The Association of Geological Surveys of the European Union
(EuroGeoSurveys)
in their position as
custodians to their national natural resources
and
guardians of their terrestrial environment

present their contribution
to the Debate on the Commission's Green Paper:
"Towards a European strategy for the security of energy supply".

Geology, opportunities for a more independent energy policy of the European Community.

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What are your areas of interest?	Geological Survey information provides the baseline for the decision making by Member state government and industry in the fields of natural resources, in the soil and subsoil and includes in general the following fields of interest: • Information technology and communication geodata • Soils and land use planning • Groundwater resources • Mineral resources • Natural geohazards • Earth energy resources • Urban development • Coastal and marine geoenvironments • Geological aspects of climate change • Research, innovation and technology foresight in geoscience • International cooperation
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INTRODUCTION

EuroGeoSurveys: decision support for environmental and natural resource policy in Europe

EuroGeoSurveys is a non-profit association of the national Geological Surveys of all fifteen European Union countries plus Iceland, Norway and Switzerland, managed by the General Meeting of eighteen Directors who currently supervise over 6000 professionals active in the public interest in basic and applied geosciences programmes. Since January 1996, a full-time Secretary General has represented the association in Brussels. EuroGeoSurveys uses its members' expertise and information to:

- Bring together the Surveys, enabling them to jointly address European issues of common interest.
- Provide a permanent network between the Surveys and a gateway to each one and its national networks.
- Assist the EU institutions to obtain joint technical advice from the Geological Surveys.
- Promote appropriate contributions of geosciences to EU affairs and action programmes.
- Initiate, develop, and promote geosciences inputs to bilateral and multilateral programmes with European and other countries.

Each member Survey reports to its government on the state of the country's landmass and Earth resources and maintains large geosciences information banks. EuroGeoSurveys is thus a network of national topic centres, each of which provides government and industry with comprehensive, objective baseline information to support decision-making on natural resource (minerals, energy, water, soils) and environmental issues, such as the holistic monitoring and preservation of the environment.

EuroGeoSurveys promotes Survey work to the EU institutions as relevant to European problem solving in these issues and has contributed opinions on minerals research,

groundwater resource policy, the urban environment and the content of new RTD Framework Programmes.

EuroGeoSurveys formulates forward strategies in eleven main policy sectors (networks) which reflect priorities on the EU agenda: information and knowledge transfer; sustainable land use planning; CO_2 disposal; natural resource demands; natural geohazards (including earthquakes); clean water, urbanisation, pollution and waste management; quality of the coastal and marine environment; land instability; impacts of climate change; and effective international cooperation in the Developing World, PHARE and TACIS programmes.

As organisation, EuroGeoSurveys does not seek involvement in political or economic debates as such, but rather provides technical and scientific input to the ongoing debate. Hence, EuroGeoSurveys has opted to leave a number of questions in the debate unanswered as they fall outside the scope of our expertise.

As national custodian to the natural resources, and guardian to the terrestrial environment, EuroGeoSurveys can offer input on a number of geology inspired opportunities in the fields of environmentally safe and sustainable energy development.

QUESTION 3

Are taxes and state aid policies in the energy sector an obstacle to competitiveness in the European Union or not? Given the failure of attempts to harmonise indirect taxation, should not the whole issue of energy taxation be re-examined taking account of energy and environmental objectives?

ANSWER:

Tax and state aid policies are obstacles when they lead to disturbances of the market both in terms of competition between different energy resources and in terms of competition between different regions within the EU.

Indeed, deep coal mining in a complex geological setting is per definition more difficult and more expensive than open cast mining. This creates an unbalanced market situation causing in the end, the closure of the non-competitive deep mines. However, as closure of mines is usually irreversible, this would mean the loss of substantial strategic energy reserves.

The competitiveness of small-scale investments in sustainable energy solutions, such as domestic solar panels and heath pumps based on geothermal and/or hydrothermal energy, are hampered due to tax policies. The individual house owner pays a non-reimbursable VAT on his sustainable energy investment, whereas larger energy utilities have this added cost fully reimbursed or partly replaced by a far cheaper investment tax.

At the same time, difficult to exploit resources can trigger the need for more cost efficient exploitation thus forming the lead to new innovative developments. Hence, the question raised in the Green Paper on the necessity of maintaining strategic mines open is justifiable.

