Hydrogen Maritime applications
EU Policy Perspective

H²@Ports Workshop
San Francisco, 10 Sept 2019

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Challenges

- Transport and connectivity are **essential for the EU economy**.
- Transport is **responsible for almost a quarter of EU GHG emissions** and the main cause of **reduced air quality** in cities.
- In the EU, transport is likely to be the **largest emitter of CO2 after 2030**.
- Maritime transport is estimated to be responsible for about 2.5% of global greenhouse gas emissions.
- To meet our commitment under the **Paris Agreement** and **the 2030 goals t**ransport emissions in 2050 should be **at least 60% lower than in 1990**.

The EU Alternative Fuels Infrastructure Legislation

Directive 2014/94/EU

Requires a minimum infrastructure to be implemented through national policy frameworks for:

Electricity: publicly accessible recharging points to be built by 2020 to allow the circulation of EVs Union-wide, both in urban and sub-urban areas, as well as by 2025 on the TEN-T Core Network.

Liquefied Natural Gas (LNG): publicly accessible Natural gas/bio-methane refuelling points for road vehicles and ships/vessels, with common standards, on the TEN-T Core Network by 2025;

Compressed Natural Gas (CNG): publicly accessible refuelling points to allow the circulation of CNG vehicles Union-wide, both in urban and sub-urban areas, by 2020, as well as on the TEN-T Core Network, by 2025;

Hydrogen: sufficient number of publicly accessible refuelling points by 2025, with common standards, in the Member States who opt for hydrogen infrastructure.

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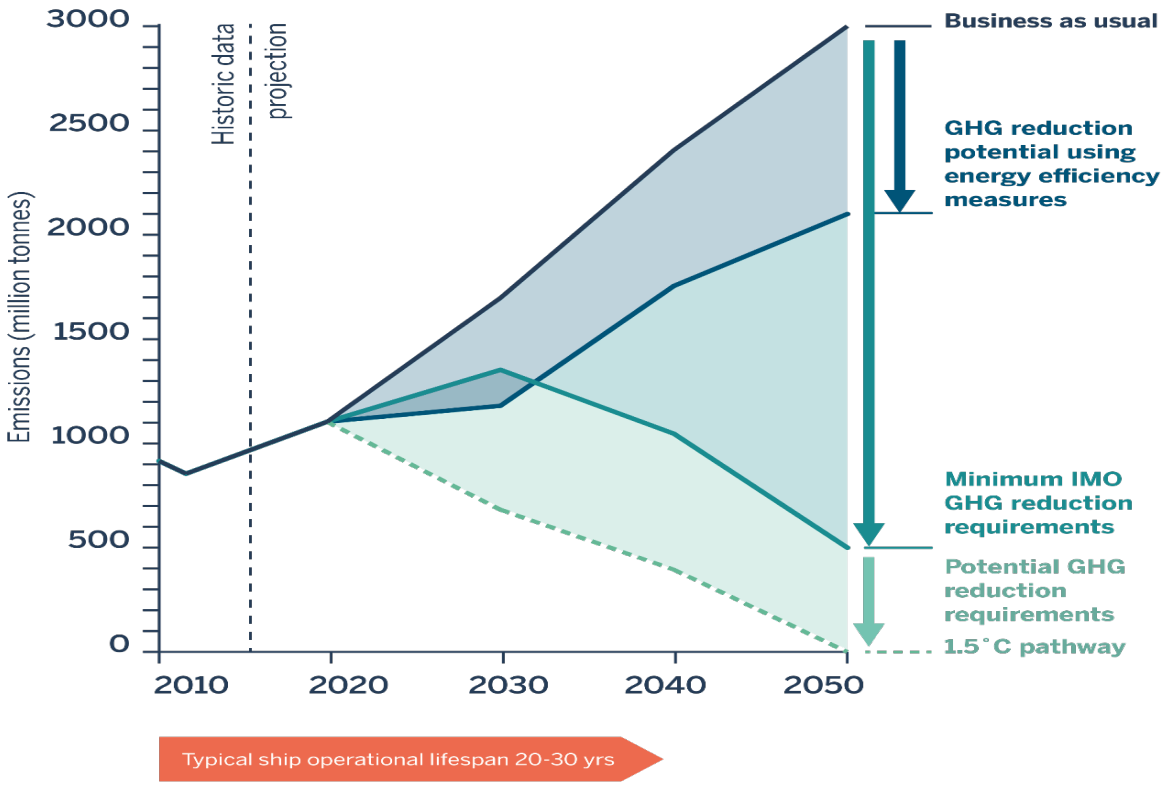
How International Shipping Needs To Decarbonise



