



Promoting sustainable mobility: natural gas and biomethane as a fuel for transport

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Promoting sustainable mobility: the potential of natural gas and biomethane and natural gas as a low-emission fuel

Transport in the EU still depends on oil for about 94% of its energy needs. As NG reserves are estimated to be lasting longer than oil, it is expected that the price of NG will be significantly lower than oil's prices in the mid and long term with a lower impact on the EU economy. In addition the use of biomethane will increase the EU energy security supply.

Transport represents almost a quarter of Europe's greenhouse gas emissions and is the main cause of air pollution in cities. The emissions from lorries, buses and coaches currently represent some 18% of the emissions from transport, whereas waterborne transport's emissions amount to some 13%.

The reduction of the oil dependence is essential for security supply reasons but also for achieving the EU 2030 Energy and Climate policy objectives, a 40 % reduction of the overall GHG emissions, a share of renewable energy of at least 27% of the EU's energy consumption, and an indicative target of increasing energy efficiency by at least 27% by 2030.

Natural gas and biomethane for transport in the EU

- How can natural gas and biomethane contribute to achieve the 2030 Energy and Climate policy objectives?
- Main drivers:
 - Commission's proposal on the promotion of the use of energy from renewable sources (recast)
 - Directive 2014/94/EU " Alternative Fuels Infrastructure" - the outcomes of the NPFs for CNG and LNG in road and waterborne transport
 - Natural gas and biomethane in the Low Emission Mobility Strategy
 - Natural gas and biomethane in the Strategic Transport Research and Innovation Agenda
 - The Clean Mobility Package
 - Financial instruments supporting Alternative Fuels Infrastructure deployment
- Conclusions

How natural gas can contribute to achieve the 2030 Energy and Climate policy objectives: Environmental advantages

According to the industry: natural gas reduces GHG emissions from passenger cars on a Well-to-Wheel (WtW) basis by 23% compared with petrol and by 7% compared with diesel. For heavy-duty vehicles, benefits compared to diesel are of 16% for CNG and up to 15% for LNG. Methane as a vehicle fuel emits up to 95 percent less PM and up to 70 percent less NOx compared to the very strict European emission standards for new vehicles (Euro VI) and light duty vehicles (Euro 6).

These advantages can be higher in the shipping sector: CO₂ 20% (including potential methane slip), SO_x almost 100%, P.M. 95%; and NO_x 85% (<https://ec.europa.eu/transport/sites/transport/files/modes/maritime/studies/doc/2015-12-lng-lot1.pdf>).

WTW GHG emissions from biomethane varies from **-158 to 99gr CO₂/Km** depending mainly on the feedstocks (*Source: JEC (2014b)*). Its use pure or blended with natural gas will increase significantly the GHG emissions reduction from natural gas vehicles and vessels.

How can natural gas contribute to achieve the 2030 Energy and Climate policy objectives? Biomethane as a renewable and mature fuel

Biomethane offers an extension and gradually increasing substitution for fossil natural gas. It can be mixed at any ratio with natural gas when used in CNG vehicles and LNG vehicles and vessels.

Natural gas and biomethane can be distributed through the existing natural gas pipeline infrastructure as compressed natural gas (CNG) in Europe or can be delivered using tanker ships/trucks in the form of LNG.

The standard **EN 16723-2** for **natural gas and bio-methane for use in transport** and bio-methane for injection in the natural gas network was adopted in March 2017.

Over 360 biometane upgrading plants exist in the EU. Grid injection is in use in **11 EU Member States** (AT, CH, DE, DK, FI, FR, LX, NL, NO, SE, UK).

Vehicles are fueled with bio-methane (either pure or blended with natural gas) in **12 European countries** (AT, CH, DE, DK, FI, FR, HU, IS, IT, NL, SE, UK).

Mainstreaming renewable energy in the transport sector (Commission's proposal REDII)

Member States shall require fuel suppliers to include a minimum share of energy, starting from 1.5% in 2021 to 6.8% by 2030, from advanced biofuels and biomethane produced from feedstock listed in Annex IX, renewable transport fuels on non-biological origin, waste based fossil fuels and renewable electricity, in the total amount of transport fuels they supply for consumption or use on the market in the course of a calendar year.

Within the above share a minimum of 3.6% of advanced biofuels and biomethane produced from feedstock included in Annex IX part A.

