

GEO ENeRGY

Promoting R&D capability in the service of European Industry

ENeRG Launches Forum for RTD Debate

In launching our newsletter *Geo-Energy*, the members of the European Network for Research in Geo-Energy (ENeRG) aim to provide a new and unique forum for debate on strategic issues important to research, technology development and innovation both in Europe and its external markets. The newsletter will focus on energy resources from the Earth's sub-surface, with a strong emphasis on oil and natural gas, but recognising synergies in science and technology with coal, coal-bed methane, gas hydrates and geothermal sources.



With the crucial importance of geo-energy to the European economy well beyond the millennium providing the context, *Geo-Energy* will address:

- the relevance to European industry of a strong, industrially-aware research base;
- the role of research as a feedstock for innovation;
- the link between technical innovation and the competitiveness of European companies, including small and medium sized enterprises (SMEs), in both home and international markets;
- the impact of new knowledge and innovative technology on the development of Europe's indigenous geo-energy resources.

Geo-Energy will also be concerned with public-private sector collaboration in support of research capability and activity. It will examine and promote the case for strong, continued support at national and European Union level for science and technology in support of optimal, safe and environmentally responsible exploration and production of geo-energy resources. Particular attention will be given to the European Union's framework programmes.

Geo-Energy will be published four times per year. The Editors welcome your contributions to the debate in future issues.

Introducing ENeRG: its goals and activities

ENeRG, the European Network for Research in Geo-energy, was created in 1993 by European organisations involved in research and technology development (RTD) focused on fossil energy sources, especially oil and gas. It was formed to promote European RTD capability in the service of Europe's geo-energy exploration and production industry and its associated service and supply sector.

Against a background in which oil and gas are expected to supply a large share of the increasing energy demand in the first decades of the next century, ENeRG members recognise that meeting this demand at an affordable price will represent a real challenge in research and in technical innovation. This issue is of particular concern to Europe as the anticipated sharp decline in North Sea production after the year 2000 will dramatically increase dependence on external sources for its oil and gas supplies.

The aim of ENeRG is to promote industry-oriented research, development and demonstration to meet the future challenges. It also works to establish a platform to develop wider and deeper co-operation in RTD and between RTD organisations and industry at the European level.

ENeRG currently has 30 Members from 12 countries (11 in the European Union and Norway). ENeRG has an open structure and operates at two levels: the international level with one Member organisation playing a lead role in each country and the national level with networking in each country.

The main objectives of ENeRG can be summarised as follows:

- to identify and match opportunities and requirements for new RTD programmes which will bring benefits to European industry;
- to explore and promote where appropriate scientific and technical collaboration between Members of the network through, for example, an improved flow of public domain information and the provision of a forum for discussion of issues which may benefit from joint action;
- to promote communication on RTD matters within European industry and in particular to develop effective avenues of communication with those organisations representative of European industry;
- to develop and present the coordinated views of Members to the institutions of the European Union;
- to inform and advise Members on issues relating to RTD arising from the activities of the European Commission;
- to promote the transfer of European know-how and technology to third countries.

Among other activities, ENeRG will conduct strategic studies aimed at providing industry and other national and European organisations with a better perspective on the role and potential of RTD and innovation to impact geo-energy supply. Topics will include the future potential of the North Sea, the route to further cost reduction in the hydrocarbons production chain through use of innovative technology, and a survey of the strengths of the oil and gas service industry in Europe.

Through this newsletter ENeRG Members will disseminate information and encourage debate on issues of importance to the European geo-energy industry and related public policy.

*We hope you will find *Geo-Energy* informative and a valuable forum for the exchange of views. If you would like to contribute to future issues, please contact a member of the Editorial Committee.*

Maintaining the *European* research base

The research community at large, is a major resource for technology development, innovation and ultimately improved competitiveness in European industry.

The research base plays a key role in setting the directions for research and in determining what is achievable in technology development. Researchers also play an important part in assisting with or executing product development as new technology moves closer to commercial application.

With wide and renewed recognition of the importance of research investment to wealth creation, public sector sources of research funds have tended to become more focused on applied research and on shorter term deliverables. This is an important shift and has its place. However there is need for balance

and for a deeper appreciation of how competence in the research base is built. To secure the long term value of the research community this competence base has to be supported and stimulated.

