February 2018

Towards the Paris Agreement with Gas Infrastructure

Achieving Europe's Energy Climate Goals

Dear Reader,
The energy world is changing rapidly. Businesses, Policy Makers and Citizens are committed to transition Europe towards a low carbon society by 2050. This is ambitious, but needed to limit temperature increase and the global warming effects on our planet. GIE believes that gas and gas infrastructure (transmission, storage and LNG terminals) have to play a key role in this process, allowing renewable energy sources to be integrated into our system and enabling a cost-efficient transition while simultaneously providing Europe's energy system with the robustness to withstand also the coldest winters.

The way we use Europe's gas infrastructure will be very different in the future. Europe's gas infrastructure can transport and store large amounts of energy across large distances, its flexibility will be a key feature in our future energy system with a high share of renewables. Also, the gases transported and stored will be very different and GIE Members are working on innovative techniques to facilitate all kinds of gaseous energy carriers, from biomethane, sustainably produced within and outside our borders, via green hydrogen, produced from excess electricity from wind farms or PV installations to synthetic methane. Targeted infrastructure investments will connect also the remotest European regions with a liquid and competitive EU gas market, achieving a fully integrated and well-interconnected market where energy can flow freely across our borders. GIE believes in tailored solutions to achieve a sustainable energy system, with gas infrastructure central to an integrated, smart energy system.

Gas Infrastructure Europe (GIE)

Why Gas?

Whether natural gas, biomethane or hydrogen, gas has unique features needed to green our energy system.

Reducing CO2 emissions by switching to gas

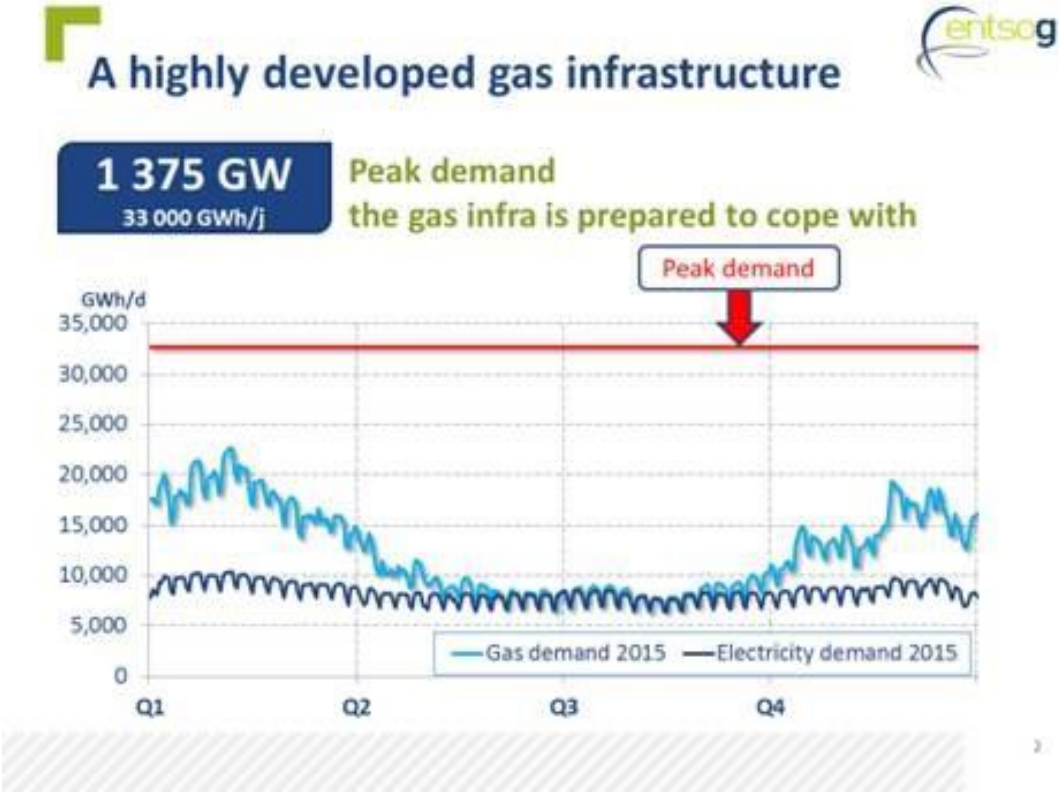
Substituting coal and oil based fuels with gas can reduce CO_2 and small particles emissions, improving air quality significantly. Well-proven technologies for space heating, transport (e.g. heavy-duty vehicles, road and sea freight, buses and passenger cars) and highly efficient gas-fired power plants can decrease CO2 emissions cost-effectively, with very limited infrastructure investments.