A cap of 1.7% of biofuels produced from organic wastes and residues with mature technologies basically from Annex IX part B.

A cap on the contribution of food-based biofuels starting at 7% in 2021 and going down progressively to 3.8% in 2030.

Preferential rules apply to advanced aviation fuels (their energy content is accounted 20% more).

The Directive on Alternative fuel infrastructures (AFI): CNG and LNG

CNG in urban/suburban and other densely populated areas	Appropriate number of points	by end 2020
CNG along the TEN-T core network	Appropriate number of points	by end 2025
LNG at maritime ports	Ports of the TEN-T core network	by end 2025
LNG at inland ports	Ports of the TEN-T core network	by end 2030
LNG for heavy-duty vehicles	Appropriate number of points along the TEN-T core network	by end 2025

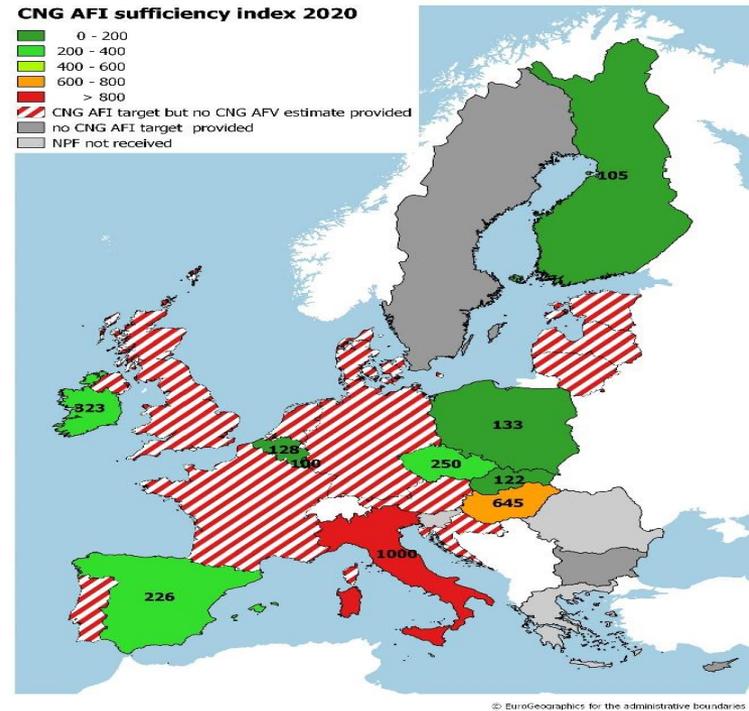
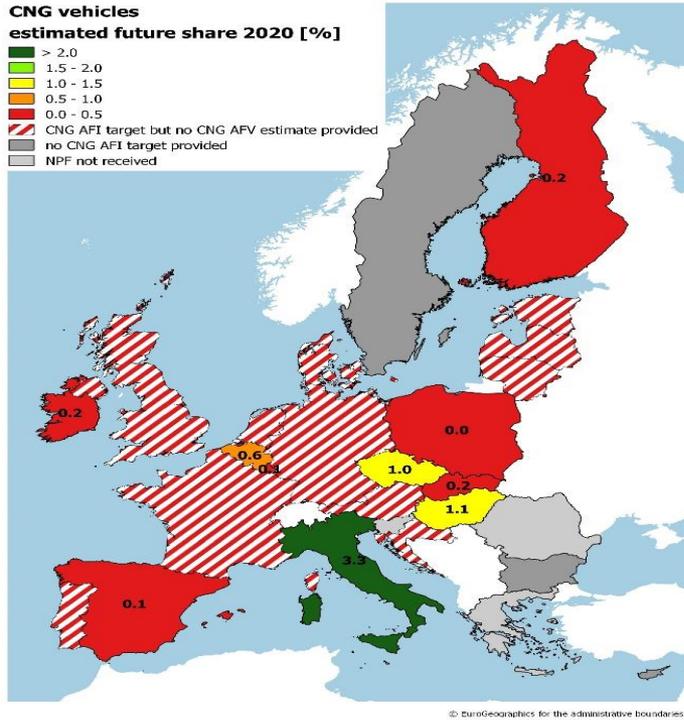
AFI Directive : CNG in the National Policy Frameworks

For Compressed Natural gas vehicles, the divergence across MS is evident. Some NPFs express a pessimistic view on the viability of CNG for road, while others (Belgium, Czech Republic, Hungary, and Italy) consider this as a priority. Italy has the highest future projected share of CNG vehicles. Many NPFs do not give any numbers for future estimates.

