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Position paper

In view of the upcoming EU Strategy for Heating and Cooling

About GIE

Gas Infrastructure Europe (GIE) is an association representing the interests of European natural gas infrastructure operators active in natural gas transmission, storage and 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 67 member companies from 25 countries.

One of the objectives of GIE is to voice the views of its members vis-à-vis the European Commission, the regulators and other stakeholders. Its mission is to actively contribute to the construction of a single, sustainable and competitive gas market in Europe underpinned by a stable and predictable regulatory framework as well as by a sound investment climate.

This document aims at providing considerations for policy makers towards the development of an EU strategy for heating and cooling.

Executive Summary

Any EU strategy aiming at the transformation of the European heating and cooling system should focus on two main objectives, reducing CO_2 and fine particulate matter emissions and reducing energy consumption.

Most scenarios of heating and cooling feature a considerably increasing consumption of renewables, contributing to a reduction of greenhouse gas emissions. Natural Gas, however, will continue to account for a significant portion of space heating.

Generally, the energy density of natural gas supply systems outweighs the one of electric systems of comparable grid level by far. High pressure transmission pipelines, for instance, carry four to five times the energy of an extra high voltage transmission line. Additionally, gas transport has much lower energy losses than the transport of electricity. Thus, the European natural gas network could increasingly contribute to the Europe-wide energy transport in a cost efficient way, while simultaneously fostering CO2 emission reductions.

On the supply side, gas is an ideal partner for a variety of renewable energy sources as it provides the flexibility needed to compensate for the intermittency that comes with the build-up of renewables. On the demand side, gas infrastructure can handle the shift in energy demand between summer and winter and allow for the integration of renewable energy sources while covering the residential heating and cooling needs (hybridization).

By increasing the share of biomethane and synthetic gas (e.g. produced from power-to-gas), the EU gas infrastructure will not only be used for distributing fossil natural gas, but also for renewable energy. Gas infrastructure is well-developed in many Member States, it is invisible and affordable,

and it is ready to play an essential role in the future EU heating and cooling system without imposing unnecessary costs on consumers.

1 Gas in Heating and Cooling

Recalling the policy dimensions of the Energy Union, GIE believes a long-term EU strategy for Heating and Cooling should be based on the following central aspects:

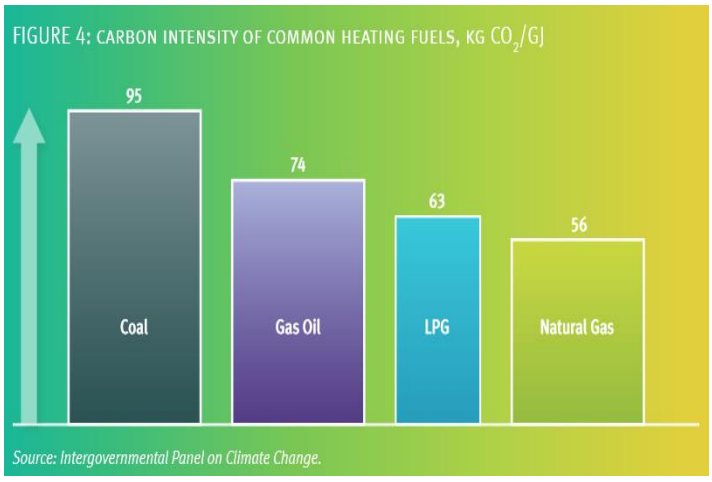
- reduction of CO_2 and fine particulate matter emissions;
- reduction of energy consumption.

GIE expects that renewable energy will play an increasing role in heating and cooling. A technology-neutral approach will allow the market to find the best solution for CO_2 reductions. We believe that for new infrastructure or large-scale new-build and renovation projects a cost-benefit analysis (CBA) should be the first step to assess which solution is optimal, either purely electric heating, district heating, gas heating or hybrid solutions.