Gas is efficient

The gas sector has invested for decades in improving the efficiency of its gas system, from production to the end-users. Existing pipelines, storages and LNG terminals are today the most cost-effective way of storing and transporting energy: As an example, the interconnector BBL connects the Dutch gas market with the British one. Comparable in length, BritNed is a subsea electricity link between the Netherlands and the UK. To transport one 1kW of energy 100 km costs around 11 EUR via the BBL gas interconnector. For the same amount of energy, the transport in BritNed costs 230 Euro.

Gas is reliable and abundant

Gas is supplied from a multitude of sources via pipelines or LNG terminals to Europe. About 1/3 is produced within the EU. With large additional volumes from existing and new origins coming on the world market in the next years, gas is a very competitive energy source. Within Europe, our gas infrastructure is mostly so very well interconnected, that prices are converging. Together with LNG terminals and storage facilities, the gas network contributes to a resilient, stable and flexible energy system.



Gas provides the flexibility needed to compensate for the variability of electricity produced by renewables

This flexibility will thus guarantee secure electricity to consumers. For gas to play its role a well-developed and meshed gas infrastructure network as well as storages and LNG terminals is required, so that gas can flow where it is valued the most. Today in large parts of Europe there is already a

system which is capable to responding to strong demand variability and the integration of green energy. Apart from enabling the integration of variable renewables such as wind and solar, the existing gas infrastructure readily allows for the transport of biomethane.

The European Gas System

The transmission pipelines, storage facilities and LNG regasification terminals are at the heart of our energy system.

Transmission System

Europe benefits already from a well-interconnected has gas network, allows for diversified supplies from a multitude of suppliers. Some investments might still be required, in order to connect the remotest regions or to help establishing competitive and liquid markets. Transmission system operators are providing services in the most efficient manner. Due to its energy density compared to electricity transmission, gas pipelines constitute the most cost-effective way of transporting energy both within and across EU Member States. GIE Members are constantly innovating towards a sustainable future for transmission networks, covering and analysing the injection of renewable gases, energy efficiency, power to gas and the potentials for gas in mobility.