Several MS, especially the ones that currently have a rather high number of CNG refuelling points in comparison to CNG vehicles on the road, state that they have no plans to support a further increase of CNG refuelling infrastructure.

For the NPFs that provide future CNG vehicle estimates, the future share varies between 0.04% and 3.27% in 2020.

AFI Directive: CNG in the National Policy Frameworks (The assessment threshold considered for the CNG sufficiency index was 600 estimated CNG vehicles per refuelling point)



AFI Directive: LNG in the National Policy Frameworks

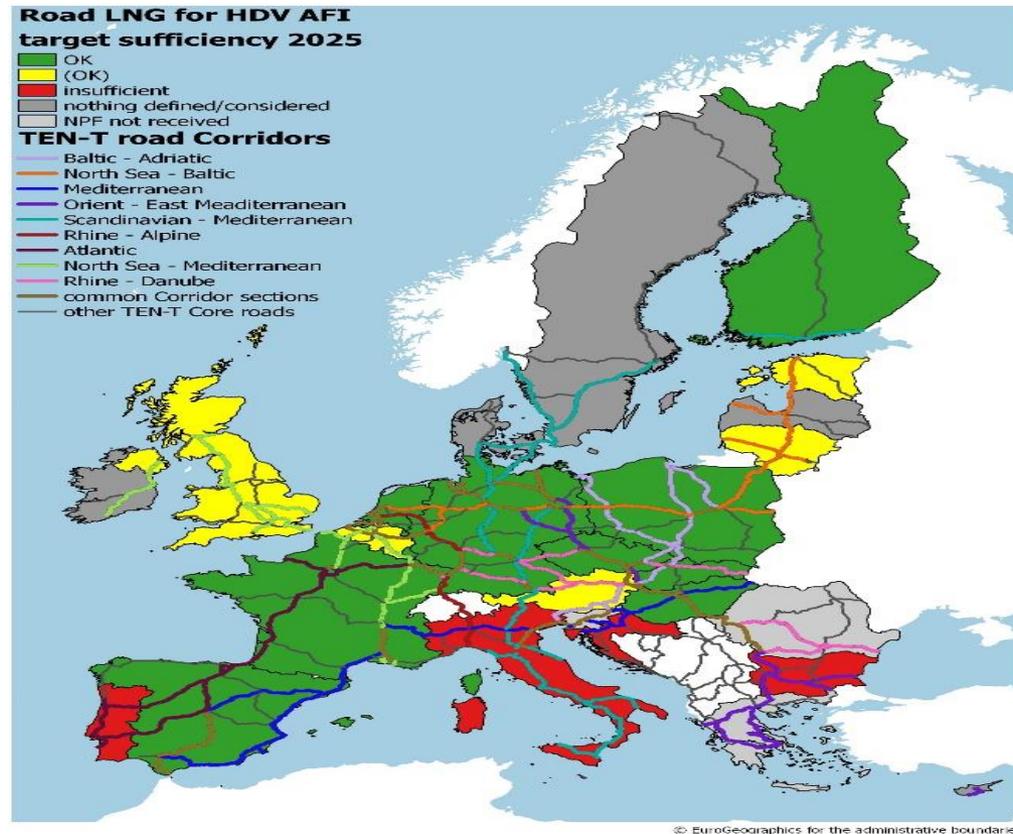
LNG for heavy-duty vehicles is covered by 19 NPFs and initial steps to ensure adequate TEN-T coverage are taken. Only six of the NPFs contain estimates for LNG heavy-duty vehicles.

Based on the targets provided in the NPFs, it is evident that some portions of the road TEN-T Core Network will remain without LNG refuelling infrastructure.

In particular, attention should be paid to the Southern part of the Atlantic Corridor and LNG cross-border continuity Spain/Portugal, the Southern part of the Scandinavian Mediterranean Corridor, the central and Eastern part of the Mediterranean Corridor, the entire Orient-East-Mediterranean Corridor, and the Baltic part of the North-Sea Baltic Corridor.

