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Position Paper

Eurogas' contribution towards the EU strategy for heating and cooling

Eurogas is the association representing the European gas wholesale, retail and distribution sectors. Founded in 1990, its members are 43 companies and associations from 24 countries.

Eurogas represents the sectors towards the EU institutions and, as such, participates in the Madrid Gas Regulatory Forum, the Gas Coordination Group, the Citizens Energy Forum and other stakeholder groups.

Its members work together, analysing the impact of EU political and legislative initiatives on their business and communicating their findings and suggestions to the EU stakeholders.

The association also provides statistics and forecasts on gas consumption. For this, the association can draw on national data supplied by its member companies and associations.

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Executive Summary

The European Commission signalled in its Energy Union communication in February 2015 that it intends to produce a European Union (EU) strategy for heating and cooling in 2015. This paper sets out Eurogas' initial thoughts and views on the subject and we look forward to further debate and consideration of this topic.

The objectives for the heating and cooling strategy should be set out within the confines of the EU's energy objectives of sustainability, competitiveness and security of supply. The following three objectives are suggested:

- I. The heating and cooling sector should contribute towards greenhouse gas emission reductions in order for the EU to reach the target set by the European Council of at least 40 % by 2030. This provides focus in delivering a low-carbon future for heating and cooling. Furthermore, reducing greenhouse gas emissions goes hand-in-hand with energy efficiency and the continued introduction of renewable energy sources.
- II. European consumers should be offered information, choice, competitive products and services, and affordability in meeting their heating and cooling needs.
- III. A framework should be provided for cost-effective heating and cooling solutions. A holistic / system-wide approach should be taken, whilst recognising the significant differences in Member States' heating and cooling requirements and national characteristics.

These objectives can be reached by following seven key steps:

1. Placing the consumer at the heart of the strategy;
2. Enforcing existing legislation;
3. Taking a system-wide approach;
4. Using energy efficiency as a means to improve greenhouse gas reductions;
5. Creating the tools to prepare future European policy on heating and cooling;
6. Helping Member States to help themselves;
7. Unleashing a new wave of technology.

For each of these seven steps, Eurogas has provided an assessment of the current state of play together with tangible proposals to bring them to fruition and ultimately achieve the objectives proposed. In the heating and cooling sector, gas continues to offer major affordable gains in both energy efficiency and greenhouse gas emissions reductions. Gas-based appliances can also be a vehicle for introducing greater renewable heating and cooling into the sector.

Eurogas' contribution towards the EU strategy for heating and cooling

Introduction

- Heating and cooling represents 46% of the EU's final energy consumption¹, of which gas comprises 47% across Europe, albeit with a considerable variety across Member States.
- The European Commission signalled in its Energy Union communication in February 2015 that it intends to produce a European Union (EU) strategy for heating and cooling in 2015. This paper sets out Eurogas' initial thoughts and views on the subject and we look forward to further debate and consideration of this topic.
- Europe already has in place the legislative architecture and the technical capability for the heating and cooling sector. However, the challenge now lies in producing a strategy that provides clear policy goals that will unlock the financial resources needed to deliver a transition to a low-carbon heating and cooling system across all Member States.
- The objectives for the heating and cooling strategy should be set out within the confines of the EU's energy objectives of sustainability, competitiveness and security of supply. The European Council has decided upon a legally binding target for the reduction of greenhouse gas emissions for 2030 and this should form the cornerstone of the strategy. This will also provide a path for energy efficiency and renewable forms of heating and cooling to continue to be introduced. The following three objectives are suggested:
 - I. The heating and cooling sector should contribute **towards greenhouse gas emission reductions** in order for the EU to reach the target set by the European Council of at least 40 % by 2030. This provides focus in delivering a low-carbon future for heating and cooling. Furthermore, reducing greenhouse gas emissions goes hand-in-hand with energy efficiency and the continued introduction of renewable energy sources.
 - II. **European consumers** should be offered information, choice, competition and affordability in meeting their heating and cooling needs.
 - III. A framework should be provided for **cost effective heating and cooling** solutions, while recognising the significant differences in Member States' characteristics and ensuring a holistic / system-wide approach is taken.
- In this sector, gas continues to offer major affordable gains in both energy efficiency and greenhouse gas emissions reductions. Gas-based appliances can also be a vehicle for

¹ EC brochure on heating and cooling in the energy transition- challenges and facts, February 2015

introducing greater renewable heating and cooling into the sector. It is therefore advisable to keep these options open.

