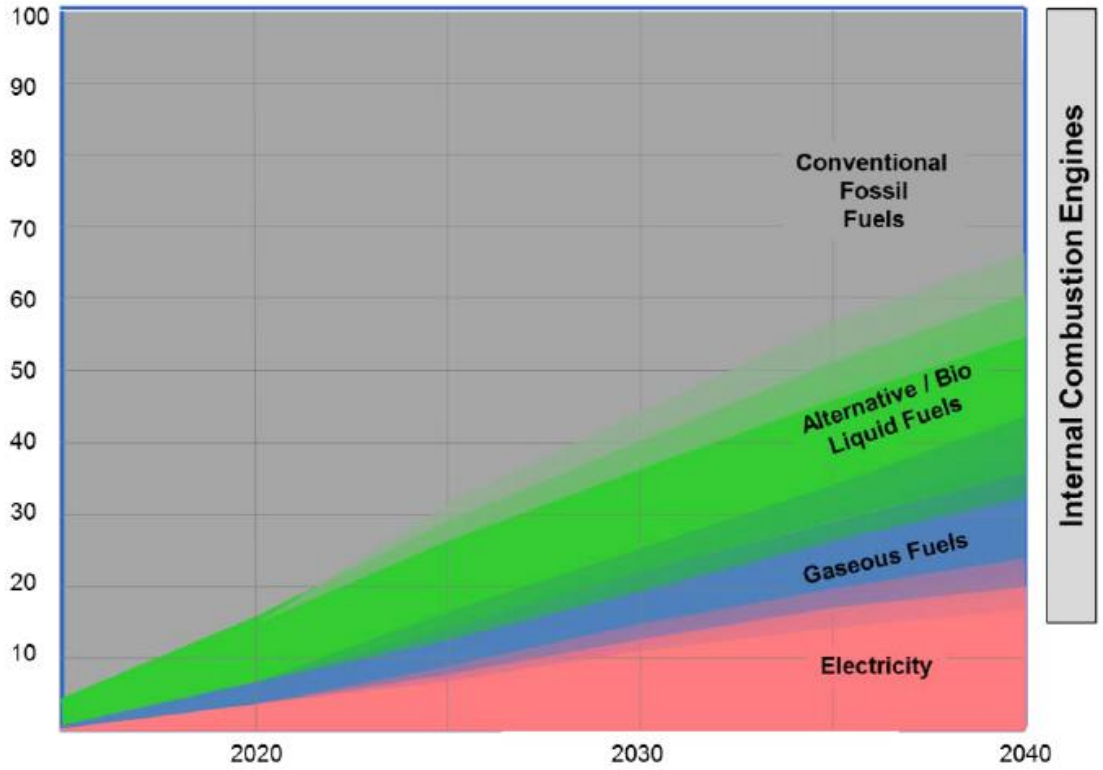
NGVA Europe
for sustainable mobility

Greenhouse Gas Intensity from Natural Gas in Transport

Bastad, 01 June 2017

Why Well-to-Wheel approach



Roadmap of road transport energy towards 2040 (ERTRAC – June 2016)

Road transport system is asked to move from **the current oil derived monopoly** towards a more complex system composed by different propulsion systems, based on both Internal Combustion Engines and Electrified powertrains.

Those systems should **rely on different forms of energies**, produced with very different processes starting from primary energy sources.

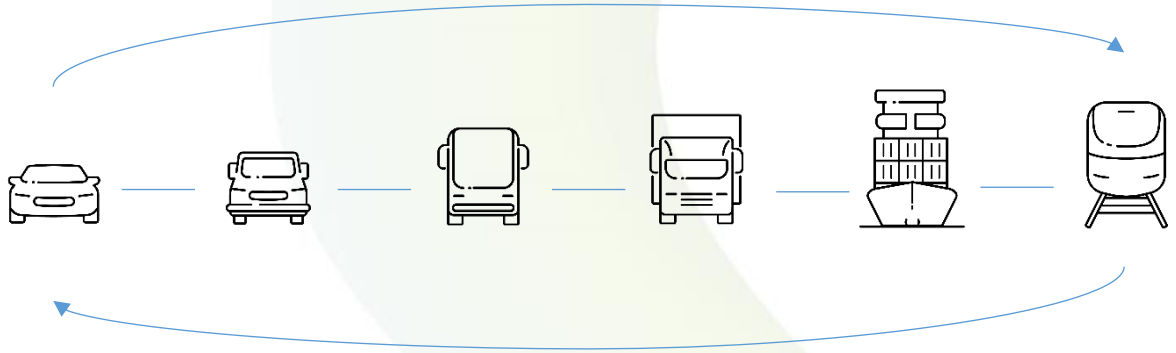
When referring to **decarbonisation**, it is fundamental to consider the entire fuel chain (from extraction to its end usage, meaning from **Well to Wheel**) to have a proper comparison among different solutions.

In this way **TECHNOLOGY NEUTRALITY** is guaranteed.

