Journey Towards Decarbonisation

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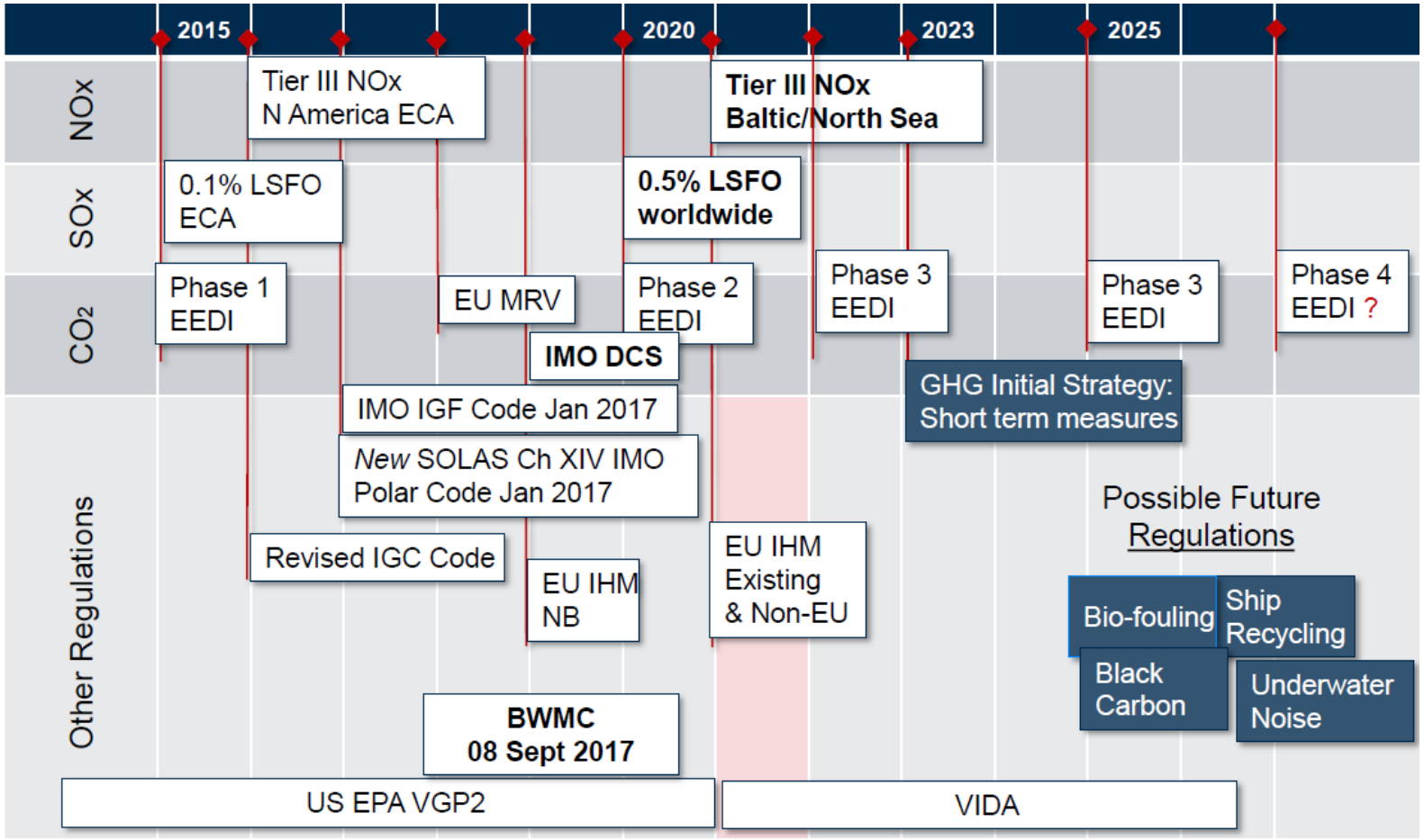
ABS

