

A Pathways to Decarbonise the Shipping Sector by 2050

Presenter:

- **Gabriel Castellanos**, Shipping Decarbonisation, IRENA

TUESDAY, 22 FEBRUARY 2022 • 14:00-14:30 CET

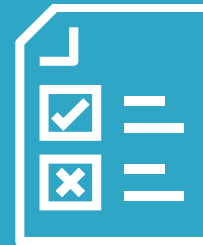
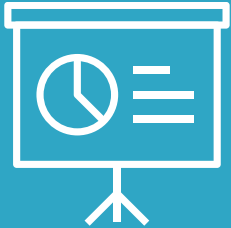
SPEAKER



Gabriel Castellanos
Associate Programme Officer
Shipping Decarbonisation
IRENA

IRENA insights

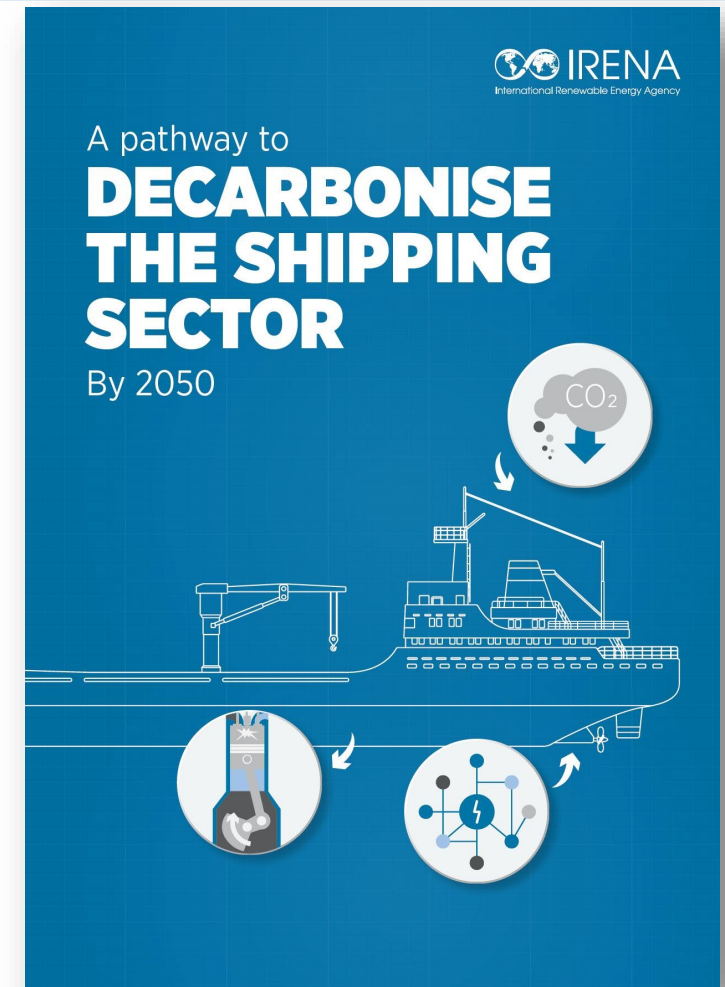
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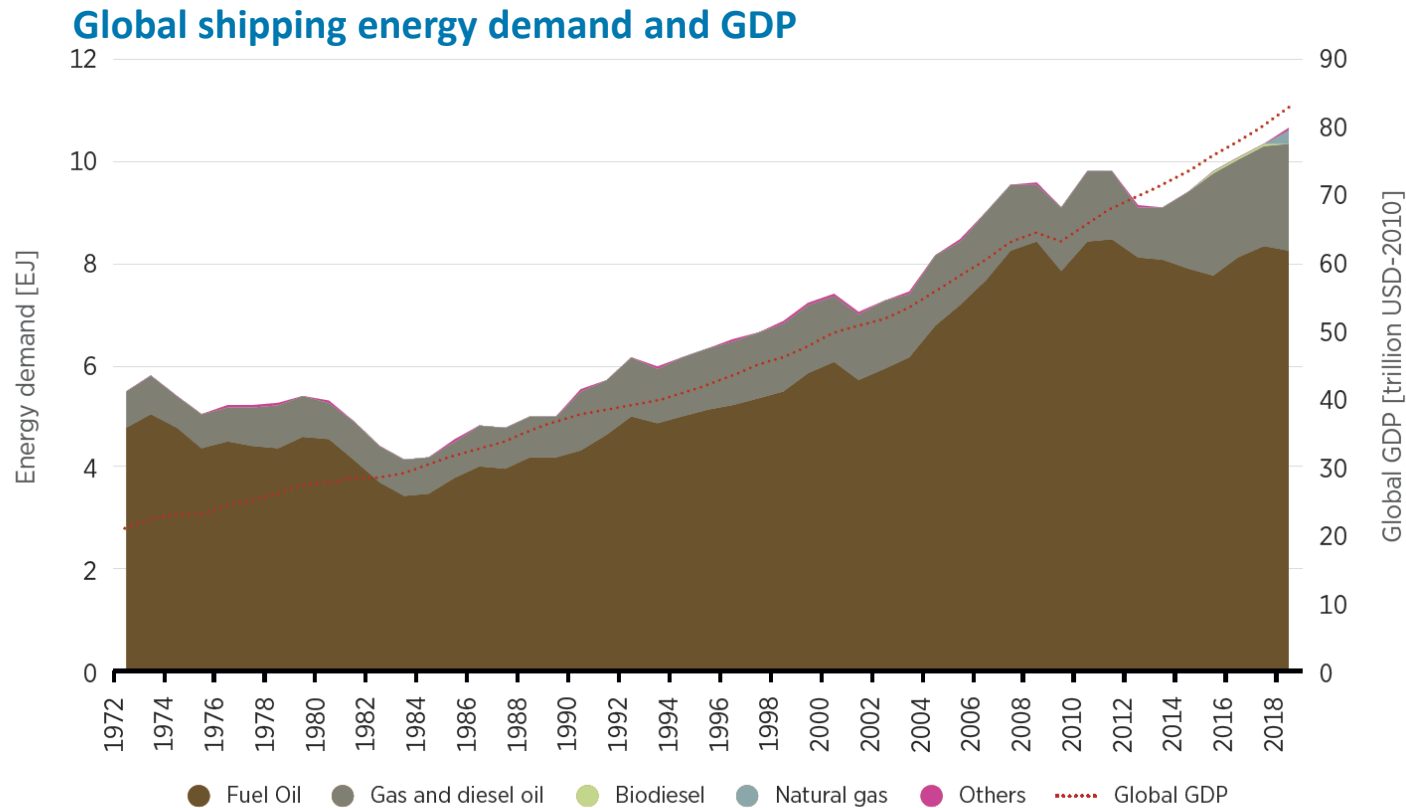
A Pathway to Decarbonise the Shipping Sector by 2050

