

OPPORTUNITIES FOR THE NATURAL GAS INDUSTRY ON THE ROAD TO SUSTAINABILITY

OPPORTUNITES POUR L'INDUSTRIE GAZIERE EN ROUTE POUR LE DEVELOPPEMENT SOUTENABLE

INTRODUCTION

It's difficult to say something fresh in a paper so close to the end of a conference of this type, where the emphasis throughout will be on '...an eco-responsible future.' However, this short discussion paper will present a specific, personal view from Brussels, taking into account the European Union's (EU) emphasis on sustainability and its recent Green Paper on security of supply.

WGC2003 is not a research conference but GERG is, of course, an R&D organisation. So, the paper will briefly outline the rôle of GERG in Brussels, the aims and objectives of the EU and, against the above background, will highlight both the difficulties that exist and the potential for financial support from the current Sixth R&D Framework Programme, with reference to recent successful examples. It will identify key technologies and will try to highlight inconsistencies in the EU's thinking. Finally, it will conclude with reference to the flagship hydrogen delivery project, NATURALHY, which is currently seeking EU support.

GERG - the European Gas Research Group

- was set up more than 40 years ago to exchange information and to develop high quality collaborative R&D projects in the European Gas Industry. Recently modernised, it has now developed into an influential, constructive lobbying force with a strong Brussels network;
- currently has 13 members from 10 countries, each actively involved in natural gas research and technical development;
- is focused on the support of the European Gas Industry and achieves this by supporting and promoting research and technological innovation in all aspects of the gas chain;
- members serve a European Gas Industry which has the responsibility of supplying some 75 million domestic, commercial, industrial and power station gas customers;
- members have developed a large European reservoir of specialist knowledge and currently support a high quality research resource numbering in excess of 2000 staff;
- projects are carried out by dedicated multi-disciplinary Project Teams, which can include academics, manufacturers and other non-member organisations;
- works to secure EU funding for collaborative R&D in the Gas Industry.

EUROPEAN UNION ISSUES

The Environment

Climate change is a long-term battle for us all and the Kyoto commitments represent only the first step. The EU reached its objective in 2000, but greenhouse gas emissions are inevitably on the rise, as sustained economic growth in the developed world fuels our desire to consume energy. Indeed the causal relationship between lifestyle and increased CO₂ emissions is well documented. The EU's Green Paper: *'Towards a European strategy for the security of energy supply'* sketches out the bare bones of a long-term energy strategy, according to which:

- the development of new and renewable energies, including biofuels, is the key to change, even if this has to be buttressed by subsidies;
- taxation may be used to enforce a real change in consumer behaviour, effectively penalising the harmful environmental impact of energies.

Energy Independence

Energy consumption in the EU is increasing and Europe is importing more and more energy products. If no measures are taken, in the next 20 to 30 years 70% of the EU's energy requirements, compared to the current 50%, will be met by imported products. As enlargement looms, the EU is becoming increasingly concerned about a potential long-term energy shortfall and has decided to take better charge of its energy destiny in an attempt to free itself from this increasing energy dependence.

Natural Gas

The EU believes that natural gas is both "precious" and a "seductive alternative to other fuels", but views the rapid increase in gas usage as potentially causing a fresh structural weakness in the EU. However, imports of oil and gas are increasing and the EU is advocating a stronger mechanism to build up strategic stocks and to foresee new import routes while stressing the role of technology.

THE SIXTH R&D FRAMEWORK PROGRAMME (FP6): 2003 - 2006

Areas of Opportunity for Gas Industry in FP6

The EU's Sixth R&D Framework Programme will be concentrated on seven priority fields and, in response to its own Green Paper, the EU will make a particularly committed effort on the priority 'Sustainable development, global change and ecosystems' by combining the goal of sustainable development with the new strategic goal of energy independence.

There is a well founded concern that renewable energies are not contributing enough and, if nothing is done to provide a new impetus, by 2030 they will account for just 9% of total consumption, which looks bad against an EU target of 12% of European energy supplies by 2010. So, research in FP6 has been concentrated on improving the available technologies, reducing their cost, improving their efficiency, and establishing their reliability.