The International Maritime Organization (IMO) has committed to reducing greenhouse gas (GHG) emissions by from international shipping **at least 50% by 2050** (compared to 2008 emissions), with a strong emphasis on **reaching zero emissions**.

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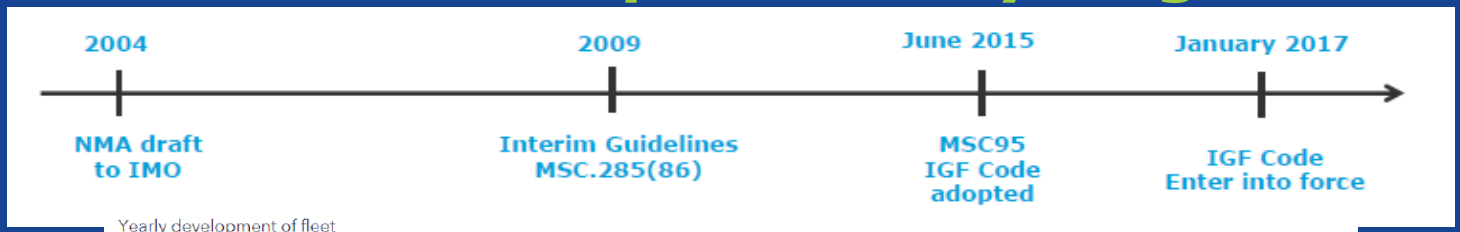
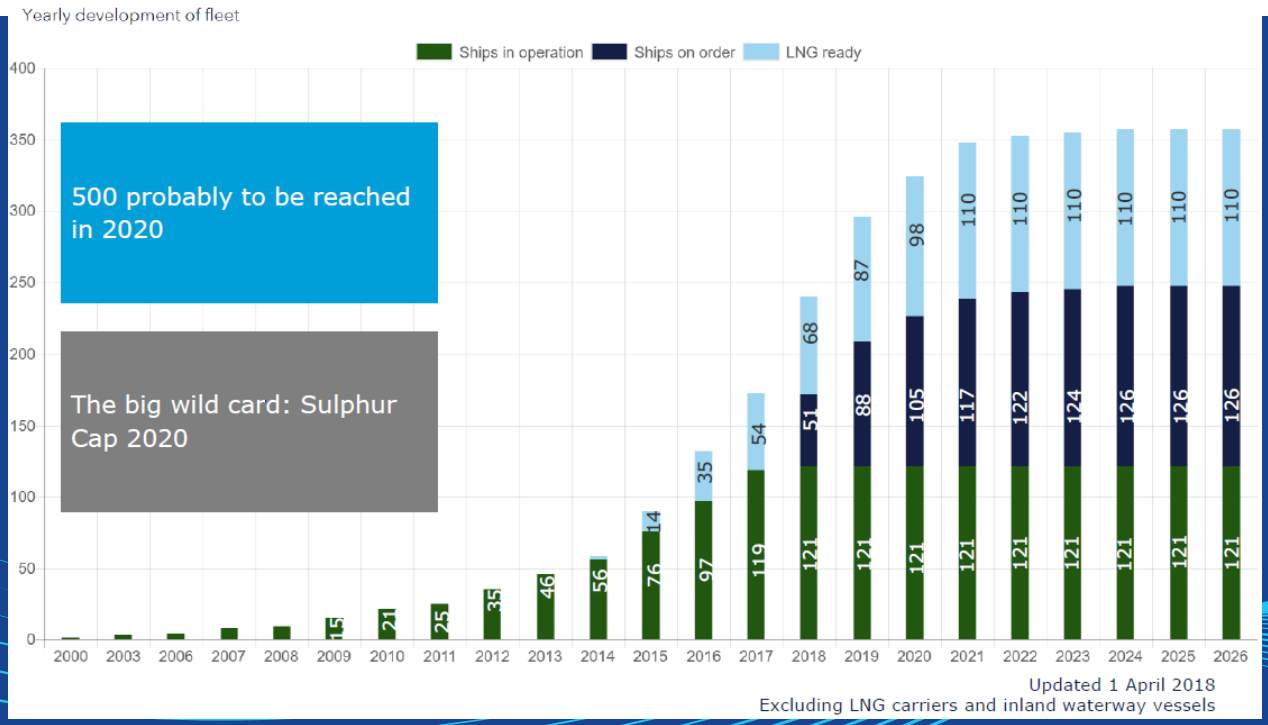
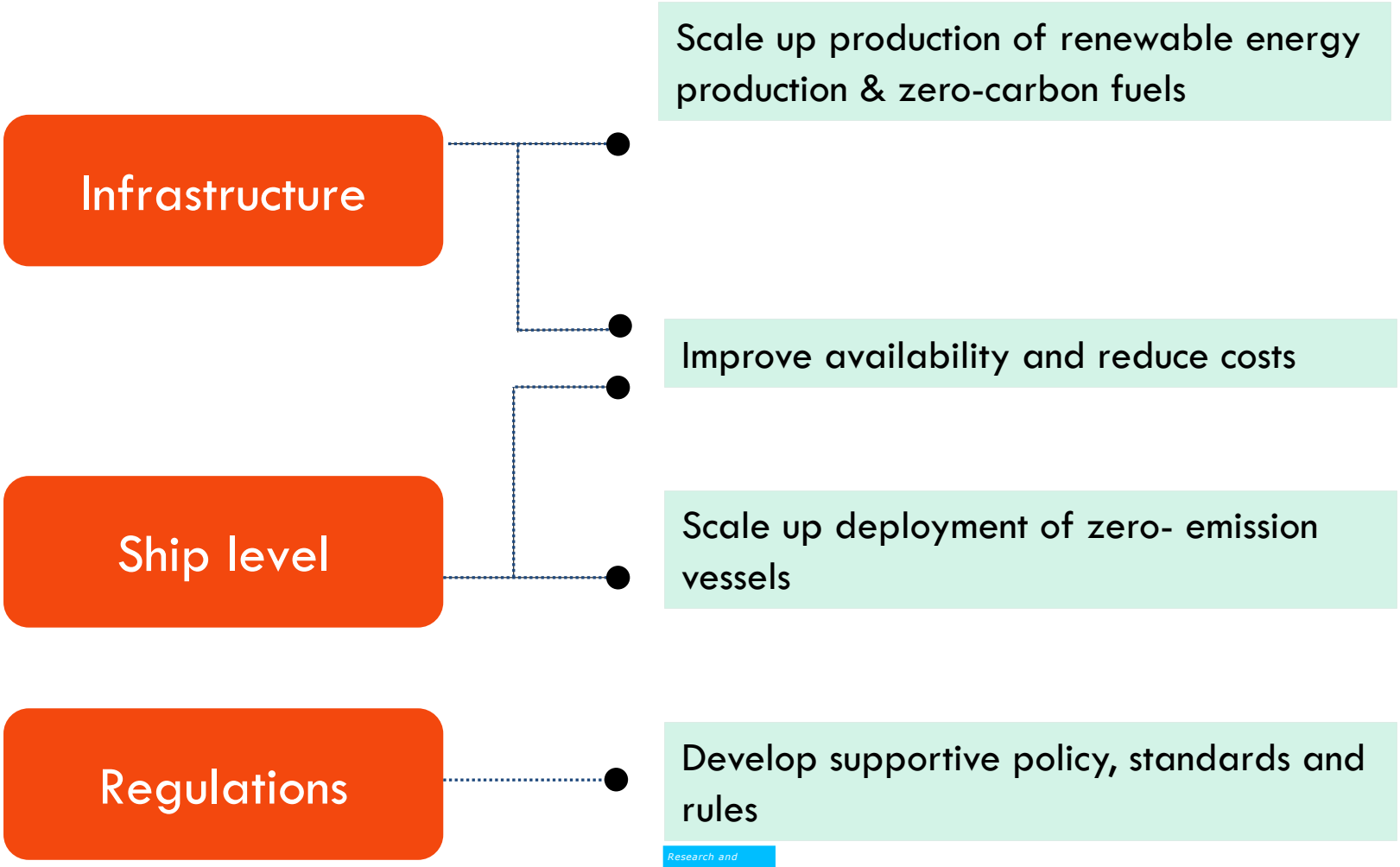
LNG – a blueprint for Hydrogen?