Regulations Timeline

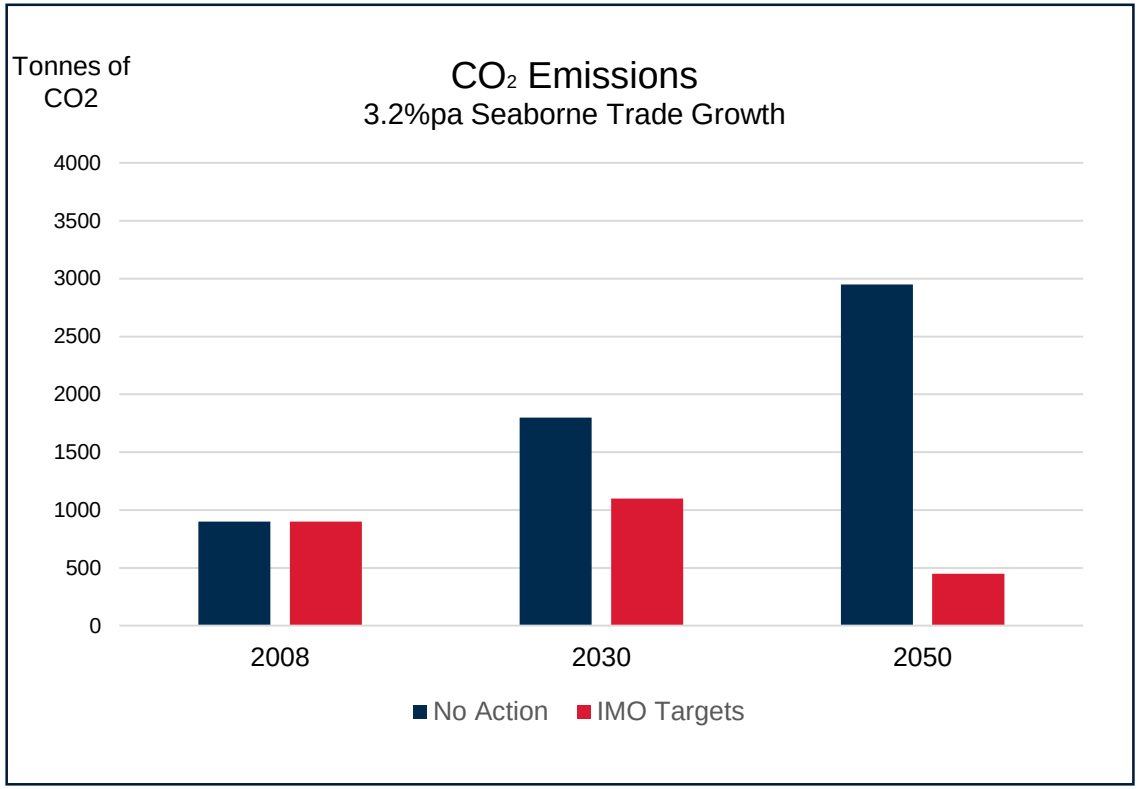


Roadmap for IMO Strategy on Reduction of GHG Emissions

Autumn 2020 (MEPC 76)	Start of Phase 2: data analysis (no later than autumn 2020) Publication of Fourth IMO GHG Study for consideration by MEPC 76
Spring 2021 (MEPC 77)	Initiation of work for adjustments on Initial IMO Strategy, based on DCS data
Summer 2021	Data for 2020 to be reported to IMO
Spring 2022 (MEPC 78)	Phase 3: Decision step Secretariat report summarizing the 2020 data
Summer 2022	Data for 2021 to be reported to IMO
Spring 2023 (MEPC 80)	**Adoption of Revised IMO Strategy (short-, mid- and long-term measures)** Secretariat report summarizing the 2021 data pursuant to regulation 22A.10

2050 Greenhouse Gas Challenge

- Shipping CO_2 emissions 2.6% of total while transporting 90% of the worldwide trade
- Emission reduction with seaborne trade growth will require low-carbon ships well before 2050
- Key activities prior to 2023 adoption of the revised IMO strategy
  - Data collection from ships
  - Fourth IMO GHG study using data from 2012-18
  - Evaluate candidates for short-term, mid-term and long-term measures to reduce GHG emissions