Approximately 810 Meuro is available for R&D on sustainable energy systems. However, because of the emphasis on renewable energies, natural gas R&D is less well supported than it was in FP5 and, as a consequence, it will be more difficult to secure funding. Nevertheless, there are several topics which offer distinct opportunities for natural gas technologies and in which Gas Industry expertise will be vital. But it is absolutely clear, and has been for several years, that if R&D proposals do not promise a significant contribution to sustainable development, they will not be funded by the EU.

INCONSISTENCIES

CHP

...is a key technology for the Gas Industry, and the European Commission estimates its technical potential in the EU-15 to be somewhere in the range: 900 - 1,000 TWh/year, corresponding to 29% - 33% of projected gross electricity demand in 2010. According to Eurostat figures, in 1994 the share of CHP in gross electricity generation in the EU-15 was 9% but, by 1999, COGEN Europe believed that the share had only risen to 10%.

CHP is quite rightly regarded as 'a good thing' so, discouraged by the rate of progress, the European Commission introduced a target of doubling the share of cogeneration to 18% by the year 2010, which could result in a CO₂ emission reduction of 150 x 10⁶ tonnes/year, corresponding to approximately 5% of the Community's total emissions in 1990.

However, initiatives to date are not promoting the spread of CHP to the desired extent, bearing in mind the EU's environmental objectives. In particular, the sharp drop in electricity prices, as a result of liberalisation, makes investments in new CHP plants unattractive and the net effect is that, overall, development of CHP systems is very low. In several countries, considerable cogeneration capacities have been shut down because their costs exceed market prices. For example, COGEN Europe reports a 15% closure in the Netherlands.

Similarly, an analysis of recent market developments reveals the grim picture that small scale CHP has been in decline since the beginning of the liberalisation process in 1995/96 and will probably face an even stronger recession in the coming years. Indications are that small scale CHP will not be able to achieve a large diffusion under a liberalised market framework. Therefore, for decentralised and environmentally sound electricity production to become a reality in the near future, specific legislation will be required to provide more consistent support for small scale CHP.

Methane Hydrates

According to many estimates the planet has extensive reserves of methane hydrates, which, if exploitable, could offer a very long-term option for natural gas supply from, say, 2050. However, extraction is highly problematic and there is some debate concerning the extent of the estimated reserves. However, hydrates represent an important potential future energy resource and could also play a role in both climate change and CO₂ sequestration.

Worldwide estimates of the natural gas potential of methane hydrates exceed 10 x 10¹⁸ m³ (400 million trillion cubic feet), a profound figure compared to the 140 x 10¹² m³ (5,000 trillion cubic feet) that make up the world's currently known gas reserves. There is a contrary view that the published estimates of the methane hydrate resource are highly unreliable and that the prospects for the commercial production of oceanic hydrates in the foreseeable future are negligible. However, even if only 1% of the methane hydrate resource could be made technically and economically recoverable, the United States alone could more than double its domestic natural gas resource base.

If the EU is seriously concerned about security of supply, then methane hydrates is clearly an area where it should be directing at least some funding to explore the future viability of a resource that has the potential for radically changing the world's energy portfolio. This is especially so if, in solving the technological challenge of extracting methane hydrates, solutions can be developed which will enable more cost-efficient sequestration strategies.

GERG PROJECTS

FP5

- **DEO: DOMESTIC ENERGY OPTIMISATION**

.... which has been presented elsewhere in this conference, was set up to demonstrate innovative energy-saving technologies, including the Stirling Engine (μ CHP)), gas-fired heat pumps, and solar-powered space heating in individual residential dwellings. Its objective, over three years, was to demonstrate packages of innovative technologies in the domestic environment.

- **MICROMAP: MINI AND μ CHP – MARKET ASSESSMENT AND DEVELOPMENT PLAN**

... considered the potential for mini and μ CHP systems in an enlarged Europe. It evaluated the technologies, the markets and the players and examined both grid connection issues and the possible take-up in different countries to 2020. It assessed the potential for cost savings, for energy and CO₂ emission reductions and proposed routes by which the new technology could be exploited.