Storages

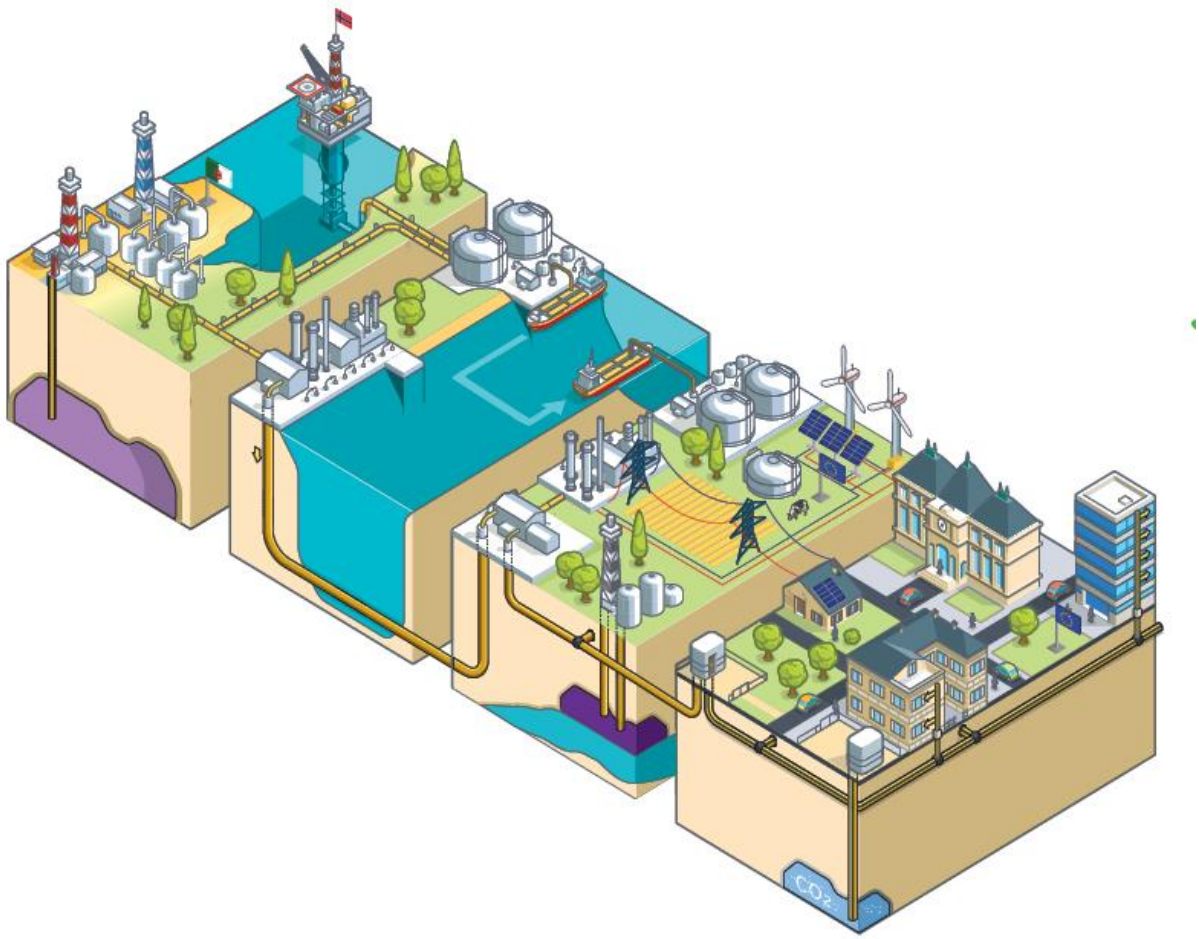
Gas storages play a major role in providing a unique system value, as an immediate and reliable flexibility tool. They ensure cost efficient secured gas supplies during normal conditions and cold winters, when gas demand peaks. With gas storages we have readily available gas volumes in entire European regions, reliably and swiftly. This is crucial to allow for solidarity between Member States in security of supply emergencies.

We are expecting that electricity will play a more important role in some important sectors such as residential heating or transport. This will help us to decarbonize the energy system, but will bring more flexibility needs to the electricity sector. In such a system, gas storages will be the cornerstone of energy storage. Massive intermittent renewable energy quantities produced by solar and wind farm will sometimes produce when electricity is not needed. This extra electricity production can be converted into renewable gases, for example synthetic methane or hydrogen. These renewable gases can be stored and used in a cost-efficient manner when the wind does not blow and the sun doesn't shine. Biomethane, produced sustainably and locally will also be stored in gas storages, providing further 'green flexibility'.

LNG Terminals

GIE members have in recent years invested into LNG regasification terminals. This connects our gas infrastructure system to gas reserves around the world. As LNG cargoes can be bought on a globally traded market, it increases competition at EU gas market and helps with security of supply. Flexible LNG supplies are ideal for the development and integration of variable renewable energy such as

solar and wind. Through the LNG terminals, LNG can be supplied via trucks or boats in smaller quantities to customers which are not connected to the gas network. LNG is also playing an increasing role in reducing CO2 and other harmful emissions from the shipping sector as a low-emission alternative. Similarly, there is great potential for the use of LNG in road freight transport.



Coupling Gas- and Electricity Infrastructure

Hydrogen/Power to Gas: A process where excess (renewable) electricity is used to produce hydrogen. Apart from its direct use in e.g. industrial processes, for heat generation or as a feedstock or in vehicles, hydrogen can be injected to a certain extent into the gas grid and blended with gas for further distribution and usage. By combining hydrogen with e.g. excess CO2 from biogas production, it can further be converted into (synthetic) methane. Synthetic methane can be stored, just as natural gas, either in dedicated storages or in the gas network for later use, without the need to adapt infrastructures or appliances.

