Marine Money
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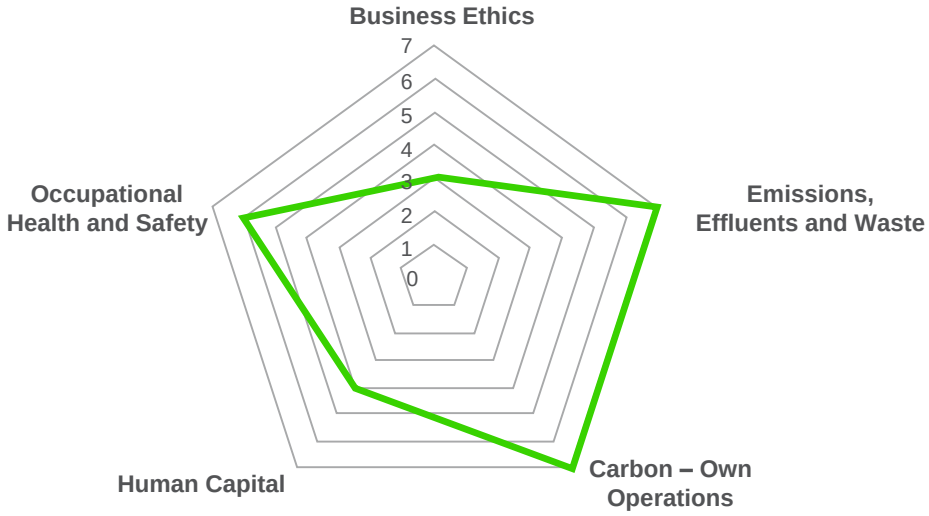
Sustainability Drivers for the Shipping Industry

- **Transportation is responsible for:**
  - 24% of direct CO2 emissions from fuel combustion (IEA 2019).
  - 3% of global CO2 emissions in 2019 (~0.9 Gt)
  - almost 10% of total transport emissions.
- Shipping is the least energy-intensive way to carry goods, consuming one fifth of the energy required for freight transport as most of the energy used in shipping relies heavily on oil-based fuels and is carbon intensive.
- Shipping CO2 emissions are expected to increase between 50% and 250% until 2050 from 2012 level (ICCT2017).
- International shipping is the largest contributor of emissions within the shipping sector with Container, bulk carriers and tankers account for 85% of emissions from shipping

Key Drivers

- The **International Maritime Organization (IMO)** goals includes:
  - Reduce absolute GHG emissions from shipping by at least 50% by 2050, while also pursuing efforts towards phasing them out (primary goal)
  - Reduce CO2 emissions intensity per transport work by at least 40% by 2030, and to pursue efforts toward a 70% reduction by 2050
- The **EU** has set goals to reduce GHG emissions from the industry by 40 50% by 2050, and is considering introducing emission trading schemes
- The **Maritime and Port Authority of Singapore (MPA)** committed SGD100 million by way of incentives 2024 in support of Decarbonization
- Carbon markets, Poseidon principles etc – *determining types of vessels and projects the financiers might or might not choose to finance*.

Financial risk explore to ESG issues



The Cost of Decarbonsiation in Shipping

IMO Agreement on technical regulations will reduce ship's Co_2

MARPOL Annex VI, Chapter 4 adopted July 2011, which entered into force in January 2013

2013	2015	2020	2025	2030		2050
• Regulations enter into force for over 94% of world fleets • Ship Energy Efficiency Management Plan (SEEMP): mandatory implementation for all ships	• EEDI requires new ships to meet agreed efficiency targets	• New ships most improve efficiency 10% • **20 % Co_2 reduction per tonne/km (industry goal)**	• New ships must improve efficiency up to 20%	• New ships must improve efficiency 30%		• **50 % Co_2 reduction per tonne/km (industry goal)**

To halve shipping's emissions by 2050 is estimated at **USD $1.4- 1.9 trillion** in investment over the next three decades, and USD $350 billion needs to be committed by 2030

Ship related investments (13%):
- Technological efficiency for newbuilds and operating fleet
- Operational improvements e.g. speed management

Land-based investments (87%):
- Investments into low carbon and zero carbon fuels

- The 87% land-based investment is based on the fact that low/zero carbon upstream infrastructure (including production facilities) does not exist and therefore capital needed as additional
- Conventional levers will only bring 35-40% reduction by 2030; alternative fuels and emerging technologies needed to reach zero carbon emissions by 2050.
- The capital would be spread across 20 years – between 2030 and 2050 – and would be the result of a joint effort between different stakeholders.