- **PRESENSE - PIPELINE REMOTE SENSING FOR SAFETY AND THE ENVIRONMENT**

...is a satellite-based remote sensing, pipeline monitoring project to improve the safe and secure transmission of gas in Europe's >180,000km high pressure gas transmission system. It will use a range of sensors, including Synthetic Aperture Radar, LIDAR, infra-red and optical surveillance technologies, which are being assessed, both for their ability to 'see' in a variety of atmospheric conditions and for their contribution to a data-fusion approach to image processing and recognition.

- **VOGUE: VISUALISATION OF GAS FOR UTILITIES AND THE ENVIRONMENT**

... is developing new tools to aid the processes of detecting and locating gas leaks from pipeline systems. Passive infra-red and active, laser-based, technologies are being developed so that dispersing gas clouds can be visualised as a means of pinpointing gas leaks from both high and low pressure gas pipes.

- **GIGA: GROUND PENETRATING RADAR FOR HIGHLY RELIABLE PIPE LOCATION**

...is a research study which will inform and enable the design and build of a new, dependable Ground Probing Radar (GPR). Its eventual objective is a GPR specifically designed to provide the precision and high resolution required for no-dig installation of gas pipelines by means of Horizontal Directional Drilling.

FP6

Hydrogen

Looking ahead, a major plank in the EU's bridge to security and diversification of energy supply is hydrogen exploitation and the EU has in mind a 'Hydrogen Economy', a view shared even by President Bush in his recently announced \$1.2 billion Freedom Fuel initiative. There is no doubt that hydrogen can play a major role in bringing about clean energy conversion in the longer term, particularly in combination with fuel cells. But, in the transition period, which in all probability will last for the next 20-30 years, the pragmatists will rely on the readily available energy sources and the clean and efficient energy technologies associated with natural gas.

Indeed, whatever the EU's view is regarding renewables in the long-term, at the current state of technology, the most feasible and cost-effective feedstock for large-scale hydrogen production is natural gas, even though it remains an expensive process.

Hydrogen will become important, but there are barriers to be overcome associated with storage, distribution and, not least, perceptions of safety. If serious progress is to be made towards the development of a European hydrogen system, a practical interim strategy must be adopted within the context of the existing, extensive natural gas system which exists as a result of substantial capital investment over many years; this is a conclusion which echoes U.S. D.o.E. views.

There is, however, a misconception that the technologies needed to convert the natural gas infrastructure for the (partial) use of hydrogen are available today, but this is clearly not the case.

- **NATURALHY**

The European Gas Industry which, unquestionably, is better qualified for the task than most in Europe, is preparing to examine the barriers that exist to, and the advantages that might accrue from, the addition of hydrogen to the natural gas transmission and distribution system. Clearly the environmental advantages of delivering hydrogen to Europe could be significant with respect to the Kyoto targets - even if the distributed mixture contains no more than 20% hydrogen. However, this is not a trivial exercise and will necessitate both considerable R & D effort and significant external funding.

The NATURALHY project represents a large, integrated body of work that could lead to the widespread delivery of hydrogen in Europe within the next 20-30 years and, therefore, make a significant contribution to an enlarged Europe's environmental aspirations whilst, at the same time, provide a logical stepping stone to the feasible, but distant, hydrogen future in Europe.

CONCLUSIONS

It should be clear by now that in Europe it is essential to be, and to be seen to be, embracing sustainable development, especially if seeking to work with or be funded by the European Union. The examples above, which are ambitious and expensive R&D projects - GERG projects - have illustrated that opportunities do exist for the Gas Industry on the road to sustainability and that there are gas companies actively involved in pursuing solutions that are important both for their business and for the environment.

There is no doubt that we must each play a part in 'Catalysing an eco-responsible future'. However, partnerships are essential, as no-one can make sufficient impact on their own, and to maximize impact these collaborations must include funding from organisations such as the EU.

In Europe we are facing reduced R&D funding, amongst other liberalisation-induced pressures. In such times, many agree that it is important to maintain involvement in organisations that allow, even promote, collaboration in R&D to ensure that mechanisms exist for shared cost and shared risk R&D activities in a period when short-term business thinking is becoming increasingly prevalent.

In Europe we have been fortunate. GERG has been active in catalysing such activity over the past 40 years and continues to attract fresh new members who increasingly see the benefits of gearing up their research euros by working with their peers and by seeking financial support from the EU, where they are winning unprecedented levels of funding.