- Elsewhere, gas supply security is a focal point of the Energy Union concept. Improved market implementation, supported by the necessary cross-border infrastructure and coupled with a regional, cooperative approach, offer the most efficient ways forward to enhance supply security. Further information on energy security can be found in the January 2015 paper 'Eurogas Views on the Energy Union and Enhancing Supply Security' available on our website².
- Under the right strategy, the continued strong presence of gas in the heating and cooling market can deliver energy efficiency, reduce greenhouse gas emissions and help introduce much more renewable energy into the heating and cooling sector. The primary reasons for this are:
 - Gas offers consumers an affordable, reliable, efficient and flexible heating and cooling solution. The price of gas to households across Europe is approximately one third of that of electricity³. Also, consumers are able to choose from a wide range of gas-based appliances and the costs of these appliances tend to be the most competitive option for consumers.
 - The existing gas infrastructure offers the most cost-competitive source of flexibility via the energy carriers (by using storage and line pack) and its use in a complementary fashion with other heating and cooling sources will only increase this flexibility. Gas networks offer the underlying infrastructure and flexibility that other energy carriers do not. The strategy should therefore seek to extract the maximum value from this existing infrastructure.
 - The overall costs of transporting gas via the grid are far more cost-effective than those for electricity or other forms of heat transportation, such as district heating or cooling. However, gas in heating and cooling can do so much more.
- In this paper Eurogas:
 - considers the energy demand for heating and cooling in both the residential and commercial sectors, though many of the points would also apply to the industrial sector;
 - focuses on existing buildings in Europe where the greatest challenges lie, as new buildings become more and more energy efficient;

² http://www.eurogas.org/uploads/media/2015-Jan_-_15PP622_-_Eurogas_Views_on_the_Energy_Union_and_Enhancing_Supply_Security.pdf

³ http://www.europarl.europa.eu/meetdocs/2014_2019/documents/itre/dv/acer_market_monitoring_report_2014_/acer_market_monitoring_report_2014_en.pdf

- seeks to propose measures and tools that puts the consumers at the centre of this strategy and considers their needs, welfare, budgets and preferences, and respects their freedom of choice.

Designing a successful heating and cooling strategy

1. Placing the consumer at the heart of the strategy

- It is estimated that consumers only spend in the region of nine minutes per year on energy matters, and much of this is spent considering the cost of their energy bill⁴, rather than their choice of heating and cooling appliance or fuel. So to change this market, we should start by providing choice and seeking to ensure access to straightforward, accurate and detailed information when it is needed. This will help to empower the consumer to become a proactive decision-maker and to play a more active role in the energy market.

- ***Competition should be the driver of delivering heating and cooling solutions to consumers. This will ensure that they are provided with the best choice in respect of services, innovation, appliances, etc.***
- ***Creating a tool, ideally electronic, to allow consumers to choose their heating and cooling application based on their individual circumstances, such as costs, needs and accommodation, would be very useful.***

- The range of heating and cooling systems and options will become more complex. Energy labels are a first step towards simplifying information for consumers.
- However, approximately 85%⁵ of Europe's current boiler fleet are inefficient non-condensing boilers. Therefore, helping consumers understand this could be a fundamental step in transforming the sector.

- ***The roll-out of an energy labelling system for existing appliances could be a key measure to stimulate activity in this sector. Consideration would have to be given as to how this could be done in a way that incentivises consumers to seek such a label on the appliances within their home, rather than it being imposed as an obligation. This could be a key tool to jump-start the transformation of the existing***

⁴ Opower presentation to Eurogas 2015 annual conference 'meeting the expectations of the new energy consumer'.

⁵ EU roadmap 2050.

heating and cooling appliance fleet.