In this context, natural gas has a number of system properties which allow for a large scale decarbonization and reduction in energy demand:

1.1 Natural Gas as a clean alternative

A switch to natural gas can result in a significant and readily available decrease of CO_2 emissions compared to other fossil heating technologies. The gas sector is leading in the development and roll-out of new, highly-efficient condensing boilers. These appliances can provide significant CO_2 emission reductions at reasonable costs and short pay back times. Affordability should play a central role. Highly-efficient condensing gas boilers are cheaper than heat pumps. Additionally, massive additional investment in the electricity infrastructure to accommodate heating and cooling needs is not necessary or justified due to gas infrastructure already existing in most EU regions. The use of gas in the industrial sector is already advanced as it relies on well-tested technologies compared to other solutions, and allows for temperatures, needed by some industry processes, which cannot be reached by renewable heating sources. In district and individual heating, there are great opportunities in a coal-to-gas switch. This is evident especially in countries with high usage of coal-fired appliances (both on individual and district heating level). Such a switch will result in a substantial decrease of CO_2 emissions (approx. 50% less CO_2) and less emissions of substances such as NO_X, SO_X as well as fine particulate matter. It will bring about benefits to overall air quality and a decrease of smog, especially in densely populated areas.



1.2 Natural gas integrates well with renewable technologies

Natural gas is also a technology that is able to partner-up with renewables, enabling the deployment and integration of these technologies. Air-sourced heat pumps have a high efficiency for most of the year, but due to thermodynamics the efficiency drops significantly during cold spells.

The existing natural gas infrastructure can transport biomethane and renewable synthetic natural gas (SNG), which is mostly produced decentralized at plenty of locations across the EU. Biomethane and synthetic gas are almost fully compatible with natural gas. Hence, highly-efficient gas appliances readily function with biomethane and synthetic gas, thus, reducing carbon emissions.

2 Gas Heat Pumps: The future cornerstone of the EU heating and cooling system

In recent years heat pumps have become a popular option for new buildings or modernization projects. With the help of electricity, the most prevalent appliances convert heat from either ground water, or from the outside air into heat for houses. The installation of ground-based heat pumps, though not being possible everywhere, has the advantage that the temperature from ground water is constant, allowing for a constant coefficient of performance (COP). Heat pumps which use ambient air are struggling with changes of the outside temperature over the year. They have to be complemented by electric heaters in order to compensate for the large drop in their overall COP at low outside temperatures. The additional load potentially affects the power systems' resilience during cold spells (see winter peak electricity demand cases in France).

Heat pumps which use gas to convert the temperature of the outside air or the groundwater into heat have several distinctive environmental advantages: as they are based on a primary energy source, which does not need to be converted, they are more efficient while the recovery of waste heat increases their overall energy efficiency. The loss of performance under very cold conditions is negligible. While gas heat pumps quickly reach their thermal capacity, they also integrate well with CHP systems.

Electric heat pumps can be complemented by small gas-fired boilers (hybridisation) which supplement the heat pumps during the coldest days of the year, exploiting the benefits of a heat pump, e.g. high COP during most of the year and reduced fossil fuel demand, while also taking benefits from the natural gas system (readily available heat at peak demand) and making use of existing infrastructure. Modern heating systems can also combine heat sources such as solar or biomass, e.g. pellets, with a heat pump and a gas fired boiler for the peak demand days. This increases synergies and allows meeting the objectives of reduced CO_2 emissions and demand of a future heating and cooling system in Europe while minimizing the required infrastructure investments. Furthermore, these systems allow the consumers to adapt usage based on future consumer prices. In the long term, these hybrid systems could use green gas, making the system 100% carbon emission neutral.

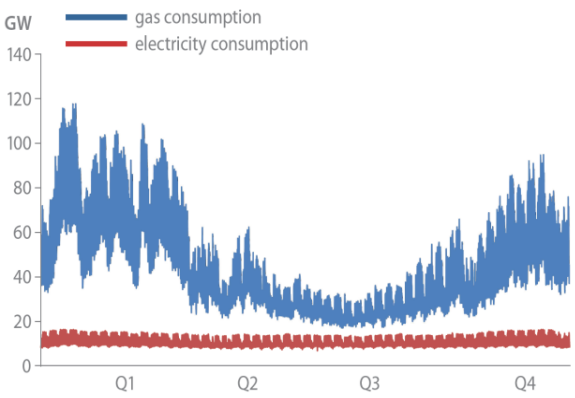
Hybridization of heating and cooling systems will result in increasingly interconnected energy systems. This requires increased cooperation at EU level between all parties and organizations involved, including GIE, ENTSOs and ACER in order to reach the objectives of reducing CO_2 and small particles emissions and reducing energy consumption.