- 01 Market dynamics and trends, trade volumes, associated energy demand, and CO₂ emissions
- 02 Technology readiness and cost of relevant renewable energy fuels
- 03 The long-term decarbonisation pathway by 2050 and its implications
- 04 Enabling actions to raise the decarbonisation ambition

The report analyses the technology readiness of the renewable fuels suitable for international shipping and explores the options and actions needed to progress towards a decarbonised maritime shipping sector by 2050



International shipping is a key sector of the global economy → Trade and manufacturing sector activity have been the key drivers shaping energy demand



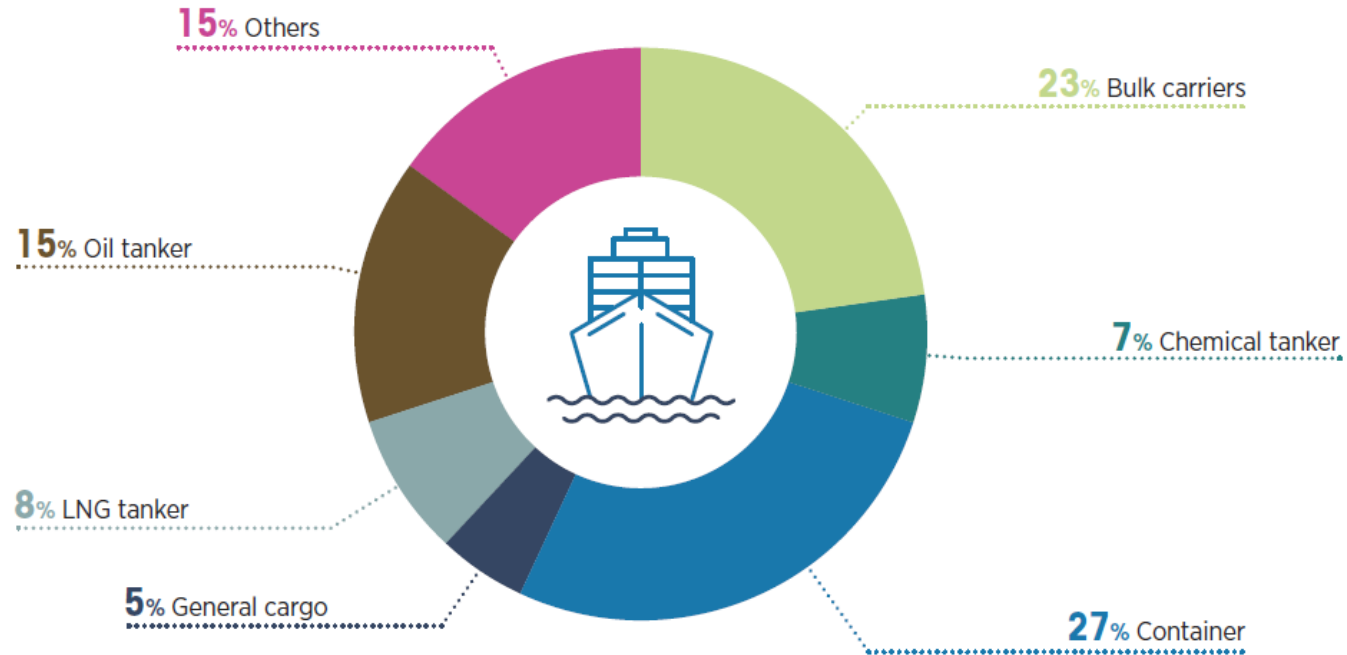
Note: Comprises energy demand from domestic navigation plus international shipping.

Source: IRENA analysis based on DNV GL (2020a), World Bank (2020)

- As the adoption of energy efficiency (EE) measures in international shipping increases, **the nexus of the nexus of GDP, trade and energy demand may decouple progressively.**
- Given the pivotal role of international shipping in the global economy, **the role of EE has limitations in terms of carbon reduction potential.**

International shipping is a key sector of the global economy \approx 20% of the global fleet comprises large and very large vessels responsible for around 85% of the net GHG emissions

Voyage-based allocation of energy consumption for international shipping



- **Key sector of the global economy**; around **80-90%** of global trade enabled by maritime shipping.
- The **shipping sector** is responsible for around **3%** of annual global greenhouse gas (GHG) emissions.
- If the **international shipping** sector were a country, it **would be the sixth- or seventh-largest CO2 emitter**.

A pathway with a 70% share of renewable fuels enables a 80% cut in CO₂ emission by 2050

A 1.5°C Scenario featuring 80% decarbonisation is based on four key measures:

Renewable fuels

1. Indirect electrification by employing **e-fuels**
→ **60% decarbonisation**

2. Direct employment of **advanced biofuels**
→ **3% decarbonisation**

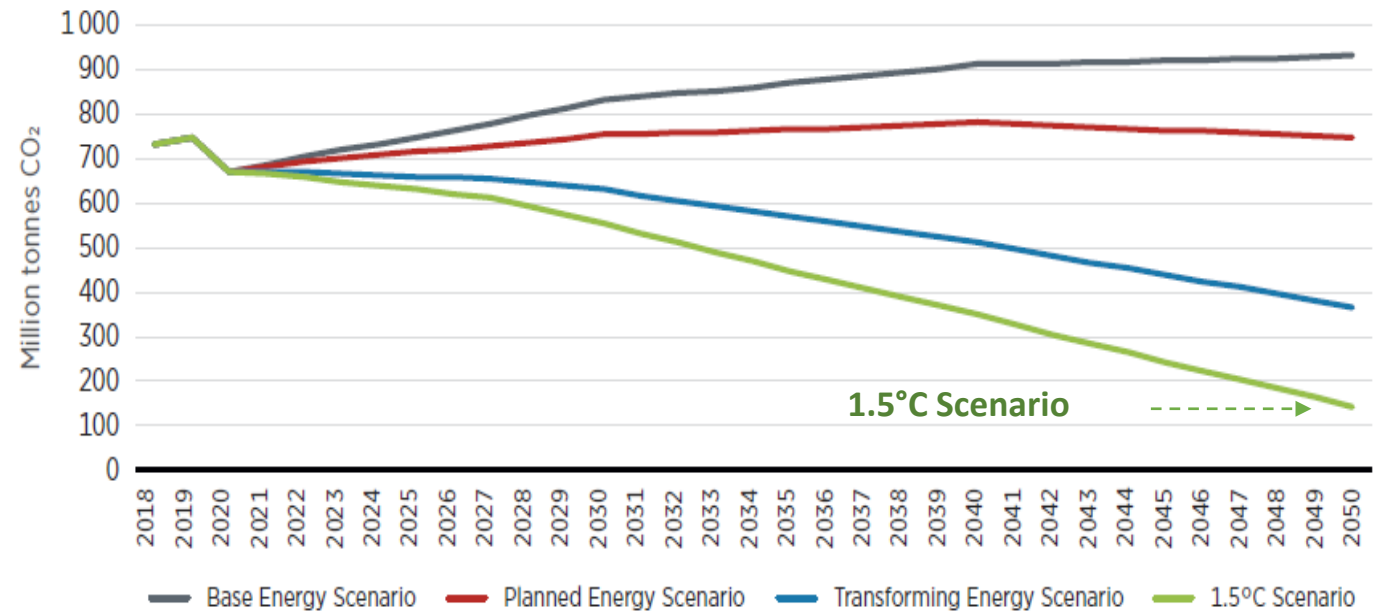