Transition Pathways in the Shipping Sector

Decarbonization **today** can be achieved through a combination of:

- **Fossil-based LNG** – Supply infrastructure, cleaner air emissions (Sox) but limited GHG net benefit given potential for methane leakage within supply chain and methane slip during combustion
- **Biofuels** (including bio-diesel and bio-methanol) – upstream sustainability challenges (deforestation, land use changes, food security etc.), and availability of sustainable biofuels
- Increasing **Energy Efficiency**: Technical efficiency, and/or Operational efficiency – untapped potential, cost benefit / efficiency inherent to the industry, addresses energy density for future solutions

Future solutions include:

New marine propulsion technology

- Modified internal combustion, efficient dual fuel engines
- Fuels cells and battery electric power, particularly for short sea / coastal shipping and at scale to support ocean shipping

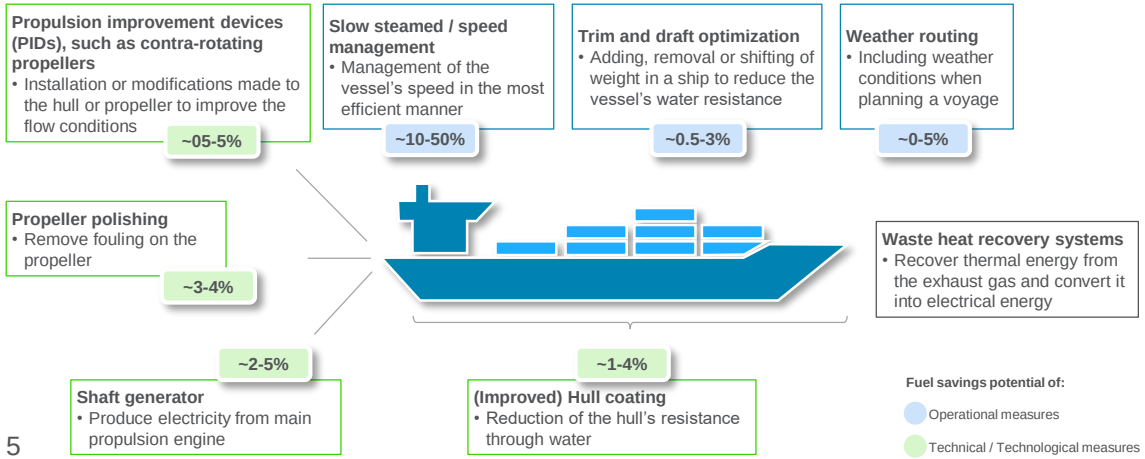
Low and Zero-Carbon Fuels

- Hydrogen and hydrogen derived fuels (ammonia), particularly for long range transoceanic transport

Transition Pathway in the Shipping Sector

Energy Efficiency

Type of EE Measure	Subtype (non-exhaustive list)	Function	Vessel Type	Technology Readiness	Fuel Savings Potential
Technological / Technical	• Shaft generator	• Produce electricity from main propulsion engine	• All vessels with high power needs and long transits	• Mature	• ~2-5% (total ship)
	• Propeller polishing	• Remove fouling on the propeller	• All vessels	• Mature	• ~3-4% (main engine)
	• Propulsion improvement devices (PIDs), such as contra-rotating • Propellers	• Installation or modifications made to the hull or propeller to improve the flow conditions	• All vessels	• Mature	• ~0.5-5% (main engine)
	• (Improved) Hull coating	• Reduction of the hull's resistance through water	• All vessels	• Mature	• ~1-4% (main engine)
	• Waste heat recovery systems	• Recover thermal energy from the exhaust gas and convert it into electrical energy	• All vessels		
Operational	• Slow steaming/speed • Management	• Management of the vessel's speed in the most efficient manner	• All vessels	• Semi-mature	• ~10-50% (main engine)
	• Trim and draft optimization	• Reduce the vessel's water resistance	• All vessels	• Semi-mature	• ~0.5-3% (main engine)
	• Weather routing	• Including weather conditions when planning a voyage		• Mature	• ~0-5% (main engine)



