Natural gas in the transition to low-carbon transport systems: focus on marine bunkering and NGVs

Dr Alexander Ermakov, Gas Exporting Countries Forum (GECF), T: +974 4404 8411, M: +974 6664 5285,
E-mail: alexander.ermakov@gecf.org

Overview

The introduction of alternative fuels for the transport sector has become an integral part of the energy policy of countries that are implementing active climate and environmental agendas. In this context, the use of natural gas in road and marine transport represents one of the most effective solutions to curb climate change and improve air quality, while its demand has significant potential for growth, underpinned by favourable government policy support.

Nowadays natural gas vehicle (NGV) markets are developing in dozens of countries. Being a readily available alternative to diesel and petrol-based engines, NGVs both compressed natural gas (CNG) and liquefied natural gas (LNG) technologies offer an immediate reduction of emissions and pollutants in all the sub-segments – from passenger cars to heavy goods vehicles (HGV). In marine transport, the introduction of the International Maritime Organization's (IMO) global cap of 0.5% sulphur content has already accelerated the adoption of LNG. Simultaneously, the shipping industry is increasingly focused on meeting the IMO's 2030 and 2050 targets and switching to LNG appears as a viable option for shipping decarbonisation.

Methods

This study is structured in two parts. The first part highlights current state and projections for LNG as a bunker fuel. The second part summarises environmental advantages of NGVs, examines policy measures supporting natural gas penetration in road transport and assesses natural gas demand prospects in road transport globally and in regional markets.

This study reflects the GECF Global Gas Outlook 2050 reference case scenario and highlights the evolution of natural gas demand in road and marine transport, taking into account current energy policies, trends related to the use of traditional and alternative fuels in the transport sector, technology developments and the potential introduction of new policies that are likely to materialise throughout the period to 2050 (1). All the projections are carried out in the sophisticated modelling tool GECF Global Gas Model – a hybrid model that utilizes econometric and linear programming techniques using time series dating back to 1990.

Results

Natural gas continues to receive a high level of policy support. It is projected to increase its share in the global energy mix, from over 23% today to 27% in 2050. This ascending trend is partly thanks to the rise in demand in road and marine transport, which is forecast to be particularly robust, growing by 270 bcm (or by 360%) to 345 bcm by 2050 on the back of policy initiatives aimed at abating emissions. The majority of gas demand growth will stem from the development of the global NGV market. Tougher rules imposed by the IMO on shipping will further increase gas consumption in this area, with shipowners already beginning to switch to LNG to reduce the carbon intensity of their fleets.

The bunkering infrastructure is responding dynamically to the expansion of the world's LNG-powered fleet and many more ports are projected to ensure refuelling capacity. Thanks to the combination of environmental advantages and increasing availability, the share of LNG in the global bunker fuel market will rise from 3% in 2020 to 32% by 2050. Accordingly, LNG demand in marine transport is forecast to reach 90 bcm by 2050. Hydrogen-based fuels are seen as the next generation fuel for shipping and will potentially start to penetrate the shipping sector after 2030. As it could take several decades for the fleet to move to zero-carbon fuels, LNG will continue to provide an efficient alternative to conventional fuels in the long-term.

Natural gas demand in road transport will rise from 65 bcm in 2020 to 255 bcm in 2050. Favourable government policies, regulatory frameworks and the expansion of refuelling infrastructure will be driving forces. Implementation of forward-looking national or regional sales bans on new diesel or petrol vehicles for 2025-2050 will implicitly

support gas mobility, despite the rapid penetration of EVs. However, there is a higher potential for uptake of NGVs expected in the HGV segment, where electric technologies cannot fit the specifics in the best way. In this context, anticipated restrictions on diesel truck movements in a range of countries and large cities open up prospects for CNG and specifically for LNG powertrains, capable of delivering lengthy driving ranges.

Conclusions

Natural gas can make a huge contribution towards decarbonisation of road and marine transport. Technologies are affordable, safe and well-developed, ecological advantages are meaningful, and the economics is attractive in many cases. As refuelling infrastructure grows, by maintaining a technological neutrality and a level-playing field between different alternative fuels, natural gas could play an important role in the transport sector.

LNG in marine transport presents important opportunity. Many of alternative fuels are in a nascent stage of development and have commercial and technical limitations. LNG is in a good position to comply with future requirements for the major types of emissions, improve air quality and offer enhanced competitiveness thanks to existing gas infrastructure and supply chains. Eventually, replacing conventional LNG with bio- or synthetic LNG (without making upgrades to vessel equipment) provides an additional and practical way for shipping decarbonisation.

Natural gas usage in road transport has even more potential for growth as many countries are adopting stricter environmental requirements for vehicles because of pollution linked to the use of traditional liquid fuels. Mature CNG and LNG technologies may represent a bridge to sustainable and decarbonised mobility in the future. To capture the growth potential, it is important to support NGV penetration through sound solutions in the context of carbon mitigation (which surpasses EVs in coal-intensive energy systems), air quality and affordability.

References

1. GECF Global Gas Outlook 2050, GECF Secretariat, February 2022. Available from: https://www.gecf.org/