NGVA GHG Intensity study

NGVA Europe, supported through a partnership of 27 industry organisations, commissioned an **industry-wide analysis of the supply and use of natural gas in Europe.**

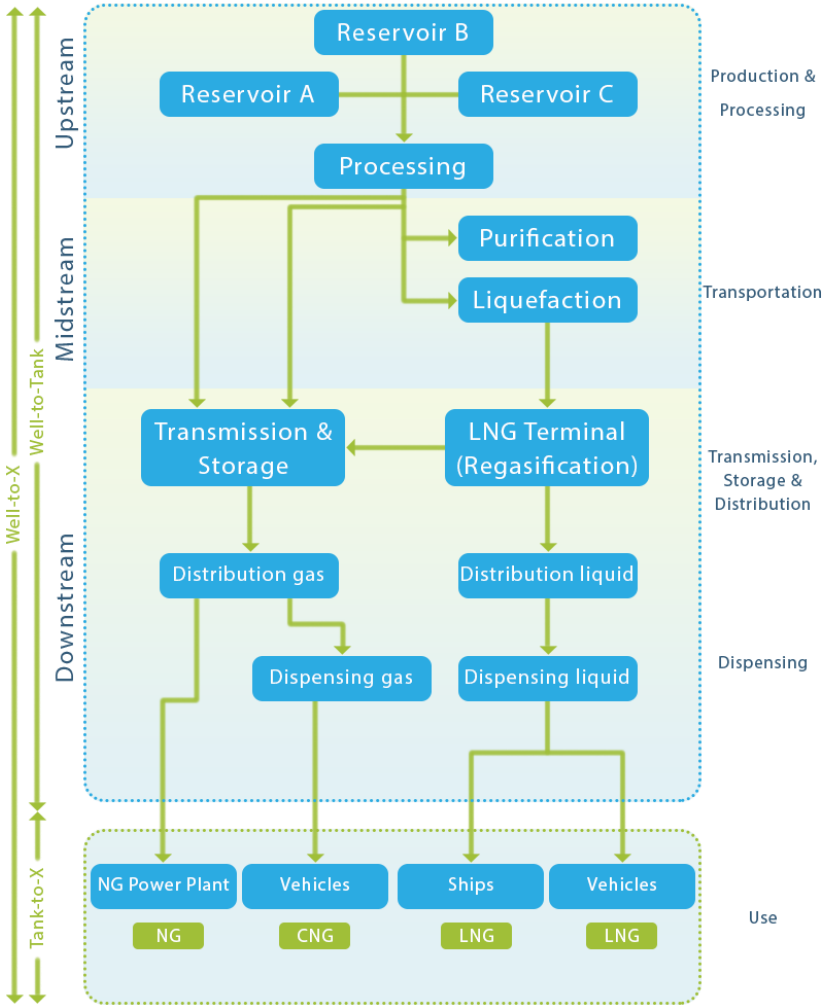
The study covers **road** vehicles (Well-to-Wheel), **maritime** vessels (Well-to-Wake) and **power** generation (Well-to-Grid).



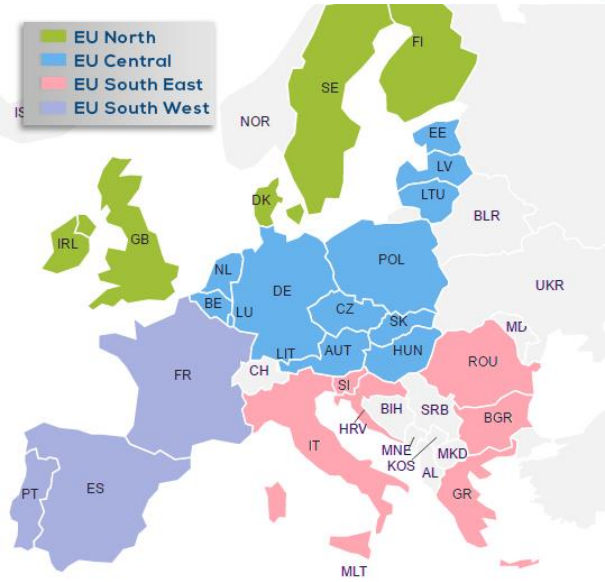
This is a deep and exhaustive analysis of the **current state and an outlook to 2030** about the natural gas supply chain, natural gas vehicles (NGVs) and shipping vessels performance.

Scope and methodology

Natural Gas Value Chain



- The analysis was performed according to four main EU regions.
- The LCA software system GaBi is used to synthesise the collected data and information and to build the basis for the GHG model.
- The study is subject to critical review by a panel of independent experts according to ISO 14044.