As research institutes, members of ENeRG are frequently made aware that funding for longer term, far-from-market research is no longer so readily available. R&D funding seems to be less risk willing at present, leaving some institutes in a market where the profit margins are small.

ENeRG wishes the public sector and industry to recognise their shared stake in Europe's research base in geo-energy and related subjects and to re-examine their roles and the different funding mechanisms available.

In general it must be appropriate for research funds from national governments and the European Union to be used strategically to secure and renew the competence of the research base. We are concerned that all parties should not run to occupy the same ground: a clearer determination of roles would improve effectiveness and also efficiency.

In offering ENeRG's perspective, members recognise the part of researchers in these developments. Often in the past, research projects, even when marketed as "industry-oriented", have become too "academic" and focused on the researchers' interests once project funding had been secured. Today, to be successful in winning funds research groups are developing stronger links with the industry they serve, such that

the industry needs are the focus of the research.

A whole new set of market rules between industry, government agencies and the research community is required, through which industry can benefit from the research base more effectively now and in the future. New mechanisms have to be found to support the longer term needs of the research base for maintenance and renewal. We need to make more effective the translation from basic and strategic research to market use. Finally, we need to ensure that available public funds for research are not crudely leveraged as subsidies behind industry directed RTD, but rather, in consultation with industry, used to secure a European RTD resource of internationally recognised quality to meet future needs.

A staged evaluation procedure for **Joule?**

It is important that the processes surrounding the submission, evaluation and selection of RTD project proposals are effective and seen to be fair. The question arises however whether in addition there is room for improvements in efficiency.

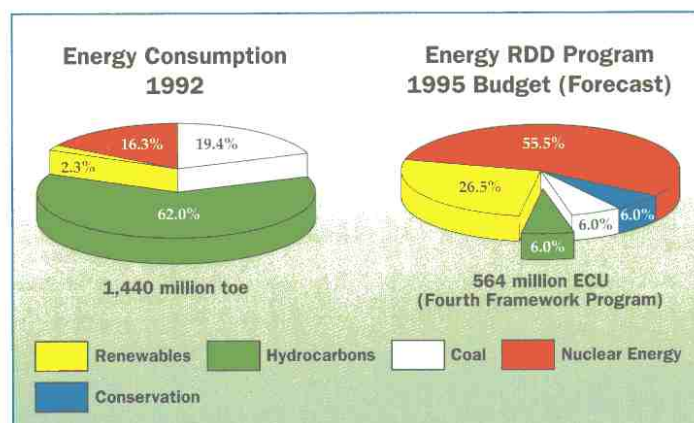
In the summer of 1994, the European Commission organised a Joule Programme geoscience fair in conjunction with the European Association of Petroleum Geoscientists' meeting in Vienna. This fair was the starting point for the new Joule Programme within the 4th Framework Programme. Around topics of common interest, scientists of many nationalities and disciplines, began the demanding process of defining research objectives and forming suitable consortia in advance of making proposals to the Programme. Consortium members then approached industry to discuss co-operation and the provision of support.

As part of its activities in the run up to the submission of JOULE proposals, ENeRG initiated the wide circulation of what was known as a

Notice of Intention, i.e. synoptic information from ENeRG Members on their plans to submit JOULE proposals and on any outstanding requirement for additional partners. This process resulted in co-ordination of many project initiatives, the creation of a number of new research groupings, and importantly, a reduction to a very large degree in unnecessary duplication of effort.

The call for JOULE proposals was made in December with a submission dead-line of 24 March 1995. After Christmas, work started in earnest. Typically groups of four to six participating organisations, from three or four countries, proceeded to spend what often would amount to 0.5 to 1 work year in total on completing each research proposal.

There is little doubt that this process constitutes a good learning experience which adds considerably to forging a well-functioning research consortium. It is, however, difficult to properly estimate in advance how much competition for the funding there might be. In addition, although everyone studies the call for the



Programme and other available material very carefully, it is still very difficult to estimate in advance, how a particular proposal might be received by the expert reviewers and EU officials. Considering the general size of the research funds available, the resources put into the effort of producing a high quality RTD application are not trivial - especially if the proposal receives no funding.