AFI Directive: LNG road transport in the National Policy Frameworks

The sufficiency assessment is based on the distance threshold value of 400 km with the following legend: OK – sufficient (exact information about the distances between LNG refuelling points provided); (OK) – seems sufficient, not all information provided in the NPF about the distances between LNG refuelling points

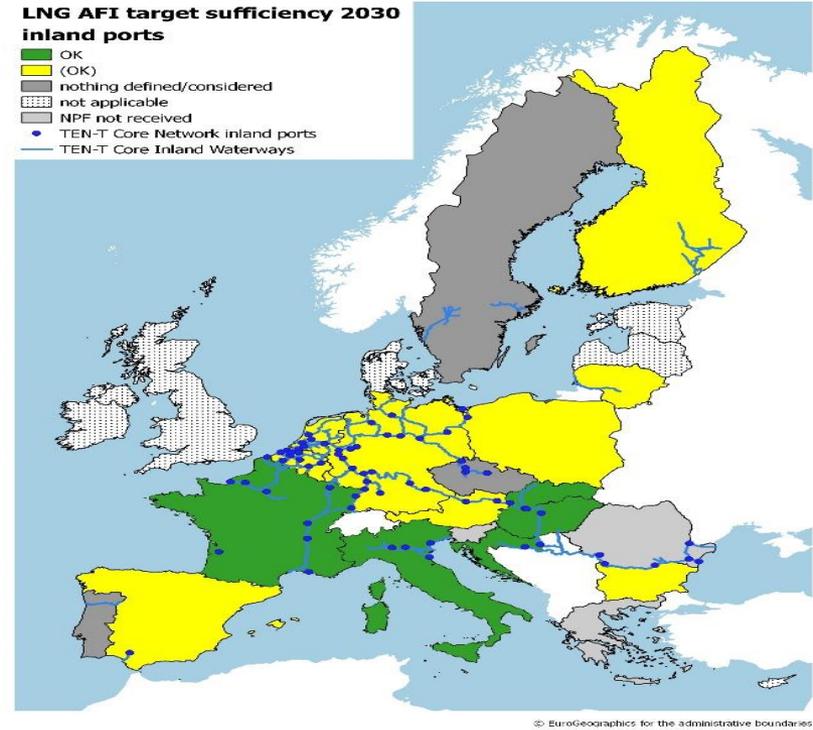
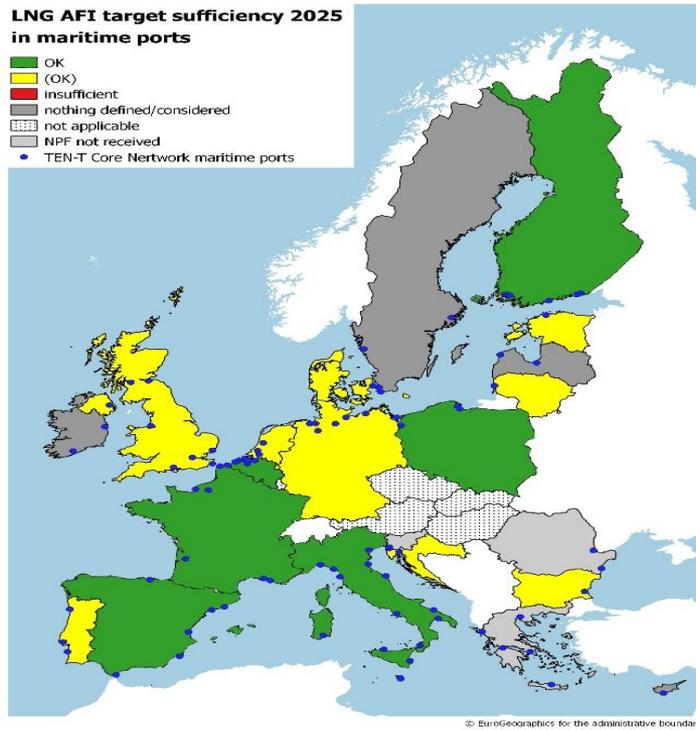


AFI Directive: LNG waterborne transport in the National Policy Frameworks

The plans to deploy LNG in maritime and inland ports vary between **high ambition (Finland, Hungary, and Italy)** and no consideration, leaving a number of ports without any solution for LNG refuelling.

