

THE ROLE OF NATURAL GAS IN A SUSTAINABLE ENERGY MARKET

Overview

The objective of Europe's energy policy is the provision of sustainable, secure and competitive energy to European customers. The approach of the Commission is therefore constructed around the three aims of addressing climate change and ensuring the security of Europe's energy supplies, within a competitive energy market.

Discussion of future energy policy is increasingly characterised by sustainability concerns and questions about the contribution of fossil fuels. The role of this paper is to show how natural gas can contribute to meeting the three aims – sustainability, competitiveness and supply security - within a balanced energy policy framework.

- On sustainability, Eurogas believes that as the most environmentally friendly fossil fuel, natural gas can make a major contribution towards Kyoto objectives and beyond. It is unrealistic to see the future only in terms of nuclear or renewables. New gas technologies and applications have a major role to play in meeting the challenges of climate change - through high efficiency boilers and appliances, in power generation (including CHP) and in applications such as road transport.

While for example Eurogas acknowledges the importance of improving building standards, care will be necessary in the way the standards are formulated so as not to undermine the positive environmental contribution that gas can make in heating applications.

- On competitiveness, Eurogas is committed to ensuring a competitive and non-discriminatory energy market, within which gas plays a full part. A successful internal market is essential to the competitiveness of Europe, and contributes to incentivising investment in infrastructure to support supply security, efficiency and service. In a competitive energy market, environmental concerns are readily addressed through market-based instruments.
- On supply security, Eurogas believes that diversity in the sources of energy is the best means of ensuring that Europe continues to have access to the energy it needs. This will require full exploitation of Europe's indigenous energy sources with renewables and new technologies being supported until they are established, although it is essential that such support in the initial stages does not distort the competitive market.

Eurogas is committed to ensuring that natural gas – with its strong environmental advantages – is well-positioned in the policy debate, and able to play its full part in a competitive, secure and sustainable energy sector.

1. Policy framework & fossil fuels

Eurogas supports the development of the internal gas market and endorses the work by the European Commission to combat climate change and to develop a more sustainable energy policy.

As the Commission recognised in its January 2007 package, the challenge of climate change calls for the most efficient use possible of all available energy sources, both in utilisation and also in the conversion of primary fuels into electricity.

This had led to the Commission's focus on introducing:

- new / improved technologies for electricity production, offering more sustainable ways of meeting much of Europe's future energy needs, and
- more demanding standards for buildings and utilisation efficiency.

In addition, renewable sources - supported by EU market share targets - are expected to play a growing role over the period until 2020 and beyond.

While renewables and new technologies such as carbon capture and storage (CCS) should be embraced, renewables should not be seen as a simple substitute for natural gas or other fossil fuels. Fossil fuels currently account for around 79% of Europe's energy consumption. For as long as renewables remain significantly more expensive than conventional energy sources, they could not displace fossil fuels on a widespread basis without major adverse impact on Europe's competitiveness and growth.

Thus, as the Commission acknowledges, fossil fuels – including natural gas, with its strong environmental advantages - are likely to remain a central part of Europe's energy mix up to and beyond 2020.

2. The role of gas

Natural gas currently accounts for 24% of Europe's energy consumption, and with global proven reserves for over 60 years, its market share is expected to continue to grow.

Gas has long been the fuel of choice because of the efficiency of this form of energy distribution, gas's flexibility and controllability in use, and on account of its low emissions of CO₂ and low levels of pollutants. These qualities make gas attractive in direct utilisation in homes and businesses, in centralised power generation, in local CHP plant (including micro-CHP), and - in some member states - in the transport sector too.

In discussions about sustainable energy policy, it is important that the positive contribution that natural gas is already making and can make in the evolving energy market is not overlooked. Eurogas believes within that diverse energy mix, natural gas – especially if it replaces other fossil fuels – can make a particularly valuable and effective contribution towards Kyoto objectives and beyond.