- Financial support schemes can be another means to incentivise customer behaviour. However, poorly designed support schemes can distort the market and result in inefficient outcomes.

- ***Any financial support schemes should have the following features:***
 - ***Be technology-neutral and designed to deliver greenhouse gas emissions reductions and / or energy efficiency;***
 - ***Be easy to use;***
 - ***Provide certainty to the consumer;***
 - ***Provide for financially vulnerable consumers;***
 - ***Recognise the different categories of consumer and in particular vulnerable consumers.***

- There is a range of new products on offer from energy suppliers, such as smarter controls, which show that changing consumers' demand patterns is not simply an 'infrastructure' issue, but that innovative products can also change behaviour.

- ***It is important that no measures are introduced that would limit the ability of suppliers to offer innovative products to consumers.***

2. Enforce existing legislation

- Europe has introduced a series of legislation to address energy efficiency and the first real results are expected in the period 2014 to 2016 (The EU currently has four key pieces of legislation affecting the heating and cooling sectors, in the fields of energy efficiency, labelling, buildings and eco-design. More information can be found in Appendix 1).
- We note in the European Commission's Communication⁶ of 23 July 2014 on the Energy Efficiency Directive (EED) the conclusion that 'If all Member States now work equally hard

⁶ https://ec.europa.eu/energy/sites/ener/files/documents/2014_eec_communication_adopted_0.pdf

to implement fully the agreed legislation then the 20 % target can be achieved without the need for additional measures’.

- As of July 2014, the European Commission indicated that only five Member States had notified full transposition of the EED and that implementation of the Energy Performance of Buildings Directive⁷ was also lagging behind, despite the transposition deadline of July 2012. There are nine Member States that have still not completed the transposition process.
- The correct implementation of this set of legislation will help ensure that any inadequacies contained therein can be identified and pursued. Given the extensive nature of the recently introduced legislation on these topics and the range of measures for Member States to implement, any new issues arising should be approached by using this existing legislative architecture.

➤ ***The Commission should prioritise the correct and timely implementation of existing legislation, particularly in order to ensure that Europe reaches its targets for 2020 on greenhouse gas emissions reductions and energy efficiency as the first step in the transition.***

3. Take a system-wide approach

- In general, there are five different means for meeting citizens’ heating and cooling needs:
 - I. Gas;
 - II. Electricity;
 - III. District heating and cooling;
 - IV. Oil / coal;
 - V. Renewables;

Gas is also used directly as a fuel in electricity production and district heating and cooling, and is renewable in the form of biogas and synthetic methane. The current mix of each of the above varies considerably across Member States. The gas and electricity markets are generally well developed with thriving competitive markets. By the end of 2015, Member States are obliged to complete cost-benefit assessments of district heating and cooling. All three options can support the introduction of renewable heat and cooling.

⁷ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0031&from=EN>

- ***The strategy should take a results-oriented approach, by focussing on the options for Member States to achieve clear objectives, rather than prescribing a particular path to take.***
- ***It should not 'pick winners' through a focus on a small number of options, which ultimately limit competition, innovation, consumer choice and affordability.***

- The heating and cooling sector is seeing significant development in Member States:
 - New buildings are showing an impressive fall in energy demand, due to tighter restrictions in Building Regulations and better energy efficiency measures.
 - Heating and cooling for consumers is about more than just the heating and cooling appliance itself. New smart applications are providing consumers with much more information on their heating and cooling demand.
 - An increasing share of renewable gas injected in the gas grid.
 - The introduction of power-to-gas facilities, which also offer the possibility of integrating more renewables and stabilising the electricity grid.
- Combining gas-based appliances with renewables such as solar panels, or using them as hybrid solutions combined with electric heat pumps, can create significant flexibility for the consumer and overall energy system. As such, the gas system provides back-up and flexibility at a decentralised level. A host of new technologies is now available for heating and cooling, from single appliances to systems that are multi-energy/multi-technology where the best of each energy/technology is incorporated, thus increasing the possibility of partnership technologies such as gas + solar and gas + electricity in order to offer consumers new ways to meet their heating and cooling needs.