Energy efficiency

3. Improvement of vessels' **energy efficiency**
→ **20% decarbonisation**

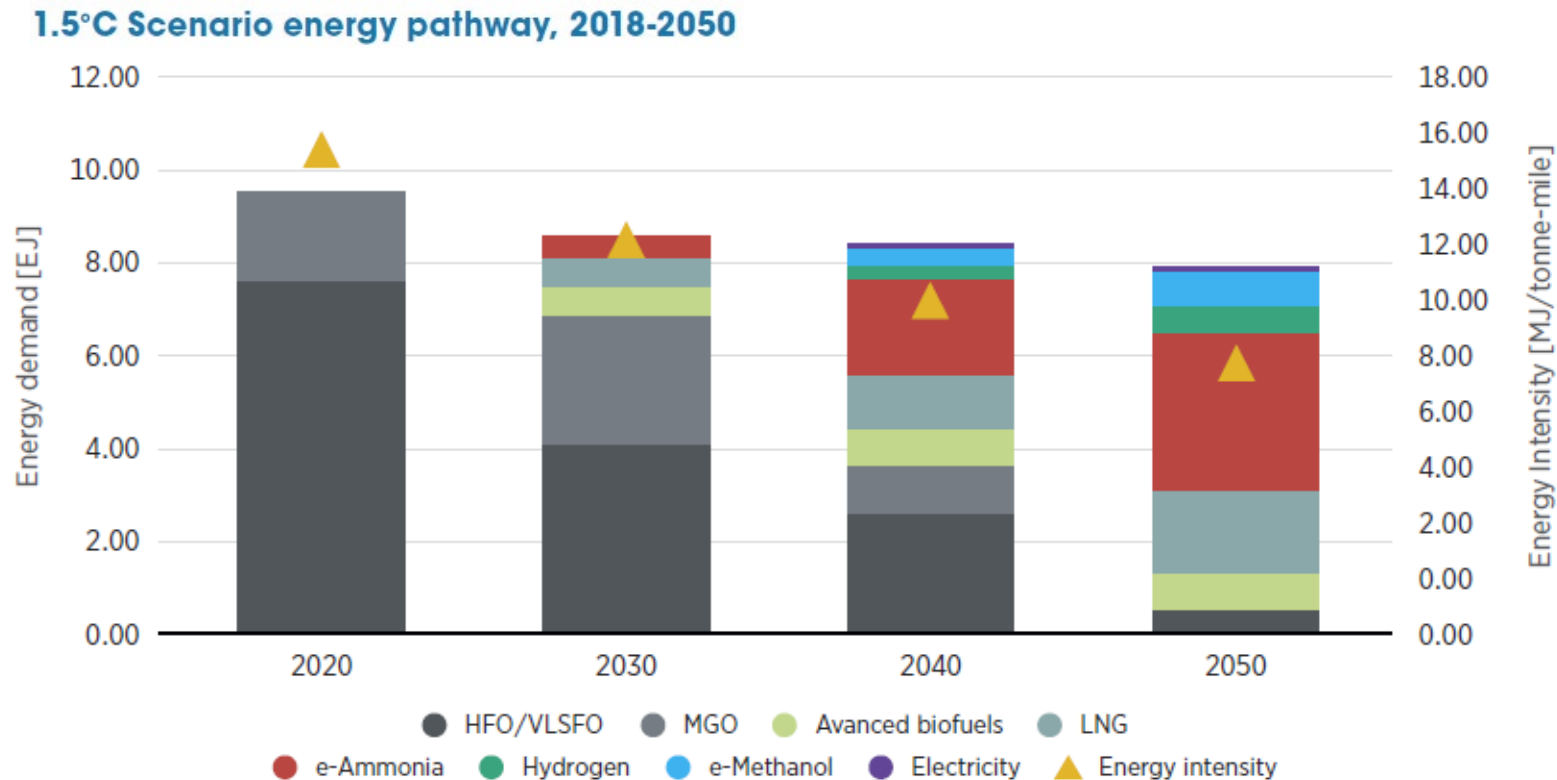
Systemic changes in global trade dynamics