Among all the fossil fuels, natural gas – as well as being the cleanest and most controllable at the point of use - is also the most environmentally-friendly, producing the lowest CO₂ emissions per unit of energy content. Depending on the quality of fuel, the combustion of natural gas results in at least 25-30% less CO₂ than oil and at least 40-50% less than coal. The CO₂ emissions can be further reduced by using natural gas in high efficiency applications. Gas thus offers unique advantages in terms of greenhouse gas benefits.

Unlike other fossil fuels, natural gas contains practically no pollutant-forming components. The product of gas-fired combustion is therefore virtually free of sulphur dioxide (SO₂) and particulates. In heating applications, emissions of nitrogen oxides (NO_x) are also low because of characteristics of natural gas that favour its use in low temperature combustion technologies and because there are NO_x abatement techniques which are suitable for gas applications.

Given the environmental attractiveness of gas and abundant reserves, Eurogas is confident that within the European energy market, the market share for gas will grow:

- in households, industry and commerce, where it will continue to displace more polluting fuels,
- in electricity generation, where gas already offers numerous advantages,
- in combined heat & power plants (CHP),
- in hybrid applications where natural gas is combined with renewables such as solar,
- in transport, where the low polluting characteristics of gas are especially valuable, and where it should progressively expand from pioneering countries to more widespread use, and
- in biogas applications, where it can be used in the provision of heat or power for local use, in transport or introduced into the natural gas distribution system.

3. Gas in conventional power generation

In recent years, the use of gas for power generation has expanded rapidly, and it now accounts for 20% of primary energy used in electricity production. Among the traditional advantages of gas in this application are the speed of construction of CCGT plants, their ease and cost of siting, and their flexibility in use. However gas can make a vital contribution not only to meeting demand for electricity but also to addressing climate change.

It is worth noting that since 1990, there has been only a moderate increase in CO₂ emissions from power production, despite the significant increase in demand for electricity over this period, reflecting the higher efficiency levels now attainable.

There is in Europe a need for 200GW of new power generation capacity to cover growing demand and to replace ageing plants, and in particular to replace coal- and oil-fired plants displaced by the Large Combustion Plant Directive. The Commission has estimated that replacing one third of the coal-fired power stations in the EU with gas would mean a saving of one third of the EU's CO₂ emissions. Eurogas therefore sees CCGT plants continuing to play an important part in a balanced generation mix as older plants are phased out, and providing significant emissions reductions over the plants displaced. Replacing a 30-40% efficiency coal plant with a 50-60% efficiency CCGT decreases primary energy consumption drastically and cuts CO₂ emissions in half or more.

While energy companies and other decision-takers need to consider a range of CO₂ reducing options including CCS, renewables and nuclear, greater use of gas in CCGTs is certainly an environmentally attractive option while renewables are being developed to widespread commercial scale.

Once CCS technology has been developed, piloted and proven, there is the potential to retrofit it to CCGT plant too. While recognising that introduction of this technology will change the competitive environment for coal and gas plant, the use of CCS in gas-fired generation would enable CO₂ emissions to be reduced to very low levels, ensuring maximum carbon neutrality.

4. CHP

Eurogas sees significant potential in the use of gas in CHP applications. Gas can be used in this way in major generating plant, where it offers significantly improved generation over other fuels, and district heating schemes, by businesses, in commercial applications such as swimming pools, and in micro-CHP applications in domestic and other buildings.

A CHP plant typically utilises 90+% of the primary energy content in the fuel, with gas combined cycle technology having significantly higher heat-to-power ratios (electricity/heating) than other fuels. In such plants therefore, gas can be used to improve generation efficiency, and at the same time reduce distribution network losses and improve network stability. Eurogas sees the prospect of significant growth in distributed generating capacity and looks forward to commenting in due course on ERGEG's expected proposals for decentralised generation. It will be important in this regard to find appropriate ways of incentivising the connection of distributed generation and to develop fair conditions for surplus energy exported to the grid.

In the short-term, the contribution that micro-CHP can make to overall reductions in CO₂ emissions is unlikely to be significant until the technology can be widely used. Given the right framework and incentives, Eurogas is confident that micro-CHP products can be developed with mass-market appeal in price and environmental terms.