- ***The strategy should seek to further unlock the possible complementarity of different heating and cooling sources.***
- ***Decisions that have already been made on technology neutrality through existing legislation (e.g. the Energy Labelling Directive⁸) should not be undermined.***

⁸ <http://register.consilium.europa.eu/doc/srv?!=EN&f=ST%2016080%202009%20INIT>

- The strategy should be grounded in realism. Involving the widest possible range of stakeholders, including industry, will make its achievement much more likely.
- Any assessment comparing one form of heating and cooling to another should take a holistic approach. For example, the requisite networks and supply of flexible energy must be in place in order for different options to work. Therefore one cannot quantify costs based on appliances alone; grid and storage implications also need to be taken into consideration. As comparisons of technologies greatly depend on local conditions such as average energy consumption, climate, seasonality of demand a sensitivity analysis to these crucial factors should be included.
- What works in one Member State will not necessarily work in another. For example:
 - A country with high levels of hydroelectricity generation may be able to accommodate greater amounts of electric heating and cooling compared with other countries which cannot deliver such flexible electricity, while at the same time accept increasing variable renewable generation sources.
 - The sources of renewable heating and cooling may be limited depending on the local climate, topography, etc. For example:
 - limited space for solar collectors in city environments;
 - transportation and sustainability issues with biomass;
 - heating demand is typically low when the solar energy production is high.
 - A district heating or cooling network may not be feasible for reasons such as the location of the heat or cooling production and the decentralised use. For example:
 - heat from large power plants and industrial clusters is mainly located at a large distance from residential areas. Long distance heating or cooling pipelines are very costly and can be inefficient, while gas infrastructure is available and cheaper to transport large amounts of energy.
 - Low heating requirements in Southern European countries make investment and operation in heating and cooling networks challenging .
 - The less energy is supplied per consumer, the more significant are energy losses.
 - The implications on existing grid infrastructures.
 - For example the gas grid is designed to cater for the peak winter load of heating demand, while in general the electricity grid is not.

- ***Measures comparing different technologies should be fair and continue to be based on a primary energy factor, which recognises the full cycle of the supply chain.***
- ***Assessments seeking to find the optimal heating and cooling solutions should consider :***
 - ***full costs (of infrastructure, appliances, their installation and maintenance, and of the energy);***
 - ***amortisation period;***
 - ***carbon dioxide (CO₂) for the whole lifecycle (produced or avoided);***
 - ***air quality (e.g. nitrogen oxide, particulate matter and their impact on human health);***
 - ***heating and cooling system efficiency based on primary energy;***
 - ***technical feasibility;***
 - ***range of application;***
 - ***economies of scale.***

4. Energy efficiency as a means to improve greenhouse gas reductions

- Energy efficiency is a key tool for not only reducing Europe's energy demand, but also improving the level of greenhouse gas (GHG) emission reductions and as such, should be the initial focus of the heating and cooling strategy.
- Gas-based appliances can offer huge energy-efficiency gains, significantly reduce greenhouse gases, and can partner with renewable energies, such as solar energy, and through gas heat pumps.
- Approximately 85% of the existing fleet of gas and oil boilers for heating are of the non-condensing variety. The available effective condensing boiler is approximately 20 % more efficient. Thus, switching to gas-condensing boilers would be a proven and very quick way to reduce GHG emissions, improve energy efficiency and cut the cost to the consumer. Moreover, it offers one of the quickest payback periods to consumers replacing an existing heating appliance. Promoting and advancing the replacement of boilers that today are consuming liquid fuels and gas boilers that are inefficient, by new condensing gas boilers,

represent a great improvement in efficiency and reduced emissions, and are extremely accessible.

- The Netherlands has already carried out this switch, meaning their homes are now 23 % more efficient when compared with 1980.
- The Eco-design rules now mean that traditional boilers will no longer be sold on the market, helping the transformation of the fleet.
- Alternatively other emerging technologies may be more suited to the consumer's needs, for example, gas heat pumps or micro-generation.