4. Reduction final energy due to **sectoral activity changes (reduced oil demand, circular economy)**
→ **17% decarbonisation**

Comparison of CO₂ emissions associated with each scenario, 2018-2050



In the immediate term energy efficiency is essential. Short term biofuels play a key role.
 In the medium and longer term, green hydrogen fuels are pivotal to sectoral decarbonization



By 2050, shipping will require a total of **46 million tonnes of green hydrogen for e-fuels production.**

→ **73%** will be needed for the production of **e-ammonia**

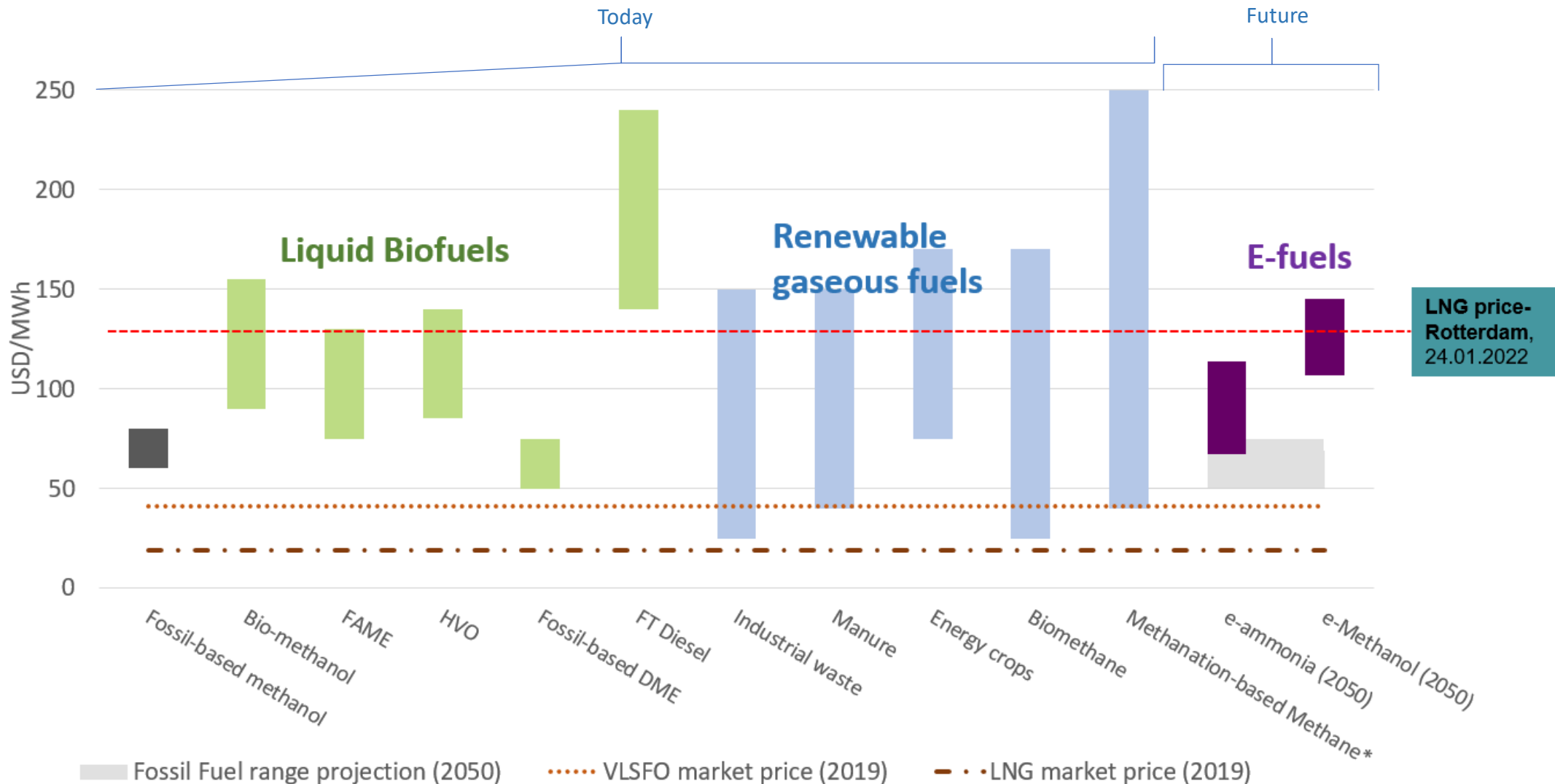
→ **17%** for **e-methanol** and;

→ **10%** will be used **directly as liquid hydrogen.**

E-ammonia will be **pivotal for decarbonising shipping by 2050.**

→ **183 million tonnes of renewable ammonia** for international shipping alone in 2050 will be needed; a comparable amount to today's ammonia global production.

In the next decades green e-fuels will become more cost competitive, thus allowing for a diversified – decarbonised energy mix

