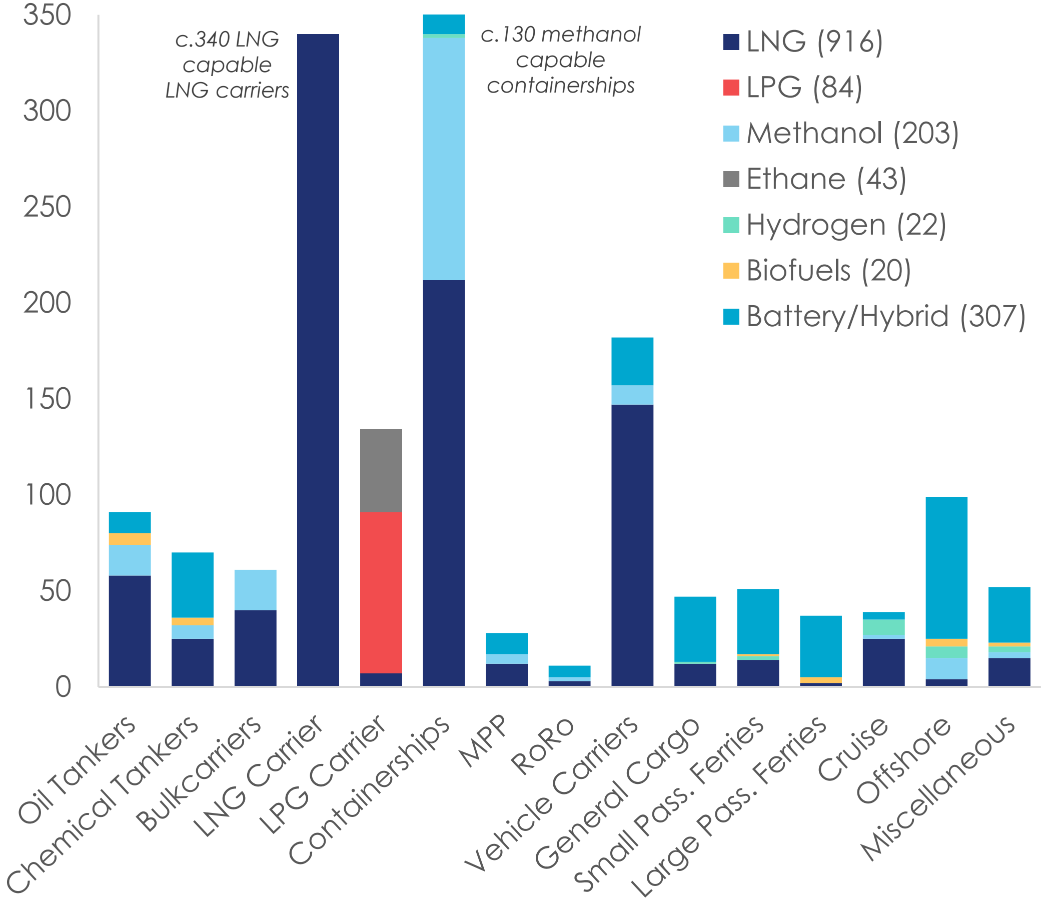
# Alternative Fuels: Current Uptake By Sector

LNG fuel gaining traction but huge uncertainty over longer-term ‘solution’

## Fleet (100+ GT) Using Alternative Fuels




## Orderbook (100+ GT) Set To Use Alternative Fuels




Source: Clarksons Research, Data as of January 2024. 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 VLECs or ‘multigas’ carriers.

# Energy Saving Technologies: Key Examples

## Clarksons Research Tracking Uptake

| Equipment Group | Technologies | Example Projects | Fuel Savings (Marketing claim) | Vessels Equipped (Fleet & Orderbook) |
|---|---|---|---|---|
| Engine Room | Waste Heat Recovery Generator | ABB, Alfa Laval, Calnetix Hydrocurrent | 3-8% | >123 |
| Propeller | Propeller Duct | Becker Mewis Duct, other in-house shipyard designs | 3-8% | >2,755 |
| | Pre-Swirl Stator | DSME Pre-Swirl, CMES-Tech, SDARI, Wartsila EnergoFlow | 4-6% | >2,216 |
| | Rudder Bulb | Kongsberg Promas, SDARI, Wartsila Energopac, other in-house shipyard designs | 3-5% | >3,286 |
| | Propeller Boss Cap Fin | Imabari Shipbuilding Hybrid-Fin™, MMG escap, CMES-Tech, SDARI | 2-5% | >1,295 |
| | Wake Equalizing Duct | Schneekluth WED, CMES-WID | 6-10% | >453 |
| Deck Equipment | Flettner Rotors | Norsepower Rotor Sail (Maersk), Anemoi Wind Engine | 7-10% | >36 |
| | Rigid Sail | DSIC, Oshima Shipbuilding | 8-30% | >16 |
| | Wind Kite | Airseas Seawing | Up to 20% | >1 |
| | Suction Wing | Econowind, Bound4blue, Oceanbird | 10-30% | >41 |
| Hull | Air Lubrication System | Silverstream, DSM ALS, Samsung SAVER Air, Marine Performance Systems, Mitsubishi MALS | 5-10% | >434 |
| | Bow Enhancement | Ulstein X-Bow, Damen Sea Axe, Kawasaki SEA-Arrow, other in-house shipyard designs | 4-10% | >1,940 |
| | Hull Fin | Oshima Advanced Flipper fin, Namura NCF™ , Sanoyas Tandem Fin™, Japan Marine United A.L.V Fin | 2-5% | >633 |

Source: Clarksons Research, January 2024. Data coverage is not comprehensive and may underestimate total uptake.

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