2050 Greenhouse Gas Challenge – Potential Solutions

Ship Technology

New Fuels & Energy Sources

Propulsion

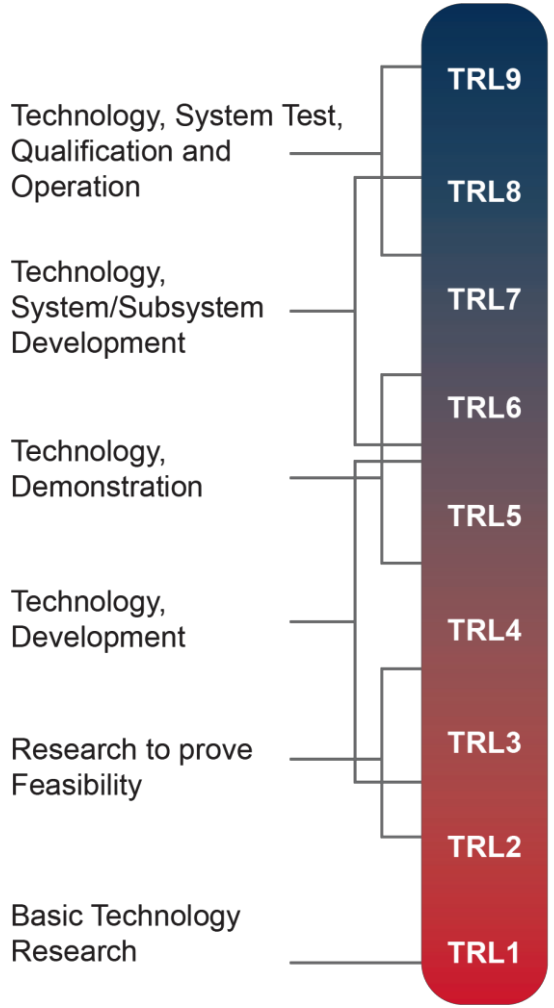
Speed Reduction/ Optimization

Digital Technology Potential

Market-based Measures

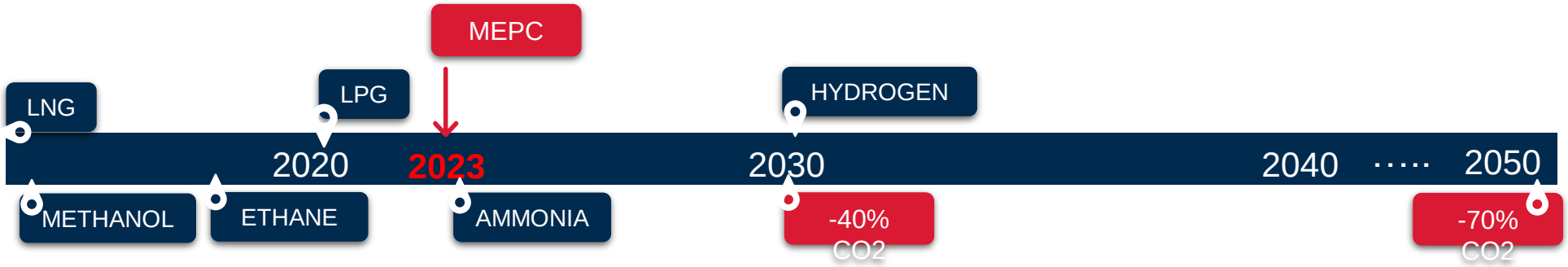
GHG Challenge – Potential Solutions

Component	Feature	Potential Saving	Technology Readiness Level
1. Hull Design	Hull form optimization Energy saving devices	5-15%	9
	Lightweight materials Hull coatings	2-5%	1-9
	Hull air lubrication system	4-5%	9
	Ballast water reduction	3-8%	3-6
2. Power and Propulsion	Hybrid power/propulsion Power system/machinery optimization Power system/machinery optimization Waste heat recovery	3-8%	7-9
3. Alternative Fuels/Energy	LNG LPG	20%	9
	Bio – Methanol Bio –Ammonia	75%	6-9
	Wind Solar power	2-12%	3-9
	Electric (non-renewable/renewable)	8-95%	7
4. Operations	Speed/voyage optimization	5-7%	9
	Cold ironing	4%	9



Technology readiness levels as defined by ISO 16290.

Maturity Timeline & IMO GHG



Alternative Fuels/Energy Sources with GHG Reduction Potential

Fuel Type	Infrastructure	Security of Supply	Energy Density	CO2	SOx	Safety
Heavy Fuel Oil						
Marine Diesel						
LNG						
LPG						
Methanol (from Methane)						
Methanol (from biomass)						
Ammonia (from methane)						
Ammonia (from renewable)						
Hydrogen (from methane)						
Hydrogen (from renewable)						
Biofuels						