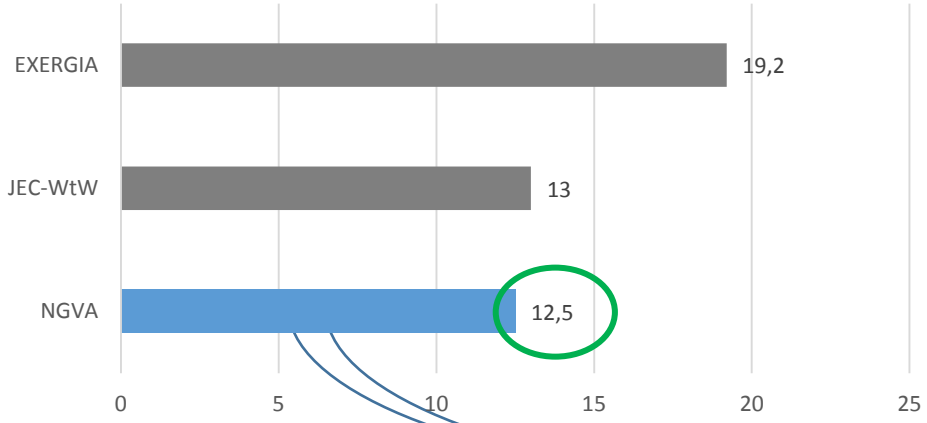


RESULTS

from the study on the GHG Intensity of Natural Gas

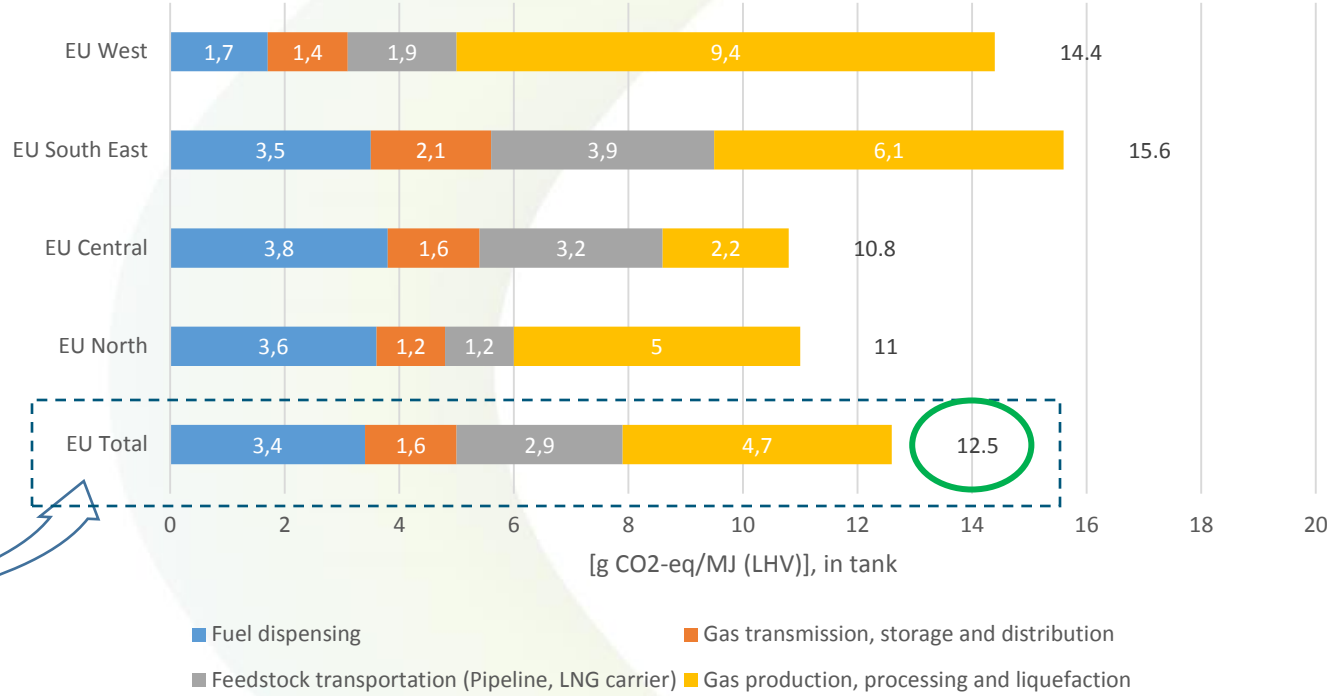
Well-to-Tank (GHG) emissions - CNG

Well-to-Tank - CNG, in tank - GHG (EU Total) [g CO2-eq/MJ]

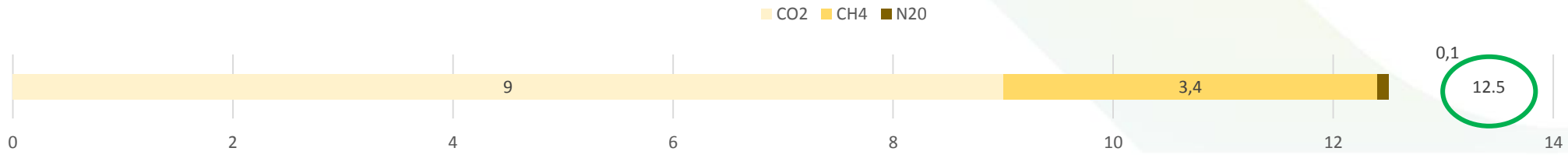


Exergia (2015)
JEC (2014)

Well-to-Tank – GHG Emissions: CNG supply Breakdown by main individual emissions per region