3 The existing natural gas infrastructure

Heating and cooling demand is highly dependent on climatic conditions. The graphic "Annual Gas and Electricity Consumption" in the Netherlands illustrates peak gas demand and the seasonal spread over one year. The European gas network has been built to address these large differences in heating demand between summer and winter. By using storage, LNG terminals and smart management of the gas network, the system can respond swiftly to any demand change, either seasonal or intra-day.

The European gas network is capable of transporting several times more energy than the current electricity system, as exemplified by the graph on annual gas and electricity consumption in the Netherlands – it does so without much loss for transmission. The gas network is an invisible and cost-competitive contributor to heating. While large investments into the electricity networks are being considered in all EU Member States, a future EU strategy on heating and cooling should seek to extract the maximum value from the existing gas infrastructure in order to achieve the objectives of the EU Energy Union.

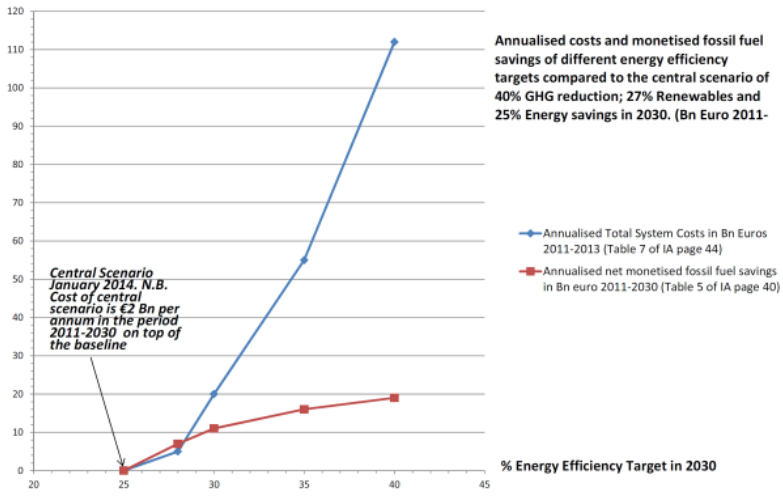
Example: Annual gas and electricity consumption in NL



The gradual increase in the energy efficiency and isolation of houses does not rapidly reduce the consumers' peak demand. As such, it can be expected that the same capacities will be required to satisfy the heating demand during the coldest days of the year, requiring a great need for flexibility in the system, consistent with the capabilities of the existing gas infrastructure.

4 Investments based on cost-benefit analysis (CBA)

Cost efficiency for measures to reduce energy consumption should be a central consideration. A CBA is a holistic and transparent analysis, assessing best solutions in a technologically-neutral way, acknowledging the limits of different heat systems. A CBA should always include the infrastructure costs on a national, regional and local basis, the power generation needed and its life-cycle costs, security of supply aspects as well as back-up needs, and the expected development of heating demand, also taking energy efficiency measures into account. When considering investments in increasing efficiency and/or decreasing energy consumption in the heating & cooling sector, the aspiration should be that the benefits exceed costs. The graph illustrates the cost-benefit ratio of increasing energy efficiency, as provided in the EC communication on energy efficiency.



Heating and cooling needs are very diverse across EU Member States. A comprehensive CBA, taking these aspects into account, allows for finding solutions which are most beneficial for the society, also reducing wrong fiscal incentives and technological lock-in. These are the approaches GIE sees as most reasonable for a cost efficient reduction of energy demand and CO_2 emissions.

Useful links

http://www.eurogas.org/uploads/media/Gas__the_right_choice_for_heating_in_Europe_PART_II_Brochure_140814.pdf

http://www.eurogas.org/uploads/media/2015_-_July_-_15PP203_-_Eurogas_contribution_towards_the_EU_strategy_for_Heating_and_Cooling.pdf

http://www.gasnaturally.eu/uploads/Modules/Publications/gasnaturally-heating-and-cooling-consultation-response.pdf