➤ ***In a diverse market, making real tangible progress will rely on finding the easy wins. The replacement of non-condensing boilers with condensing boilers offers this, as does a switch from liquid fuels to gas-based heating.***

5. Creating the tools to prepare future European policy on heating and cooling

- There is a lack of EU-wide data on the heating and cooling sectors, which can be used to inform the approach taken to develop the future heating and cooling systems.

➤ ***A heating and cooling strategy should seek to create a central database of information on heating and cooling, without creating an undue burden on Member States. This might be approached under the work planned on governance for the Energy Union.***

- The large number of stakeholders in the heating and cooling sector is a challenge to implementing policy. This makes policy measures more complex, as they often have to reach many of these participants and omitting one group can result in the measure not working.

➤ ***Establish a European-level forum to bring representatives of these bodies together.***
➤ ***Create a framework for distributing relevant technology-neutral information to the many stakeholders involved, such as energy suppliers, distribution system operators, architects, appliance vendors and installers, in order to allow them to assist consumers in making the right choices.***

- The European Commission already uses, and will most likely continue to use, complex least-cost optimisation models to drive policy.

- ***Models need to a) ask the right questions (including an assessment of the whole energy system and the overall efficiency), and b) use the right assumptions; otherwise there is a risk that they will come up with ‘wrong’ answers.***
 - ***There must be a role for all stakeholders in such assessments; consultations should be carried out before the exercise and not afterwards.***
 - ***In order to guide heating and cooling policy, each Member State may have to model different scenarios, given that each country has a different starting point***
- ***Open consultation on a modelling process helps to ensure more robust / credible outcomes.***

6. Helping Member States to help themselves

- Member States’ individual circumstances in the heating and cooling sectors vary considerably in terms of climate, demand profiles, underlying infrastructure, sources of energy available, building stock, purchasing power, access to finance and market participants. Within the Member States, different heating and cooling options will suit different consumers, e.g. certain appliances will not be suitable in a city dwelling for reasons of installation restrictions or the effect of biomass on air quality.
- Given the differences in national circumstances in the heating and cooling sectors, imposing specific decisions upon Member States is unlikely to be feasible.

- ***Prepare best practices or guidelines in the following areas:***
 - ***Training for heating and cooling installers: The supply chain for heating and cooling will play a critical role in deciding which heating and cooling systems are used – they will need to be aware of, and trained on, the increasing range of systems and technology options;***
 - ***Carrying out Member State heating and cooling assessments;***
 - ***Informing consumers and policy makers on the choices and options available to them, including emerging technologies.***

7. Unleashing a new wave of technology

- There are so many different consumer types, locations and building types that decarbonisation will involve a wide range of approaches using a wide range of technologies. It is recommended to avoid 'either/or' policy decisions and instead to embody technology neutrality and a realisation that heating and cooling will be part of the whole energy system.

➤ ***Support for innovation should be technology-neutral in order to maximise the range of appliances and options available in the future.***

- There is an increasing role for the connectivity of appliances/technologies – this area is moving faster than appliance innovation. Perhaps the greatest developments in heating and cooling will not be in the carrying infrastructure or appliances but in the range of in-home appliances that are now emerging and can help the heating and cooling transition. These can also offer exceedingly effective energy savings at a very low cost. For example, smart phone applications can be used to control the room temperature remotely.
- While gas and indeed other forms of heating and cooling can offer a range of new products, consumers are not always aware of the options available to them. A concerted effort is needed to deliver this.

➤ ***The strategy should consider the means to increase the visibility of new and efficient heating and cooling appliances, and this should also cover the installers' views / appetite for new technologies, how to deal with high up-front costs, etc.***

Appendix 1 – list of EU legislative measures linked to heating and cooling, taking effect in the period 2014-2016.

Energy Efficiency Directive

- April 2014: Member States produce long-term strategy for mobilising investment in renovating national stock in residential and commercial buildings;
- From January 2014: 3 % per year of floor areas of government buildings renovated;
- From January 2014: obligated energy schemes to deliver 1.5 % savings per year until 2020;
- Roll-out of energy audits, smart meters, billing information, behavioural changes;
- December 2015: Member State assessments for the potential of cogeneration and district heating;
- Guarantees of origin for cogeneration;
- By December 2014: if required, certification and/or accreditation schemes and/or equivalent qualification schemes, including, where necessary, suitable training programmes, become or are available for providers of energy services, energy audits, energy managers and installers of energy-related building elements.