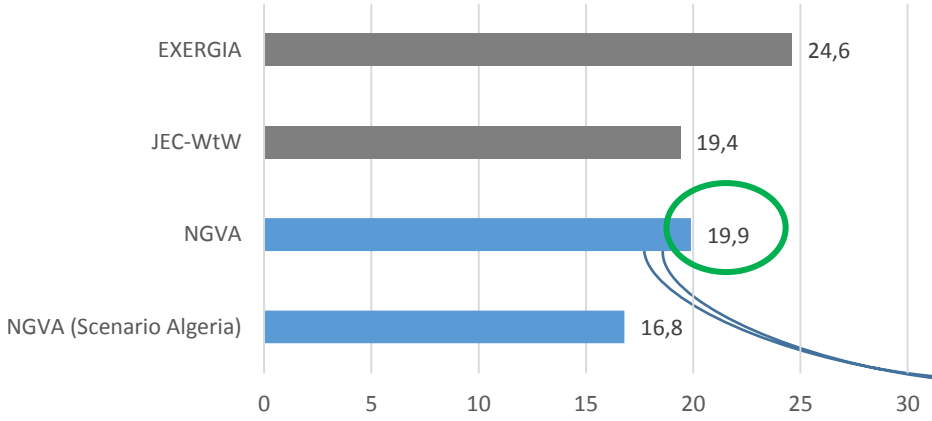


Well-to-Tank – GHG Emissions: CNG supply breakdown by main individual emissions

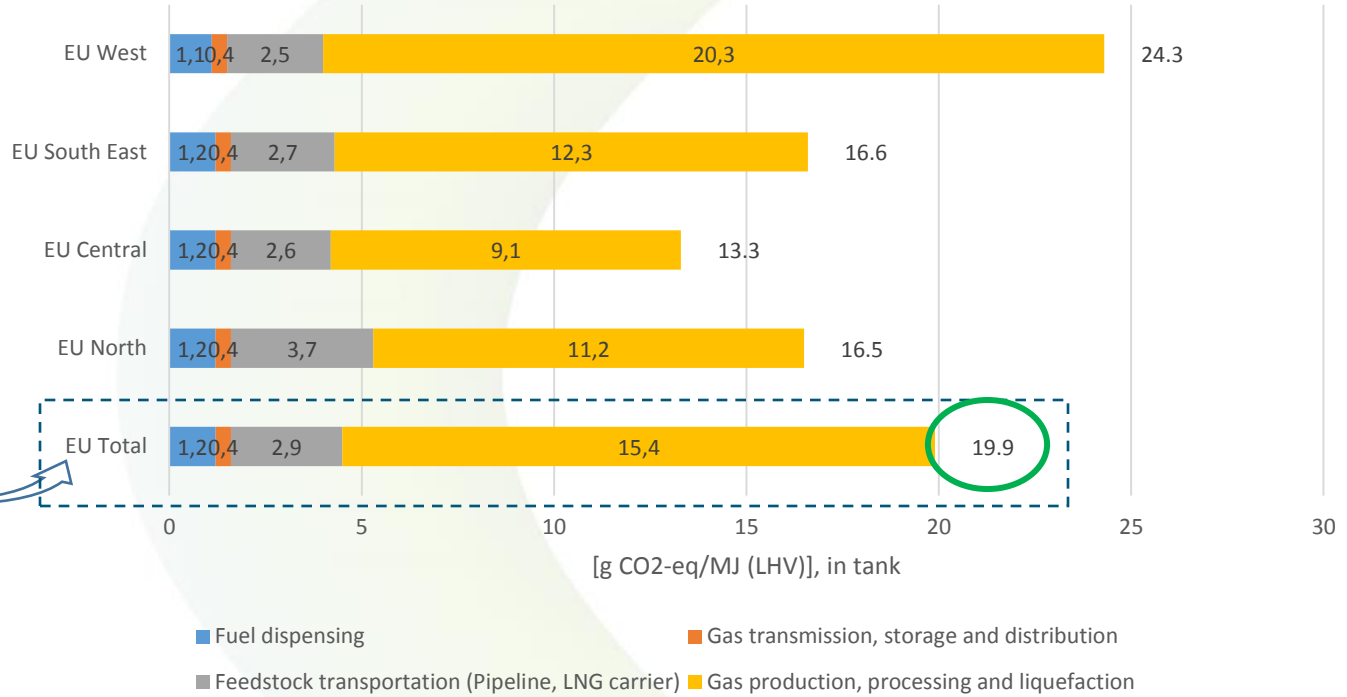


Well-to-Tank (GHG) emissions - LNG

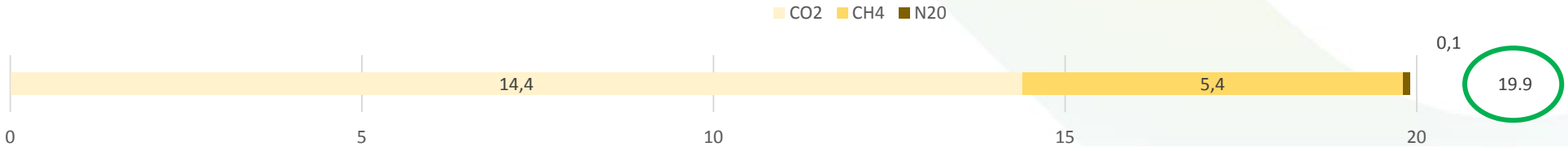
Well-to-Tank - LNG, in tank - GHG (EU Total) [g CO2-eq/MJ]



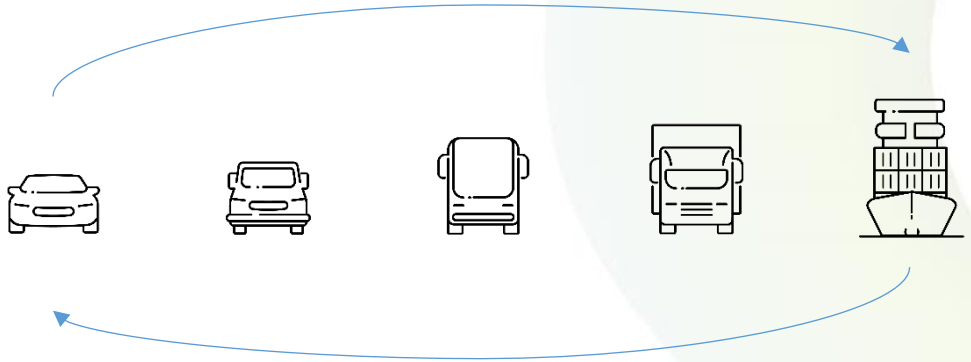
Well-to-Tank – GHG Emissions: LNG supply Breakdown by main individual emissions per region