- Energy efficiency measures are important but not sufficient to align with the IMO's trajectory or full decarbonization by 2050. Due to uncertainties around total fuel consumption and subsequent GHG emissions reduction that can be achieved through multiple Energy Efficiency measures, depending on the size and type of vessels but no one size will fit all.
- Sustainalytics views such measures as ancillary to fuel switching and new marine propulsion technologies, which have greater decarbonization potential.

Use of Proceeds & Sustainability Linked Structures

Financial institutions have an important role to develop financial solutions to stimulate sustainable shipping that reward sustainable performance and enable large scale uptake of innovation, technology, design and operational efficiencies

- **Green/ Transition Loans:** typically linked to a specific use of proceeds linked to a positive environmental outcome.
  - **Framework**: When the Environmental impact is not easily identified this format of borrowing is normally supported by a framework which outlines qualifying projects a company will undertake with a green objective, the framework is typically accompanied by a Second Party Opinion (SPO) by a specialist ESG SPO provider. Costs of an initial SPO ranges between USD20-50k depending on complexity of business and annual monitoring cost is est at USD10k.
  - **Verification**: Typically provided by an Audit firm An external verification provides third-party oversight for the identifying the use of proceeds or is method of monitoring, and reporting of sustainability targets. Costs of verification ranges between USD20-30k depending on complexity of business and annual monitoring cost is est at USD8-10k.
- **Sustainability Linked loans**: typically the simplest form of sustainable finance a company can undertake, pricing is linked to Environmental and Social performance metrics. Most typically performance against targets are self reported relying on existing company disclosures but many corporates elect to employer a Verifier to confirm compliance and calculation methodology of the targets as a hygiene factor.

	Framework	SPO/ Verification	Proceeds	Guidelines
UoP : Green, Social, Transition Loans	• Framework Optional	• If no Framework: External Verification • If Framework: • Second Party Opinion	• Specific Use of Proceeds	Green Loan Principles
Sustainability - linked Loans	• No Framework needed • Margin linked to environmental and/or social performance targets	• External Verification Optional • ESG Rating Optional	• General Corporate Purposes	Sustainability Linked Loan Principles

Shipping Industry Norms

Use of proceeds: Transition/ Green Loans	• There is ongoing debate within the market on acceptable green use of Proceeds in Shipping typically the funding of LNG / hydrogen fueled vessels s and/or retrofit of ships that are not used to transport fossil fuel derived products and operate are in line with the International Maritime Organization's low-carbon trajectory operate as an acceptable use of proceeds. The market is developing some exceptions can be made if Vessel owners product buyer and sellers confirm commitment to an emission reduction pathway
Sustainability - linked Loans	• While there are no prescriptive guidelines on this the following targets tend to be incorporated into sustainability linked structures : – **Annual Efficiency Ratio (AER):** The ratio of a ship's carbon emissions per actual capacity-distance (e.g., dwt/nm sailed). The AER uses the parameters of fuel consumption, distance travelled, and design deadweight tonnage – **Energy Efficiency Operational Index (EEOI):** EEOI is the amount of CO2 emitted by the ship per ton-mile of work. It is the ratio of the CO2 emitted to the ton-mile (amount of cargo x nm sailed). The total operational emissions to satisfy transport work demanded, this is usually quantified over a period of time which encompasses multiple voyages. It measures the ratio of a ship's carbon emissions per unit of transport work. – While third party verification is recommended Banks tend to be comfortable with corporate self disclosures inline in the IMO Guidance as evidence of performance against these targets