For none of the inland waterway **TEN-T Corridors**, sufficient LNG refuelling infrastructure is planned to enable circulation of LNG inland waterway vessels. Only Italy provides estimates for LNG vessels.

AFI Directive: LNG waterborne transport in the National Policy Frameworks



Eliminating technical barriers for natural gas: standards

The standard **EN 16723-2** for **natural gas and bio-methane for use in transport and bio-methane for injection in the natural gas network** was adopted in March 2017

The standard for LNG refueling points **for inland waterway vessels or sea-going ships** will be addressed by **EN ISO 20519:2017**

The standard for LNG connectors and receptacles will be addressed by **EN-ISO 12617:2017**.

The CEN has started the process for **transposition** in EN-ISO standard of the **ISO 16924** standard for LNG and L-CNG refueling points to be published in **early 2018**.

The CEN has started the process for **transposition** EN-ISO standard of the **ISO 16923** standard for CNG refueling points to be published **in early 2018**.

The standard for CNG connectors and receptacles will be addressed by **EN ISO 14469:2017**

Low Emission Mobility Strategy

The European Strategy for low-emission mobility establishes three main pathways to achieve a low-emission mobility: increasing the efficiency of the transport system; speeding up the deployment of low-emission alternative energy for transport, and moving towards zero-emission vehicles.

The prospects for low-emissions alternative energy differ among transport modes. The widest range of options is currently available for passenger cars and buses, and solutions are rather straightforward for rail through electrification. In the medium-term, advanced biofuels will be particularly important for aviation, as well as for lorries and coaches.

Natural Gas is expected to be increasingly used as an alternative for marine fuels in shipping and for diesel in lorries and coaches. Its potential can be increased significantly with the use of biomethane and synthetic methane (power-to-gas technologies).

The Strategic Transport Research & Innovation Agenda

The Strategic Transport Research & Innovation Agenda adopted on 31 May 2016 as part of the 1st EU Mobility Package .

Research and Innovation on natural gas blended with biometane should focus on **the development of new and highly efficient, low polluting combustion engines that include hybrid technology**. This will contribute together with a higher use of renewable methane to the decarbonisation of road vehicles.

Research and Innovation on the vehicle side will be developed and implemented in close coordination with the Strategic Energy Technology Plan (SET-Plan) to develop and **increase the production of renewable methane mainly from biomass and power to gas technologies**.

The Clean Mobility package

Post-2020 CO2 targets for cars and vans:

- Average emissions of the EU fleet of new cars and vans in 2030 will have to be 30% lower than in 2021.
- Average emissions of the EU fleet of new cars and vans in 2025 will have to be lower than 15% in 2021.

Action plan and investment solutions for the trans-European deployment of alternative fuels infrastructure. The aim is to increase the level of ambition of national plans, to increase investment, and improve consumer acceptance.

Proposal for amending the Clean Vehicle Directive:

- Minimum target for the share of heavy-duty vehicles -Electricity, hydrogen, natural gas including biomethane, in gaseous form (CNG) and liquefied form (LNG)- in the total public procurement of heavy-duty vehicles at Member State level
- Minimum target for the share of light-duty vehicles (25 gr CO2/Km and 80% RDE air pollutants emissions limits in the total public procurement of light-duty vehicles)



EU Funding

The 2017 CEF Transport Blending MAP Call for Proposals, opened on 8 February 2017, makes €1 billion funding available for projects of common interest in the transport sector aiming at maximising the leverage of private involvement. This call is open to all EU Member States (2nd step Deadline 12 April 2018).

Cohesion Fund and ERDF also support transport infrastructure investments (mostly in rail and road) aimed at closing the missing links and removing bottlenecks in the system.

Horizon 2020 work programme 2018-2020 (Energy and Transport)

The development of natural gas and biomethane as fuel for transport

Main issues to be addressed:

- Methane emissions from the whole natural gas supply chain should be minimised
- The entry in the market of new manufacturers of LNG trucks and vessels is needed
- A stronger introduction of biomethane in transport should be supported to increase the sustainability of natural gas. In addition, the use of biomethane will increase the EU energy security supply
- The reduction of cost of biomethane in the whole chain should be a priority for the industry
- The EU supports the development of natural gas and biomethane for transport through the implementation of the AFI Directive and several financial instruments (CEF, Horizon 2020...).



Thank you for your
attention!

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