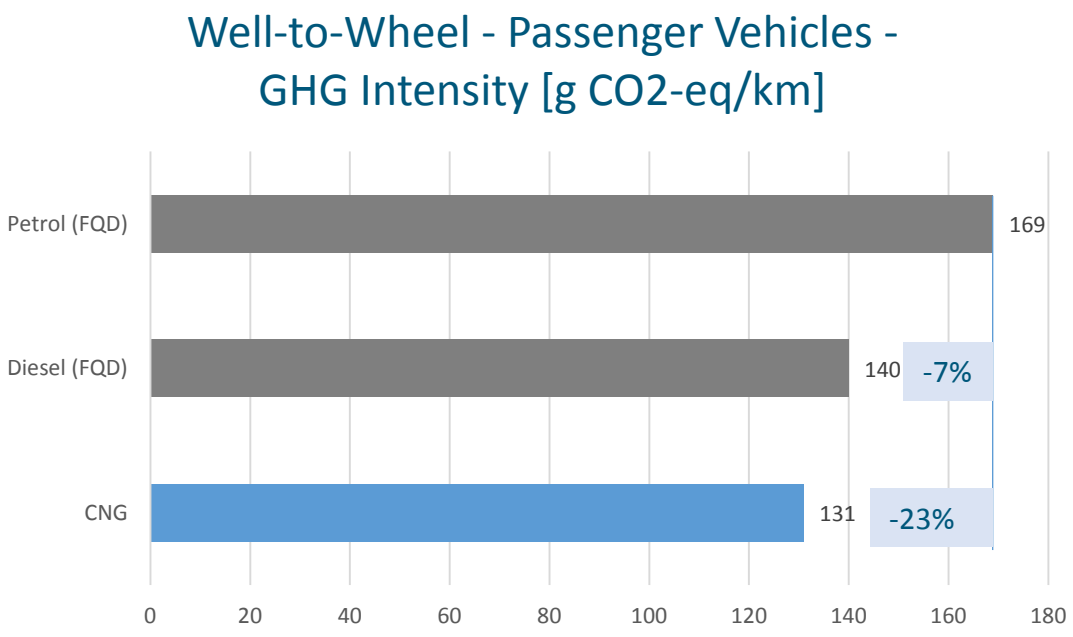
Well-to-Tank – GHG Emissions: LNG supply breakdown by main individual emissions



Well-to-Wheel Results

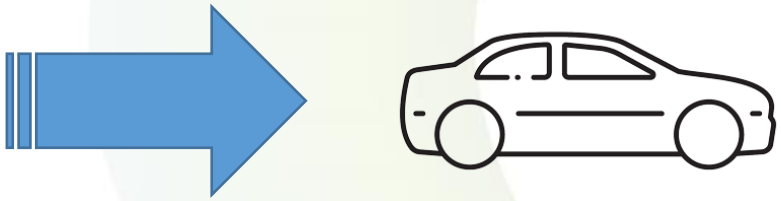


Well-to-Wheel (GHG) emissions from Passenger Car

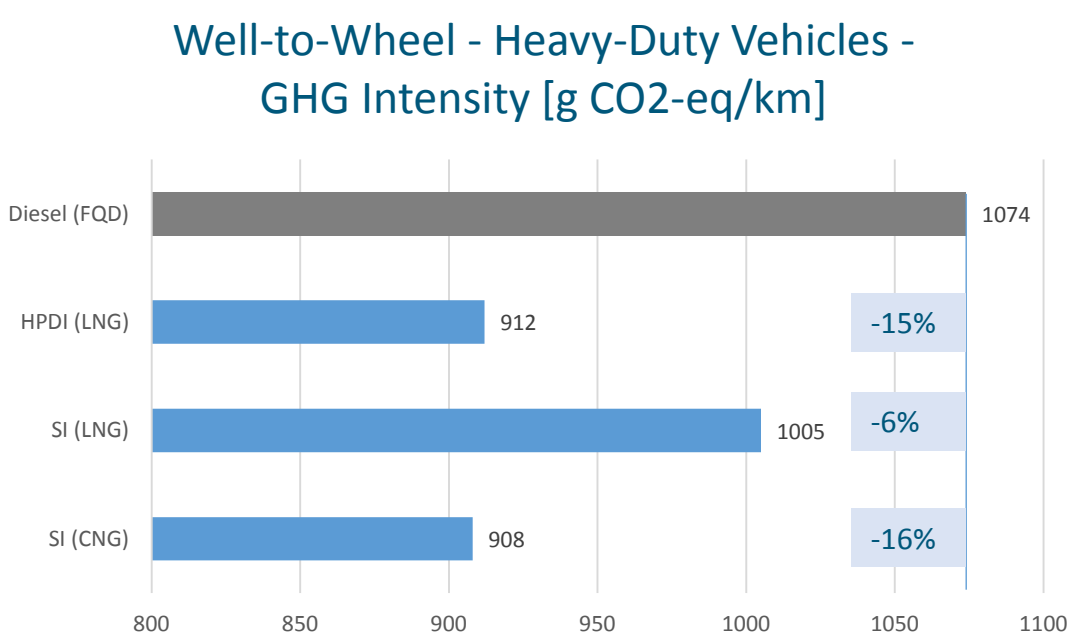


Vehicle from the C-segment being used according to the New European Driving Cycle

Significant benefits and **reduced GHG emissions** from passenger cars are possible with CNG.