5. Industrial Applications

For the time being, it is important to recall that direct use of gas is already a highly performing solution in terms of overall efficiency in both heating and generation, and also in industrial applications, Natural gas is greatly appreciated by industrial customers. Innovative technological developments, including the development of new burner types, offer process advantages and low emissions. Gas used in combination with smart technology facilitates the production of high-grade goods in an efficient, cost-effective and environmentally friendly manner.

6. Energy diversity

Eurogas believes that the policy for a sustainable energy market must provide the framework for a diversified mix of environmentally-friendly fuels in a competitive market. Even after the wider deployment of renewables, Europe's security of supply will require a diversity of energy sources, including fossil fuels such as natural gas, and with indigenous energy sources being exploited to the fullest possible extent. No one energy source should be at a disadvantage.

In Eurogas's view, it is important to avoid technology picking and over-reliance on any single energy source. The former replaces market forces by a *dirigiste* energy policy based on the wisdom of the day; the latter creates unnecessary strategic vulnerability.

Given the lead-times to bring engineering solutions to market and the significant investments involved, it is also important to ensure a stable or at least predictable framework, within which decisions can be made. Sudden changes of policy approach (e.g. on renewable support schemes) risk undermining past investments, resulting in stranded costs and distorted competition.

A stable and predictable energy policy based on diversity therefore best underpins security of supply, while at the same time supporting a more sustainable energy mix.

7. Biogas

Biogas (i.e. gas from biomass) provides a number of environmental advantages. Most often the biomass material is digested and used locally within an existing plant or in transport fleets. It may also be introduced into the natural gas distribution system, subject to there being strict gas quality monitoring.

Eurogas is supportive of initiatives in this area. Biogas offers similar advantages to natural gas, but in addition enjoys the unparalleled advantage of it being a renewable energy source, produced from waste matter or crops. Recent technological advances and reduced production costs have given new impetus to this environmentally friendly approach, with 'second generation' biogas produced from sources such as forestry residues promising improved performance. While Eurogas does not support a specific 'green obligation' on gas suppliers, it recognises that biogas can be the most efficient means of utilising biomass in support of environmental objectives.

So far only relatively small volumes of biogas have been fed into low pressure networks. Eurogas therefore looks forward to further planned work on technical or practical considerations associated with this, since wider access of biogas to the natural gas grid would further facilitate development of the biogas sector and enable consumers to exercise the choice to use an even more environmentally friendly fuel.

8. Renewables & renewables support schemes

Achieving EU targets for renewable sources of energy will be challenging. Eurogas therefore recognises the importance of encouraging the development of renewables, so that they can play their part in reducing greenhouse gases. At the same time they will contribute to greater supply diversity and thus security.

In devising mechanisms to support the introduction of such new energy technologies, Eurogas believes that member states should avoid overlapping policy obligations or approaches which entail high administration costs. Wherever possible, a harmonised and market-based approach should be adopted.

Support schemes should be transitional, well-signalled and predictable, and should be designed to minimise market distortions and reach targets at minimum cost. Particular care must be taken that schemes do not produce excessive reliance on particular renewable options or inadvertently distort national or European energy markets.

9. Efficiency in energy use & building standards

Eurogas broadly supports the EU Energy Efficiency Action Plan, noting in particular the initiatives to improve the efficiency of electricity generation, transport, appliances and buildings. We will consider specific proposals arising from the plan as they come forward.

Gas has a major share of Europe's energy market – 35% in the household sector, 24% overall - and its popularity continues to grow. Relative to the environmental impact of the electricity sector overall (taking into account generation efficiencies and distribution losses), direct utilisation of gas can play a positive role environmentally, through both the development of micro-CHP and the use (particularly in new buildings) of high-efficiency boilers and appliances. For example, direct heating by the latest condensing boilers can be more than twice as efficient in carbon terms as converting the gas into electricity and distributing it to heat dwellings, once generation efficiency and electricity network losses are considered.