Shipping Sustainable Finance Transactions

Select Recent Transactions

Borrower	Country	Type	Date	Tenure (yrs)	Amount (USDm)	Currency	Transaction overview
Klaveness Combination Carriers (KCC)	Norway	Term Loan & RCF	Jul-20	-	60	USD	• The credit margin will be adjusted based on KCC's sustainability performance, as defined by the company's ability to reduce EEOI and absolute CO_2 emissions per vessel
Oman Shipping	Oman	Term Loan	Jun-20	8	35	USD	• RCF linked to environmental class notation and reduction of EEOI
Precious Shipping Public Co	Thailand	Term Loan	Apr-20	4	11[(a)]	USD	• The green tranche is to finance and/or refinance part of the aggregate cost related to ballast water treatment systems
Maersk	Denmark	RCF	Feb-20	5	5,000	USD	• Secured a sustainability-linked USD 5bn revolving credit facility with a syndicate of 26 banks; The credit margin will be adjusted based on the progress in meeting CO_2 targets, with the firm aiming to reduce CO_2 emissions per cargo moved by 60% by 2030
International Seaways	Marshall Island	Term Loan & RCF	Jan-20	5	340	USD	• Total loan was USD 390m, of which USD 340m included a sustainability-linked pricing mechanism, linked to the carbon efficiency of the INSW fleet (reductions in CO_2 emissions year-over-year)
Teekay	Bermuda	Bond	Oct-19	5	125	USD	• To partially fund four LNG powered newbuilds, as per company's Green Bond Framework
Havenbedrijf Rotterdam	Netherlands	RCF	Apr-19	5	336	EUR	• Pricing linked to undisclosed ESG metrics which reflect the borrower's key sustainability initiatives
Nippon Yusen	Japan	Term Loan	Mar-19	5	81	JPY	• To fund the cost of installing scrubbers
Nippon Yusen	Japan	Term Loan	Dec-18	10	18	JPY	• To fund methanol-fueled chemical tankers and ballast water treatment equipment
DP World	UAE	RCF	Oct-18	2 - 5	2,000	USD	• Loan pricing is linked to carbon emissions intensity as a way to incentivize the company to reduce its GHG emissions
Star Bulk Carrier	Panama	Term Loan	Sep-18	5	70	USD	• Total loan was USD 310m, of which the green tranche was USD 70m; used for the procurement and retrofitting of scrubbers for up to 50 vessels in the company's fleet
Mitsui OSK Lines	Japan	Bond	Aug-18	5	45	JPY	• Proceeds will be used to finance and refinance LNG fueled ships, LNG-bunkering ships, ballast water management systems and SOx scrubber systems. Under its Green Bond Framework, MOL has committed to ensure the financed vessels will not be used to transport products including, but not limited to, coal, tar sands and oil shale
Evergreen Marine Corp Taiwan	Taiwan	Bond	Jun-18	5	65.7	TWD	• The proceeds from the bond issue will be used for improving energy efficiency, preventing and controlling pollution, and sustainable environmental developments in line with the government's green finance policy
Nippon Yusen	Japan	Bond	May-18	5	91.5	JPY	• Proceeds will finance and refinance LNG fueled ships, LNG bunkering ships, ballast water management systems and SOx scrubber systems

(a) The maximum amount of USD 10.60m divided into two tranches; a Green Tranche and a General Tranche

Industry Sustainability Initiatives

Sustainable Shipping Initiative is a multi stakeholder initiative dedicated to improving the sustainability of the shipping industry in terms of social, environmental and economic impacts.

- *Ship Recycling Transparency Initiative*
- *Roadmap to a sustainable ship[ping industry*
- *Human Side of Shipping: Delivering on Seafarers Rights*
- *Decarbonization: Sustainability criteria for marine fuels*

Getting to Zero Coalition is a partnership between the Global Maritime Forum, the Friends of Ocean action, and the World Economic Forum.

Poseidon Principles was launched as the first sector-specific, self-governing climate alignment agreement amongst financial institutions, designed to quantitatively assess and disclose financed emissions from financial institutions' lending portfolios.

Sea Cargo Charter provides a global framework for aligning chartering activities with responsible environmental behavior to promote international shipping's decarbonization.

The Neptune Declaration developed by a taskforce of stakeholders from across the maritime value chain including A. M. Nomikos, Cargill, Dorian LPG, GasLog, Global Maritime Forum, International Chamber of Shipping, International Maritime Employers' Council, International Transport Workers' Federation, ONE, Philippine Transmarine Carriers, Sustainable Shipping Initiative, Synergy Group, V. Group, and World Economic Forum.