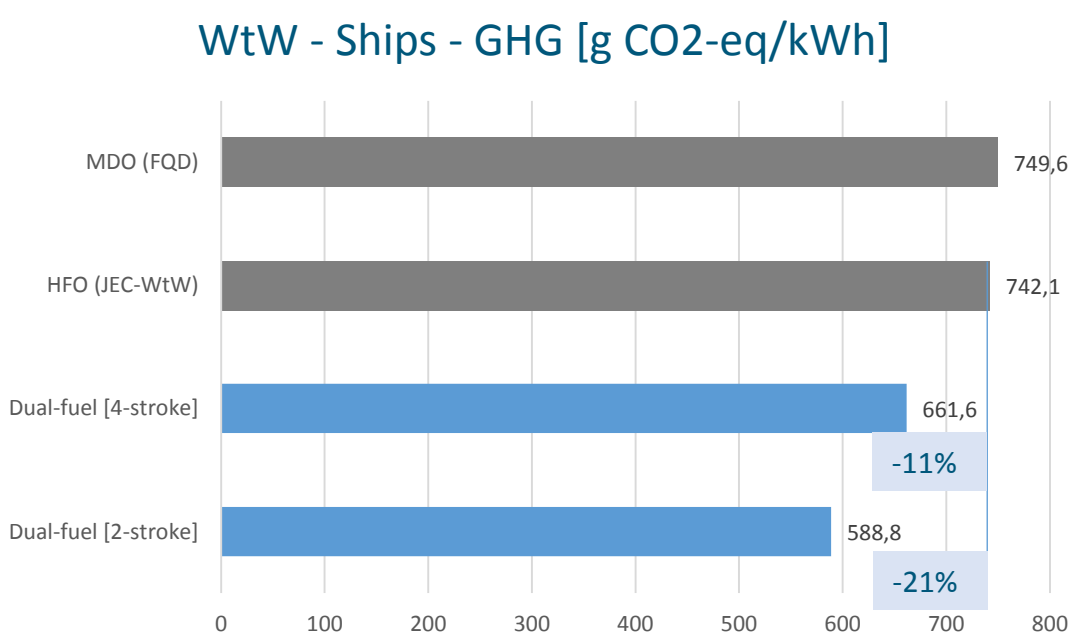
Well-to-Wheel (GHG) emissions from Heavy-Duty Vehicles



40 t tractor + trailer combination with 75% payload in long haul use

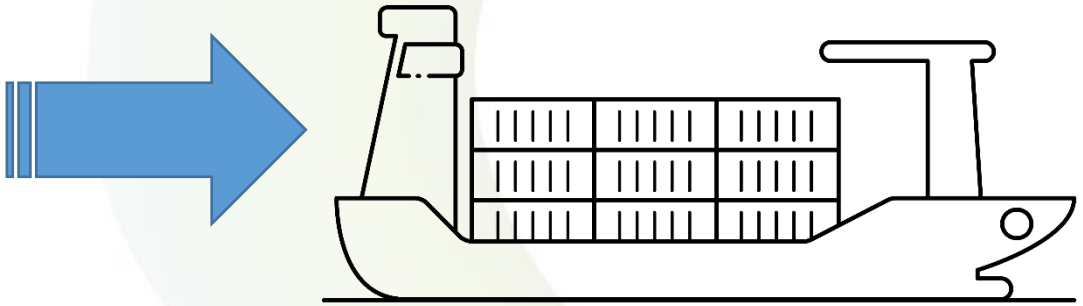
For long-haul missions, both CNG and LNG are having lower emissions that traditional fuels.

Well-to-Wake (GHG) emissions from Maritime applications

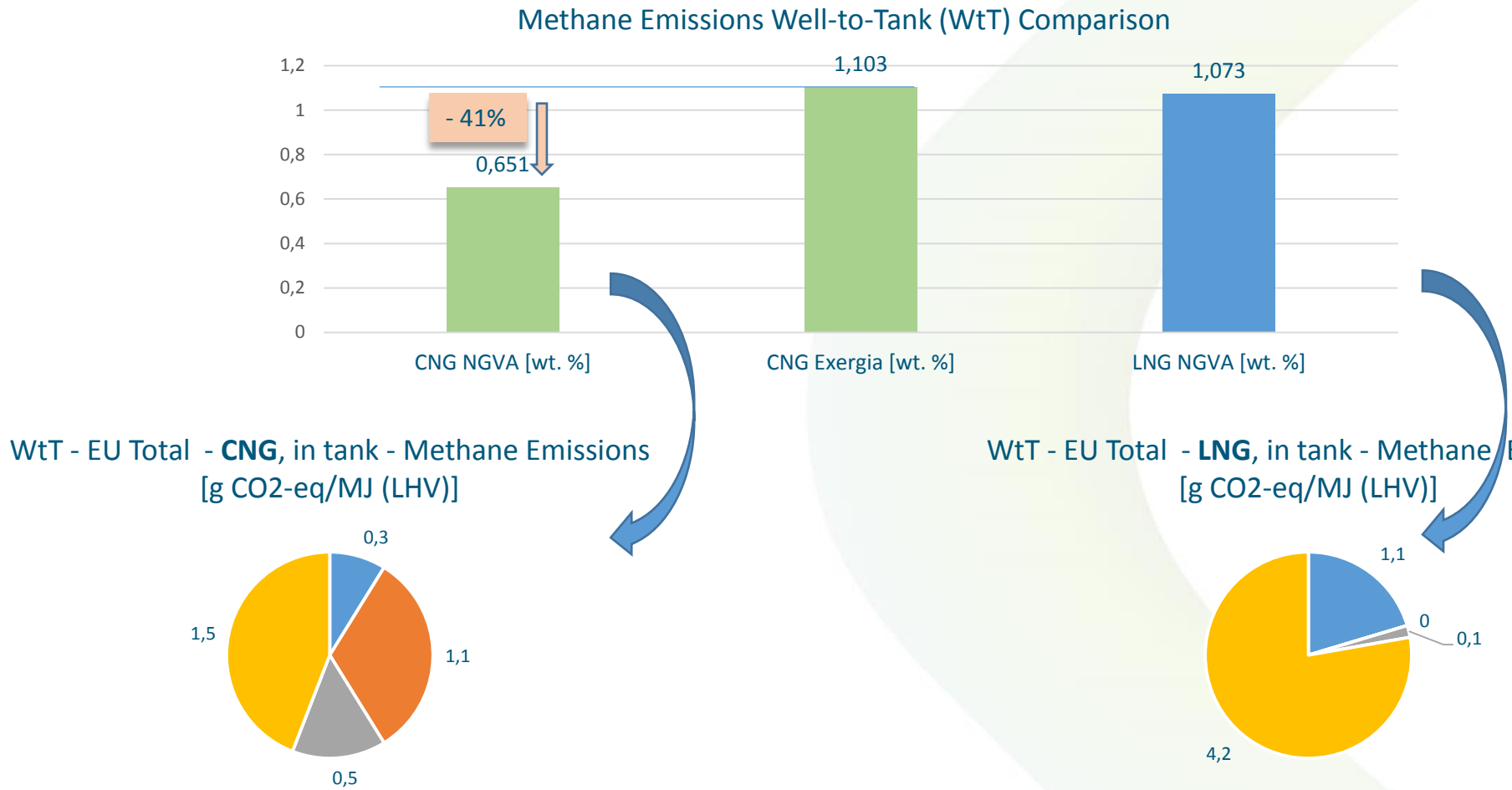


The benchmark for maritime comparison here is Heavy-Fuel Oil, results from JEC.