It would seem to be cost-efficient and desirable to convert into productive RTD activity as much as possible of the time and funds now being used by scientists to generate research proposals. One way to do this would be by introducing a formal pre-screening procedure. The pre-screening must be straightforward, i.e. a comprehensive but brief account of the project

proposal and the capabilities of the researchers on a few pages, and a response time from the Commission of the order of a few weeks. The involvement of "experts" is still practicable. The pre-screening option could be open either for a fixed period of time prior to the proposal dead-line or it could be open at any time between calls. A method such as this is already used in parts of the THERMIE programme, and it is also being used successfully by the Department of Trade and Industry in the United Kingdom for its LINK Reservoir Sciences Programme.

A re-examination of proposal submission and evaluation methods with the aim of improving efficiency without loss of effectiveness should be undertaken now.

Oil and Gas RTD: securing the future

The view that hydrocarbons will be the main source of energy and chemical feedstock for the next 40-50 years is widely shared. However, oil and gas production in the EU is expected to decline over the next 20 years.

The countries of Saudi Arabia, Kuwait, Iran and Iraq can, of course, supply Europe with oil and other hydrocarbon-related products. From data published by the European Commission (EC) it appears that dependence on outside sources will increase from 48% in 1990 to 59% in 2005. However European expertise and technology, properly supported, can impact supply.

The EU has played a significant role in the development of new knowledge and advanced technology for the exploration and production of hydrocarbons. Technologies such as flexible risers, subsea production equipment, floating platforms have all received financial support from the EC. This support was crucial, particularly in support of manufacturing, engineering and service companies, which do not have the resources to support in full the high costs of the required research, technology development and demonstration (RTD&D) by themselves.

The mood now seems to have changed and fewer resources are being made available in the EU's non-nuclear energy programmes for activities in support of geo-energy.

As Table 1 shows, "energy", despite its crucial place in economic and industrial development, no longer seems to be an EU priority for RTD&D. If the energy budget was 50% in the 1st Framework Programme initiated in 1984, it now represents less than 20% of the budget for the present 4th Framework Programme. In particular, in recent years there has been a significant erosion of the budget for action on fossil fuels from 310 MECU in the 3rd Framework to 220 MECU in the Fourth (Table 2).

Table 1 Fourth Framework programme (1995-1998)

Field	Funding in MECU
First activity - RTD and demonstration programme	10686
I. Information and communication technologies	3405
1. Telematics	843
2. Communication technologies	630
3. Information technologies	1932
II. Industrial technologies	1995
4. Industrial and materials technologies	1707*
5. Standards, measurements and testing	288
III. Environment	1080
6. Environment and climate	852
7. Marine sciences and technologies	228
IV. Life sciences and technologies	1572
8. Biotechnology	552
9. Biomedicine and health	336
10. Agriculture and fisheries (includes agro-industry)	684
V. Energy	2256
11. Non-nuclear energy	1002
12. Nuclear fission safety	414
13. Controlled thermonuclear fusion	840
VI. Transport	240
14. Transport	240
VII. Targeted socio-economic research	138
15. Targeted socio-economic research	138
Second activity - co-operation with third countries and international organisations	540
Third activity - dissemination and exploitation results	330
Fourth activity - stimulation of the training and mobility of researchers	744
Total	12300**

*including 90 MECU for the Joint Research Centre direct activities

**including 1028 MECU for the Joint Research Centre programmes

ENeRG considers that the level of financial support from the 4th Framework programme for oil and gas is inadequate, especially when compared with the importance of this energy resource.

Recently, the JOULE Programme's evaluation of proposals coming from the first call within the 4th Framework Programme gave an interesting result: we believe that the total

amount of approved projects addressing renewable energy research fell short of the allocated budget, while some "supportable" oil and gas proposals were rejected for lack of funds. Renewable energy sources are important and achieving an appropriately balanced allocation of RTD&D funds is not straightforward. Nevertheless, it is important that allocation is based on sensible,

weighted criteria. This should include the share of supply (actual and expected) provided by the various sources, their technical maturity and environmental impact, the RTD effort needed to bring results to the market and the likely impact of RTD on security of supply, on employment and export. We believe that using these criteria RTD&D investment by the EU in oil and gas should be increased significantly.