Eurogas sees potential in the use of natural gas in hybrid applications, in conjunction with renewables such as solar. Used in this way, natural gas complements the environmental attractiveness of renewables, while ensuring continuity of energy supply for the user.

While Eurogas acknowledges the importance of improved building standards, we therefore believe they must not be framed in such a way as to disadvantage or even in some extreme cases preclude the use of natural gas, which those buying new property will continue to want to use, either in direct applications (incl. CHP) or in combination with other energy sources such as renewables. In any case the introduction of low energy buildings and the gradual transition to a low-carbon building stock must recognise that not all electricity will be produced from renewables or other low carbon sources, and that no electricity generation technology can be entirely carbon-free.

Looking further ahead, gas heat pumps and fuel cells are promising technologies, offering significant opportunities for energy and thus CO₂ savings. Again it will be essential that improved building standards do not inhibit natural gas and the application of such technologies.

10. The role of gas suppliers in encouraging energy efficiency

As an association representing companies involved in the supply of gas, Eurogas considers that gas suppliers, who have the primary relationship with end-users of gas, are ideally placed to encourage customers to adopt energy efficient measures in their homes and in industry.

Suppliers can help customers focus on their consumption and encourage them to reduce the amount they use. They can offer innovative products and tariffs, working with technology providers to support the development of new low carbon technologies, and may also participate in market-based incentive schemes to facilitate the uptake of energy efficiency measures.

11. Gas in the transport sector

Energy use in the transport sector continues to grow strongly. Since road transport in industrialised countries accounts for about 60% of CO₂ emissions and it is the second largest source of hydrocarbons and NO_x, there is renewed focus on the alternatives to the traditional fuels. Among the leading options is natural gas both in its conventional form and in conjunction with biogas – indeed one of the most efficient ways of introducing biofuels in the transport sector is through NGVs.

Natural gas is already used in fleet operations in a number of member states, and given the right infrastructure, it can also be used in individual private vehicles.

Key issues affecting the use of NGVs are

- the availability of the necessary specialist infrastructure,
- the prevailing tax regime, which determines the relative commercial attractiveness of NGVs compared with diesel or petrol, and
- the preparedness of vehicle manufacturers to provide NGV options.

Subject to resolution of these issues, NGVs currently have the potential to provide substantial reductions in greenhouse gas emissions, producing around 20% less emissions compared with petrol, depending on vehicle efficiency.

Looking much further ahead, there is the possibility that hydrogen fuel cells could be developed for use in electrically-powered vehicles. Methane can be reformed into hydrogen, either within the vehicle or in local fuelling stations. This opens the prospect for using the current extensive gas network infrastructure to enable either route and so facilitate this application.

12. Conclusions

Gas is a clean fossil fuel, which makes an important contribution to the current energy mix, and to the achievement of the threefold aim of European energy policy - sustainability, competitiveness and security of supply.

Gas continues to displace other more polluting forms of energy, thereby helping to address climate change.

Gas used in combined heat & power (CHP) plants improves generation efficiency, thereby supporting the competitiveness of Europe's industry.

Direct utilisation of gas in buildings is already playing a positive role environmentally, through high-efficiency boilers and appliances. Micro-CHP has the potential to make a major contribution in the near future. In the longer term, gas heat pumps and fuel cells are also promising technologies.

Gas used as a transport fuel offers substantial environmental benefits, as well as reducing oil dependency.

However, for natural gas to be able to fully realise these contributions to a sustainable future, energy policy must reflect a diversity of environmentally-friendly fuels. This in turn supports supply security. In this context therefore, renewables should not be seen as a substitute for gas but as a complementary form of energy.

The challenge for energy policy will be to facilitate and incentivise the deployment of the most appropriate technological solutions and applications. This includes designing short-term support schemes for renewables which minimise market distortions, formulating improved construction standards which do not preclude the use of natural gas in buildings, potentially in hybrid solutions with e.g. solar, and determining the regulatory and tax regimes under which gas applications such as transport and biogas can fulfil their potential. If these challenges can be met on a stable and predictable basis, Eurogas is confident that natural gas will continue to play a key role in a sustainable energy future.