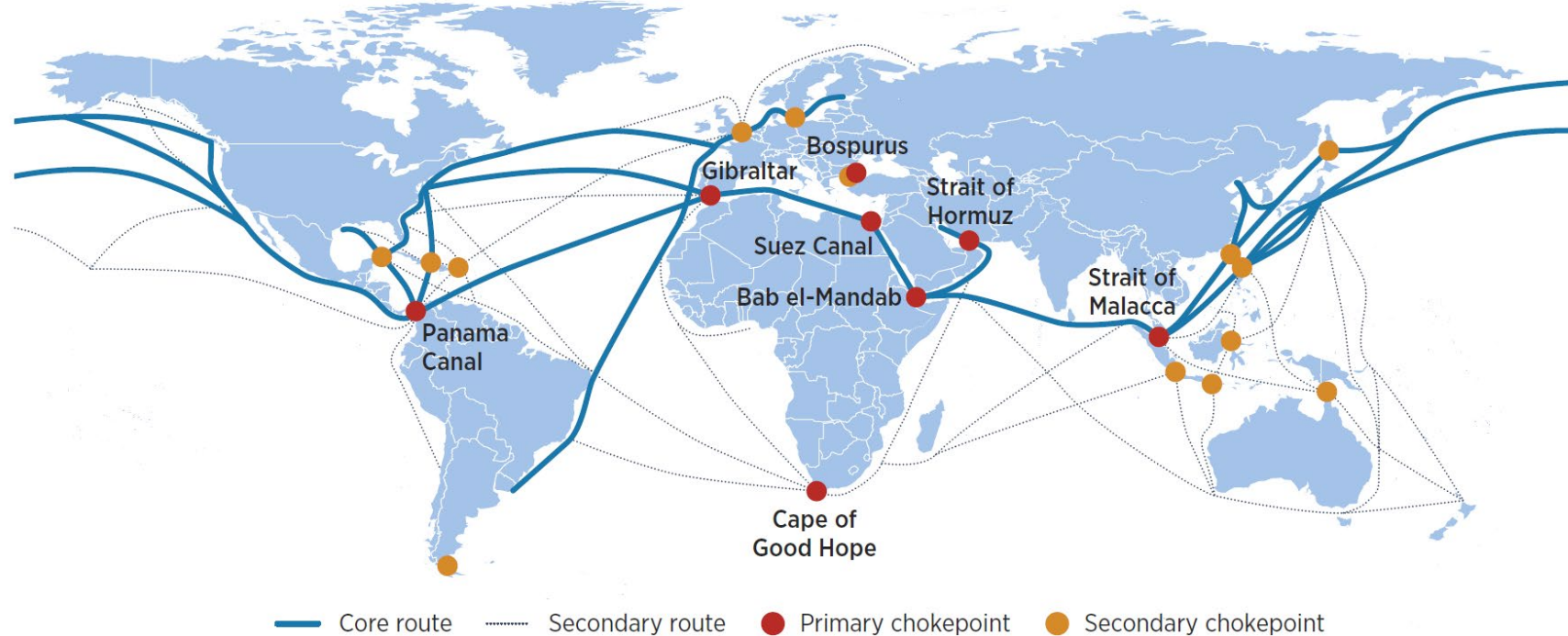


**LNG price-
Rotterdam,
24.01.2022**

*Hydrogenation of carbon dioxide and carbon monoxide, resulting in methane.

It is crucial to identify the geographical locations that could fast-forward the energy transition in the sector

Main maritime shipping traffic routes



Source: Rodrigue (2020)

- **Example 1** - The Panama Canal provides direct access between the Atlantic and Pacific oceans without circumnavigating Cape Horn. In 2019, the Panama