Further work is needed to transition the maritime industry to zero-carbon fuels



Developing the framework for hydrogen as marine fuel

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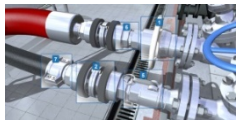
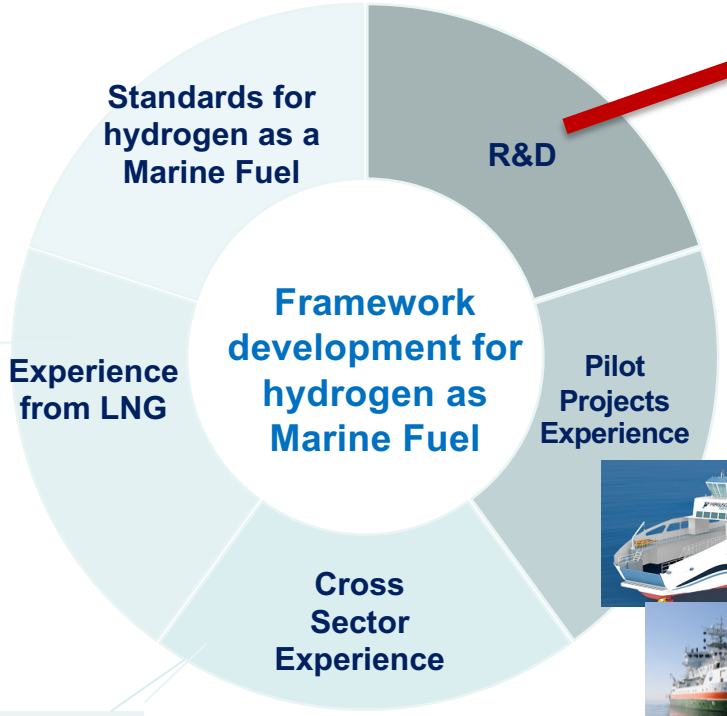
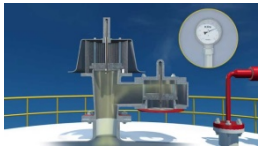


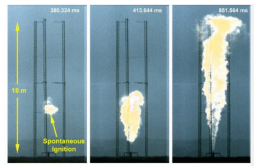


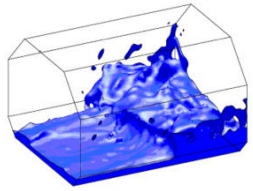
General
- (EX) zones for hydrogen
- Embrittlement
- Risk of autoignition
- Safety relief valves
- Diffusion and trapping
- Safety Concepts

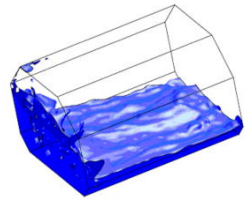
Liquid Hydrogen
- LH2 Storage Technology
- Release of hydrogen
- Pressure build-up due to rapid vaporization
- Low temperature effects.
- Ignition of 'oxygen snow'
- Vacuum loss
- Sloshing in tank

Gaseous Hydrogen
- CH2 Storage Technology
- Release of hydrogen
- Pressure management
- Ignition mechanisms









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Thank you for your attention!

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