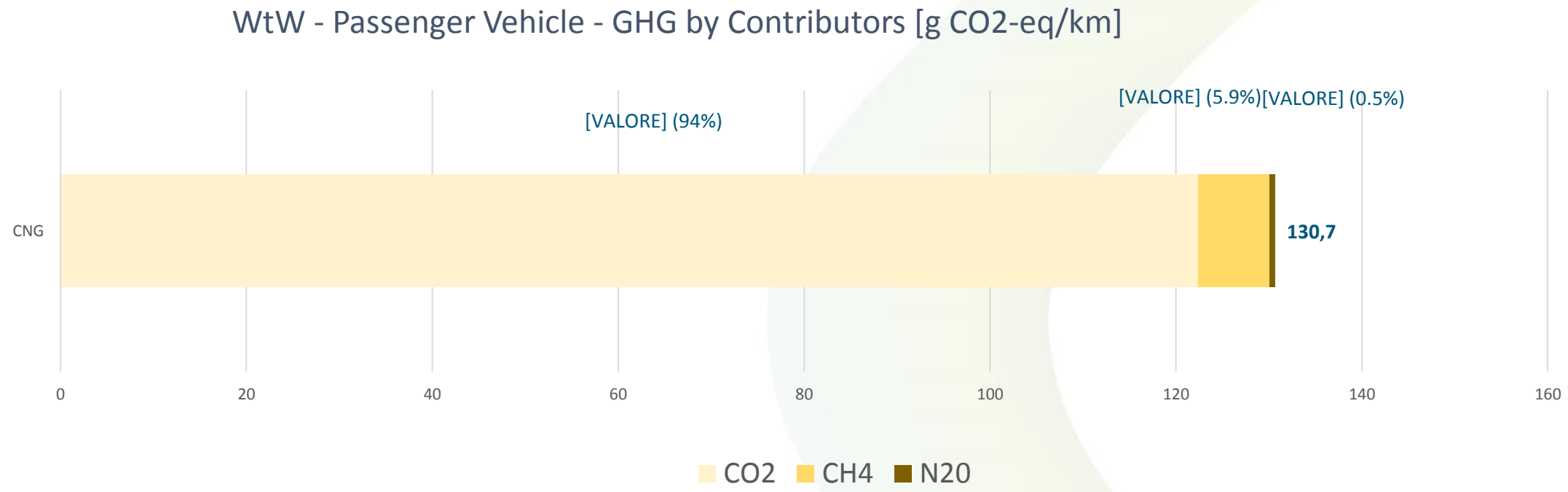
In maritime applications, the use of LNG provides a clear Well-to-Wake benefit compared to Heavy-Fuel Oil fuels.



Methane emissions



Well-to-Wheel (GHG) emissions by contributors

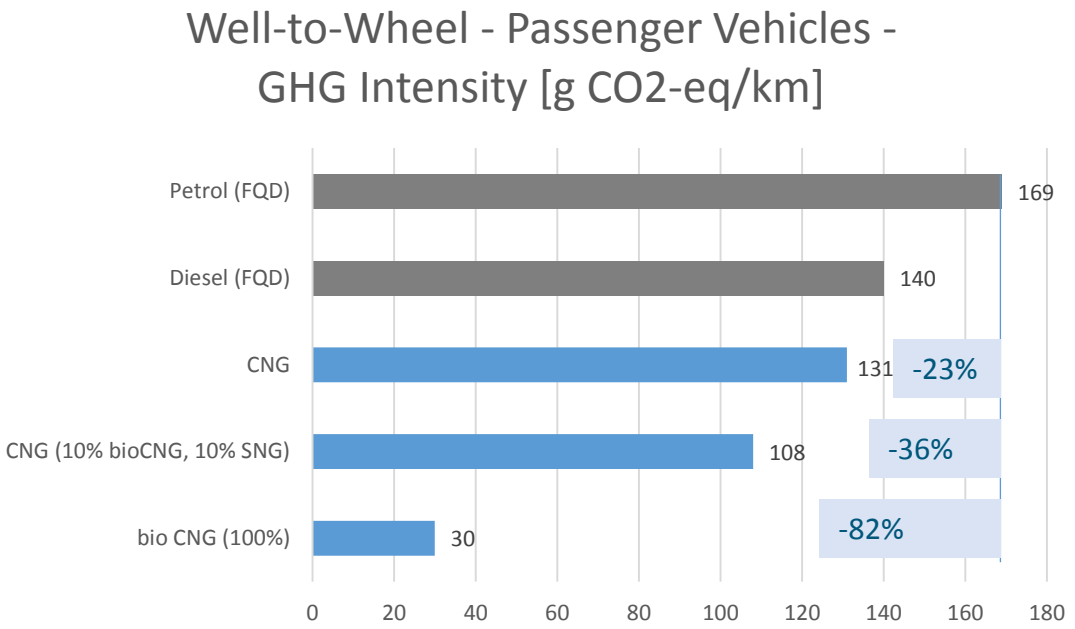


On both CNG and LNG applications no leakage is admitted at vehicle level
CH4 emissions are generated as unburned HC at the exhaust and considered as CO_2 equivalent