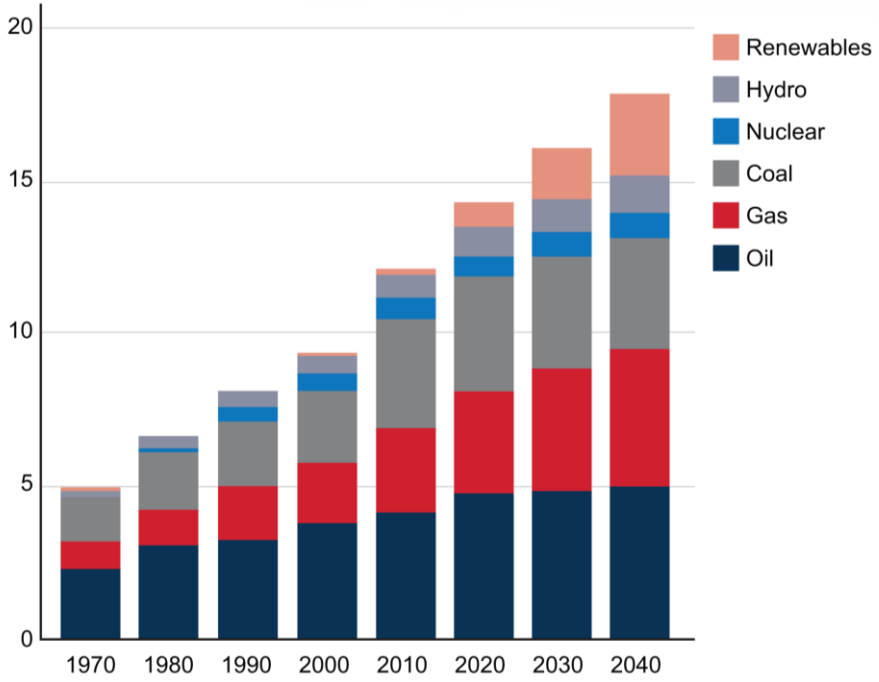
Notes:

- **Infrastructure** refers to existing bunkering infrastructure or facilities that can be adapted to support bunkering (e.g. import/export terminals)
- **Security** of supply refers to the availability of sufficient global production to meet significant demand from the marine sector for bunkers
- **Energy density** refers to the volumetric energy content of the fuel and on-board storage requirements
- **CO_2 and SOx** refers to impact on emissions
- **Safety** refers to handling, storage and consumption risks

Source: ABS/MSI study

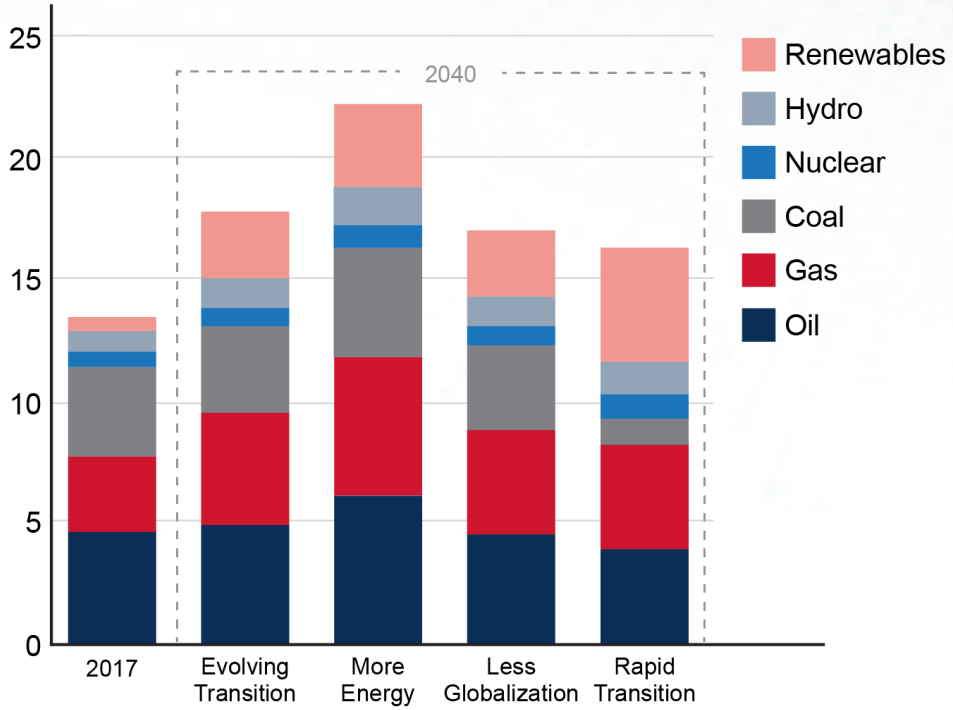
Future Energy Sources

Primary Energy Consumption by Fuel
Billion toe



BP Evolving Transition (ET) Scenario

Primary Energy Consumption by Fuel
Billion toe



- Transition towards a lower carbon fuel mix
- Renewable energy is the fastest growing source
- Fossil fuels contribution remains high with gas showing steady growth

UN Sustainability Framework

- United Nations: Agenda for Sustainable Development
- Adopted by all 193 United Nations member states Sustainable Development Goals (SDGs)

Thank You

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