Ecodesign Directive⁹

- Space heaters up to 400 kW that can be sold are restricted from September 2015 – this will remove the traditional boiler from the market.

Energy Labelling Directive

- Household (in force), space heaters and water heaters (with a deadline for entry into force of labelling in September 2015) and residential ventilation units (with a deadline for entry into force of labelling in January 2016).

Energy Performance of Buildings Directive

- Revised intermediate targets for improving the energy performance of new buildings apply from 2015.

⁹ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0125&qid=1432537203388&from=EN>

Appendix 2 – further information on gas-based heating and cooling appliances

<p>Gas-based heating technologies at a glance</p> <p>Gas-condensing boiler</p> <p>Burns gas and the hot gases produced are passed through a heat exchanger where much of their heat is transferred to water, thus raising the water's temperature. This technology includes an additional step to the traditional gas boiler where it captures the waste heat in the flue gases, which is used to pre-heat the cold water entering the boiler, hence improving the overall energy efficiency.</p> <p>Gas heat pump</p> <p>A gas heat pump combines condensing technology with environmental energy to extract heat from low-temperature sources (air, water, ground) and upgrades it to a higher temperature and releases it where it is required for space and water heating. Heat pumps can also be operated in a reverse mode for cooling purposes.</p> <p>Combined heat and power</p> <p>A combined heat and power unit is a system that produces both heat and electricity for the user. This single process of combined heat and power production provides synergy that improves efficiency. The co-generation process, which is often for larger industrial-type use, is also available on a small scale for residential and commercial usage.</p>	<p>Efficiency: up to c. 103 %</p> <p>Renewables: through using renewable gas and/or combining with solar panels and electric heat pump.</p> <p>Efficiency: Heating: sorption up to 165%, engine up to 150%. Cooling: engine up to 130%, additional efficiency recovering heat from engine and combustion products</p> <p>Renewables: extract heat from air, ground or water and through using renewable gas.</p> <p>Important reduction of CO₂ and primary energy compared with conventional grid power, depending on national mix.</p> <p>Efficiency: c. up to 100 %</p> <p>Renewables: through using renewable gas and/or renewable electricity.</p>
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<p>Fuel cells</p> <p>A fuel cell is a device that is similar to micro combined heat and power (micro-CHP), which uses chemical energy from gas and converts it into heat and electricity through a chemical reaction with oxygen or another oxidising agent.</p> <p>Hybrids</p> <p>A gas hybrid is the combination of a gas-condensing boiler and an electric heat pump. Electric heat pumps become less efficient as the outdoor temperature drops because there is less heat available from the air, ground or ground water. During periods of lower temperatures, the gas-condensing boiler provides the heat. It will not only result in a better overall efficiency of the system, but will also reduce the load on the electrical grid in periods of very high electricity demand.</p>	<p>Efficiency: c. up to 100 %</p> <p>Renewables: through using renewable gas and / or partner with Solar Panels</p> <p>Renewables: extracts heat from air, ground or water and through using renewable gas.</p>
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*Efficiency is an average seasonal efficiency performance, actual performance will vary depending on use, applications and installation

Appendix 3

Affordability of gas in heating and cooling

Delta energy

A review of different technologies for UK customers carried out by Delta Energy and Environment showed that gas boilers have the lowest upfront cost of all of the common heating options available. In terms of annual running costs, the same report showed that the gas boiler, gas heat pump and micro-CHP as the most competitive appliances. Delta concluded that under their base case assumptions 'gas appliances have substantially stronger consumer economics than alternative technologies'. The "2050 Pathways for Domestic Heat" report is available at this link:

http://www.energynetworks.org/modx/assets/files/gas/futures/Delta-ee_ENA%20Final%20Report%20OCT.pdf.pdf