R-GAS

Introducing **renewable** methane

Renewable gas



- Renewable gas has the key property to be **100 % compatible with natural gas**, being easily blended or used directly as a neat fuel in engines
- Locally produced
- Renewable gas represents a fast drive towards decarbonisation

Renewable gas

Biomethane

Organic Waste

Target of 100 kg CH_4 out of 1000 kg organic waste

EU28 yearly production of organic waste = 120 Mt (*source Ispra 2015*)

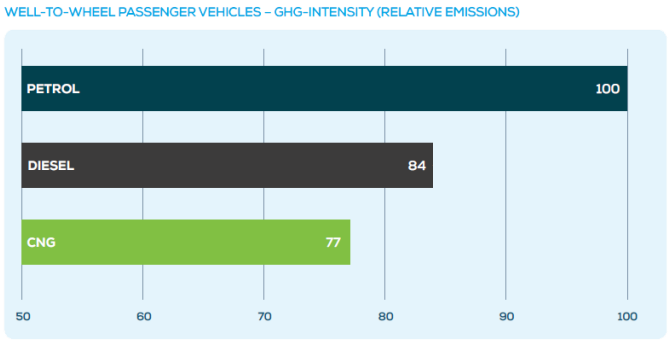
→ Potential for 12 Mt biomethane/year
→ Able to run 2 000 000 vehicles* only from our waste!

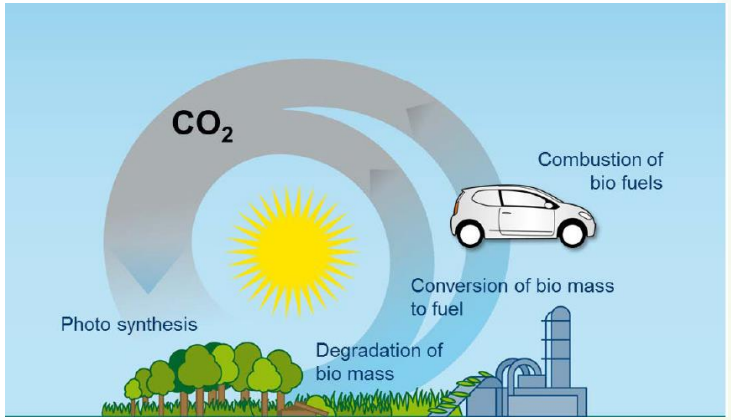
* *Vehicle consumption 4 kg/100 km – 15 000 km/year*

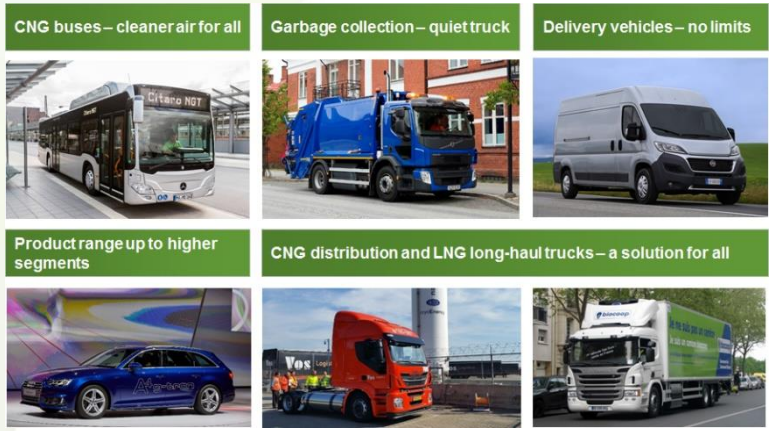
↓CO_2

Decarbonising Transport

Achieving the decarbonization target







Low Carbon Clean Fuel

Renewable gas

Product range with low TCO

Natural gas is a key solution to effectively decarbonise the transportation system in both light and heavy duty applications

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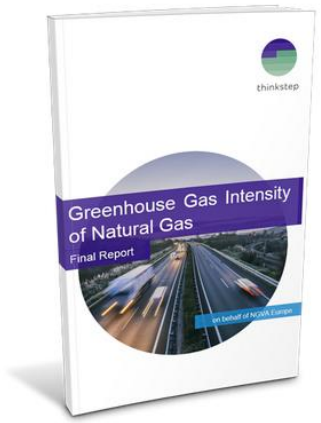
Greenhouse Gas Intensity from Natural Gas in Transport



For this reason, having accurate, updated and reliable GHG inventory data is key to understanding the current advantages, as well as the future potential for supporting Europe's activities in developing a strategic vision for real sustainable mobility.

NGVA Europe, supported by a wide partnership of industry organisations, commissioned the leading global consultant and software company in the Lifecycle Analysis (LCA) domain, *thinkstep*, to perform an **industry-wide analysis of the supply and use of natural gas in Europe**, not only with regard to road vehicles (Well-to-Wheel) but also including maritime vessels (Well-to-Wake) and power generation (Well-to-Grid). The study includes a deep and fully comprehensive analysis of the current state, as well as an outlook to 2030 on the natural gas supply chain, and the performance of NGVs. This study also represents a relevant reference for future studies on the matter.

The goal of the study is to provide **high quality, reliable, and up-to-date industry-based lifecycle data** to inform the public and support dialogue with external stakeholders and policy makers. It is also intended to contribute to an informed debate during the revision process of the different policy actions dealing with clean and efficient mobility.

Click Here To Receive The Study