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**, transport 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.
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.
LNG – a blueprint for Hydrogen?

2004: NMA draft to IMO
2009: Interim Guidelines MSC.285(86)
June 2015: MSC95 IGF Code adopted
January 2017: IGF Code Enter into force

Yearly development of fleet

500 probably to be reached in 2020

The big wild card: Sulphur Cap 2020

Updated 1 April 2018
Excluding LNG carriers and inland waterway vessels
Further work is needed to transition the maritime industry to zero-carbon fuels

- **Infrastructure**
  - Scale up production of renewable energy production & zero-carbon fuels
  - Improve availability and reduce costs

- **Ship level**
  - Scale up deployment of zero-emission vessels

- **Regulations**
  - Develop supportive policy, standards and rules
Developing the framework for hydrogen as marine fuel

**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
Thank you for your attention!

Robert.missen@ec.europa.eu