At present, industrial investment is not seen as an attractive use of capital. Oil and gas exploration and production companies, adjusting still to lower prices for oil and gas and to rising "finding" and field development costs, place their own pressure on the financial margins achieved by the innovative service sector companies. This in turn can adversely affect ability to re-invest in innovation, especially among the many small and medium sized enterprises in Europe's oil and gas service sector.

Should Europe allow its indigenous oil supplies to decline faster than necessary, becoming increasingly reliant on imports? With oil prices presently at a low level this could be seen as a viable option, even though in the past there have often been unexpected reactions in the oil market. Every oil price shock has its cost and the availability of secure oil and gas reserves is a prerequisite for dampening sudden turmoil.

ENeRG proposes instead a strategy in support of technical innovation to improve efficiency and effectiveness of exploration and production. The impact will be not only to optimise indigenous resources, both discovered and undiscovered, but to enhance the competitiveness of European firms in international markets. Support from the EU can be a major incentive in developing the new technologies essential to providing a stable, affordable supply of oil and gas produced in an environmentally sound and safe manner.

Table 2 Non-Nuclear Energy Programme

Sector	R&D (ex JOULE MECU)	Demonstration (ex THERMIE)
Rational use of energy	95	118
Renewable energy	221	134
Fossil fuels	39*	181*
Total	355	433

*approximately 50% for hydrocarbons

The RTD marketplace

There is no consistent, systematic route from research to innovation. The process is not linear: it depends both on technical and market factors. One element is the workings of the RTD marketplace.

The main market players in the petroleum exploration and production (E&P) sector are described below.

Universities

- Basic, strategic and applied research providers. There can be a blurring of the distinction between research and consultancy/technical studies for industry.
- Infrastructure and projects funded by national governments. Project funding is also received from the European Commission (EC), from individual companies, and from industry consortia.

Some companies fund staff positions and/or infrastructure in universities, e.g. buildings, equipment. As a "public good" investment, companies may seek nothing in return other than public relations advantages. In other cases, a company may invest to access new capability.

- Mixed mission of research, education and training, also in some cases technical studies/consultancy.
- Beyond peer reviewed publications, there is no consistent view amongst universities on their role in information/technology transfer to industry and an uneven approach to the management/exploitation of intellectual property.

Research institutes

- Strategic and applied research and technology development providers, also engaged in

consultancy and technical studies.

- Funding received from national government for infrastructure, but to a varying and diminishing degree (see below), and for projects. Project funding is received from the EC, from individual companies, and from industry consortia.
- Focus is on the "business" of RTD. They are undergoing a progressive shift from predominantly public funding to reliance on industry. Geological surveys have a strategic role in national geo-energy resource evaluation in addition to working under contract with industry.
- Substantial resources usually devoted to the management of intellectual property and to information/technology transfer.

There is growing interest among international E&P companies in "far market" RTD organisations, especially in US based defence laboratories.

E&P companies in RTD

- Clients of RTD providers and potential end users of RTD output. Companies both initiate RTD activity and respond to unsolicited proposals from third parties.
- A sub-set of E&P companies operating in Europe have in-house RTD capability located within Europe and/or outside, notably in the USA.
- In-house RTD activity levels have fallen over recent years (but see national petroleum companies below). There is tighter focus on shorter term needs of internal business units. There is increased reliance on external capability for strategic and applied research.
- Major companies will utilise the best RTD capability wherever it

is to be found internationally, but may also help foster the growth of national RTD capability in new areas of business activity.

- National petroleum companies e.g. in South America and SE Asia have a growing in-house capability in RTD.
- Ownership of intellectual property rights is not usually a primary concern.

Service and supply companies in RTD

- In-house RTD capability exists in a sub-set of larger companies, focused on commercially sensitive applied research and technology development.
- They are users of the output from RTD organisations and sometimes "clients" on specific external projects.
- Larger, integrated service companies are taking on more of the operations of E&P companies. This may blur the distinction between E&P

companies as end users of RTD and the service sector as intermediate users, with RTD agenda setting passing increasingly to the latter.

- Smaller companies may be technically innovative but have limited scope for investment in RTD and then usually only in near market technology development. Various national government and EU schemes are now in place to support their wider participation in RTD.

An effective, efficient European RTD market will play an important part in securing the future of affordable, secure supplies of oil and gas, and in maintaining and further developing a healthy, internationally competitive European service industry.

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