Canal reported 13 785 ship passages and a total of around 229 million tonnes of goods.
- **Example 2** – Singapore is responsible for nearly ¼ of the global bunkering supply.
- **High need to focus efforts on and facilitating investments in strategic geographical locations.**

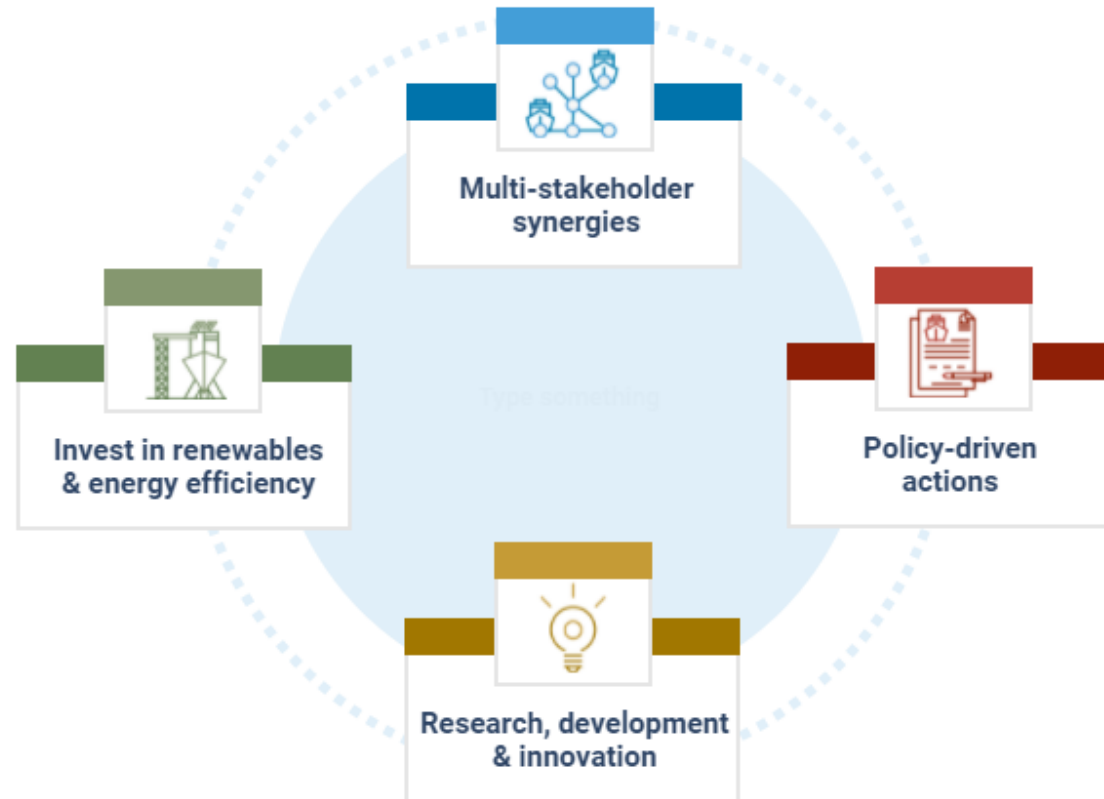
Moving from nearly zero CO2 emissions to net zero requires a 100% renewable energy mix by 2050. To achieve this more ambitious goal, taking early action is critical.