Biogas/Biomethane: Biogas is produced by breaking down matter such as organic waste, e.g. manure, straw, crops, wood/straw, etc. Biogas is normally used at local level for the production of

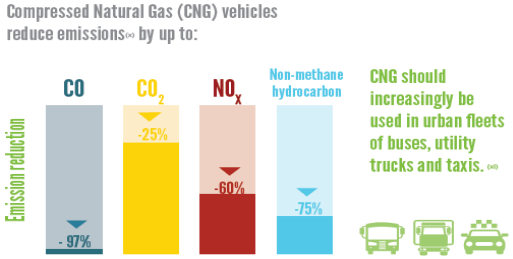
heat and power. When upgraded to biomethane it can be injected into the gas network and transported and utilized just as natural gas.

(Hybrid) Heat Pumps: Gas heat pumps are highly efficient appliances, which combine the great efficiency of a heat pump with the flexibility and reliability of the gas network, thereby decarbonizing residential buildings and homes. As such, they facilitate renewable electricity production to play a bigger role in the domestic heating sector.

Carbon capture and geological storage (CCS) is a technique for trapping carbon dioxide emitted from large point sources such as industrial plants, compressing it, and transporting it to a suitable storage site where it is injected into the ground. This technology has significant potential to help mitigate climate change in Europe and is recognized as an essential technology in many scenarios for meeting the 2050 Energy and climate objectives.

Small Scale LNG: GIE members are supporting the development of a small-scale LNG market, offering new and innovative logistic services to their terminal users. These services include, or are planned to include, the following activities: Reloading, ship-to-ship trans-shipment, LNG truck loading (to supply off-grid areas/users), rail loading, bunkering activities (terminal- to- LNG fuelled ships, terminal to bunkering ship), etc.

Mobility: Natural gas has great potentials as a fuel for light/heavy duty vehicles, lorries, buses and ships. An increasing number of CNG and LNG vehicles at competitive prices are offered to customers. The number of filling stations is increasing annually. CNG and LNG vehicles allow for large reductions in CO_2 emissions, air pollutants and noise emissions in Europe's cities and urban areas. LNG as a transport fuel for ships can besides reducing CO_2 emissions, also meet the most stringent air pollutant emission levels set by the EU and IMO with a reduction potential of 85-90% for NOx and almost 100% for Sox & PMs. By switching from oil-based fuel to gas in the transport sector both CO_2 and air pollutants can be cut significantly. With the increasing amount of green gases, the utilization of gas as a transport fuel will accelerate the decarbonisation of road and maritime sectors even further.



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GIE's Policy Asks

Clear, coherent and positive signals from EU policy makers regarding the role of gas in the future energy mix are an essential prerequisite for a sound investment climate in the gas sector. This also ensures that the EU gas market continues to be an attractive market in a global context.

The EU needs flexible and integrated energy infrastructure. GIE asks the EU institutions to ensure a level playing field which encourages primarily market driven investments.

GIE asks the EU institutions to ensure full implementation of the provisions of the 3rd Energy package. An integrated approach, legislating electricity and gas networks coherently, fosters integration and addresses the challenges of the energy transition.

The ETS should be the main policy instrument to deliver market based CO2 emission reductions. Overlapping policies should take into account effects on the quantity/ price of emission allowances.

Every market is different. GIE asks policy makers to consider local and regional challenges at the corresponding level and to recognize the differences in energy markets across Europe.

GIE asks for sustainable goals which support research and innovation and wide deployment in technologies such as biogas/biomethane, power to gas and gas for transport. This ensures Europe's technological lead in decarbonisation solutions.

About GIE

Gas Infrastructure Europe (GIE) is the association representing the interests of European natural gas infrastructure operators active in natural gas transmission, gas storage and Liquefied Natural Gas (LNG) regasification. GIE is a trusted partner of European institutions, regulatory bodies and industry stakeholders. It is based in Brussels, the heart of European policymaking.

GIE currently represents 68 member companies from 24 countries. Its internal structure has three columns corresponding to the three types of infrastructure activities represented: Gas Transmission Europe (GTE), Gas Storage Europe (GSE) and Gas LNG Europe (GLE), who cooperate under the umbrella of GIE. This structure allows member companies to speak with one voice on gas infrastructure topics as well as to build positions on column-specific issues.

GIE's vision is that by 2050, the gas infrastructure will be the backbone of the new innovative energy system, allowing European citizens to benefit from a secure, efficient and sustainable energy supply.

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Gas Infrastructure Europe

Avenue de Cortenbergh 100
1000 Brussels
Belgium

T +32 2 209 05 00
F +32 2 209 05 01

gie@gie.eu
www.gie.eu