Stakeholders need to develop **broader business models** and **establish strategic partnerships** beyond the traditional players.

e.g. Energy-intensive industries – Power suppliers – Petrochemical Sector, etc.

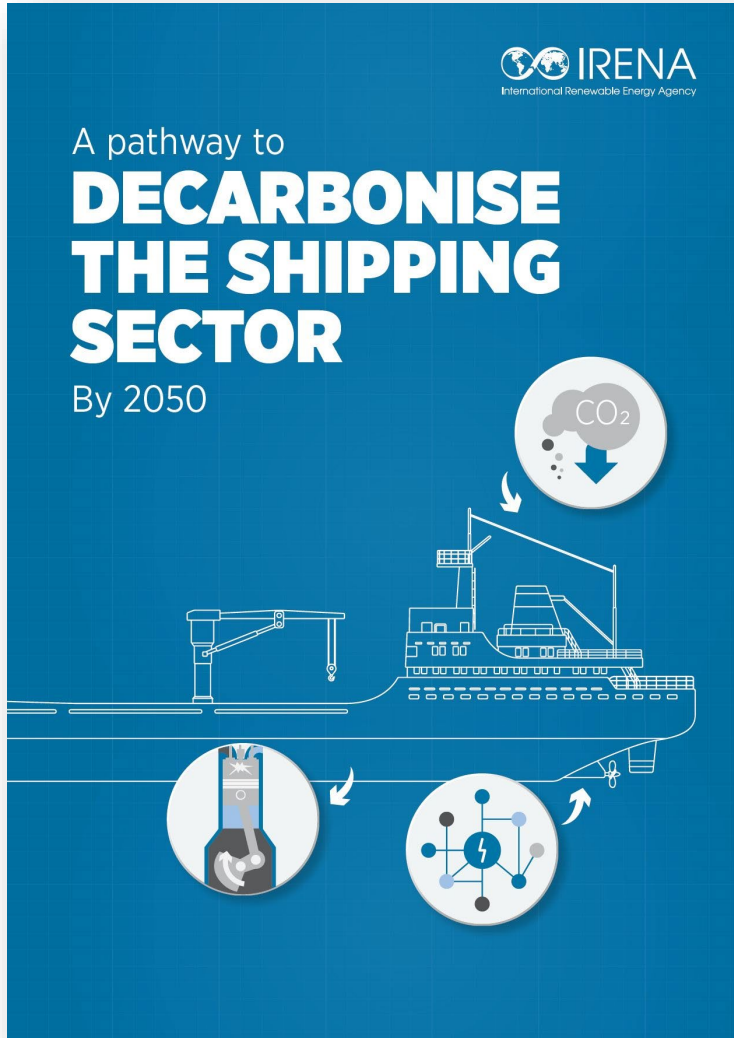
Enable affordable lines of credit and introduce incentives to foster:

- Develop **carbon-zero vessels**.
- Implementation of **retrofits**.
- **Production of renewable fuels** in resource rich locations.



Enable a level playing field for renewable fuels. Early action **will foster employment of renewable fuels and prevent stranded assets**.

Prompt R&D institutions to analyse the upstream dynamics of renewable fuels; including the GHG life cycle analysis of the different renewable fuels.



Thank you for your
attention!



Q & A
10 min

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