In general, a well structured and flexible taxation policy, or a policy of subsidizing innovative research, can enable the development of less competitive energy resources, e.g.: geothermal energy, marginal oil and gas fields, deep coal mines, leading to an increase in recoverable reserves, an increased competitiveness, substantial technological spin-off, and stimulation of employment.

QUESTION 4

In the framework of an ongoing dialogue with producer countries, what should supply and investment promotion agreements contain? Given the importance of a partnership with Russian in particular, how can stable quantities, prices and investments be guaranteed?

ANSWER:

The European Community has all the knowledge and technology needed to guarantee sound exploration and exploitation of energy resources in remote or challenging areas, including Russia.

EU established Company participation in both technological and financial development will enable the European community to take a partner role in infrastructure, investment and capability.

On the other hand, as long as political stability is not achieved in some of these CIS countries the European Community should ensure its energy independency through the installation of flexible, readily available replacement systems to cover larger gaps in the energy delivery from the exporting countries.
This can be achieved in different ways:

1. Increase the development of sustainable energy resources
2. Install sufficient capacity for stockpiling of energy reserves.
3. Ensure alternative energy import options.

In order to achieve the optimal balance, a sound and elaborate modelling and decision support system should be developed to enable swift rerouting of the energy resources. Stockpiled reserves should be calculated based on the swiftness of reaction to a rupture in energy deliverance. The operation of such a strategic energy decision support system should become the statutory task of the commission, or should be delegated to a separate operational unit.

QUESTION 5

Should more reserves be stockpiled- as already done for oil – and should other energy sources be included, such as gas or coal? Should the community take on a greater role in stock management and if so, what should the objectives and modalities be? Does the risk of physical disruption of energy supplies justify more onerous measures for access to resources?

ANSWER:

The need for stockpiling of reserves depends on the degree of reactivity of the energy sector. Therefore, a strong and lasting solution needs to be found in a combination of both stockpiling and increased reactivity and flexibility.

The Dutch example (page 29 of the Green Paper) based on a stimulation of the use of small-scale gas reserves, balanced for peak demand by the Giant Groningen reserve, gives a perfect example of such a scheme. The Dutch situation, though exemplary, is highly dependent on a specific geologic setting and therefore not directly applicable elsewhere. The system is nevertheless adaptable to other settings, provided the exploration/production strategy is altered drastically.

It is all too often readily accepted that small, or rather economically marginal, fields will be developed when energy prices are in general sufficiently high. History has proven this to be only limitedly true. In fact, even in an era of high-energy prices, the amount of money and human resources available for investment is limited and usual, when commercial companies have limited resources, they invest in those projects that deliver the highest

rate of return with the lowest reasonable risk. Hence, even during a period of high-energy prices, those reserves that are largest, or cheapest to produce will be developed first. Such investment strategy incorporates the danger of a strong, self-accelerating and early killing process to the European strategic energy resources. Such devastating scheme will without counter measures develop as follows:

PHASE 1

- Development of largest reserves.
- Energy safety at reasonable price.

PHASE 2

- Depletion of largest reserves.
- Additional import of energy.
- Start of development of marginal fields.
- Installation of stockpiling facilities.
- Energy safety at reasonable price due to massive import.

PHASE 3

- Abandonment of largest reserves.
- Complete dependency on import.
- Abandonment of development of marginal fields due to lack of technology.
- Searing energy cost as result of a combination of: total dependence on import, high abandonment cost, high production cost.

Such a situation could very well destabilize the European Energy market, leading to an economic crisis. By stimulating the development of marginal fields without further delay, the European Energy market may develop along a much more stable and predictable scenario:

PHASE 1

- Investment in RTD for development of marginal reserves.
- Develop marginal fields preferentially and use larger fields for stockpiling.

This will result in:

- Development of larger total recoverable reserves in EU.
- Limited benefit to the companies and the states (high production cost)
- Postponement of benefit from the largest fields.
- Development of new innovative technologies
- Reduced need for new stockpiling projects (increased flexibility).

PHASE 2

- Alternating closure and development of marginal fields.
- Balanced by larger fields with a longer lifetime.

This will result in:

- Development of larger recoverable total reserves, estimated at millions of bbl of oil and hundreds of billions of m^3 of gas.
- Availability of cheap stockpiling facilities (abandoned marginal fields).

PHASE 3

- Abandonment of marginal fields
- Depletion of largest fields.

This will result in:

- Phased abandonment cost.
- Continued production at reasonable cost.

In the end, a policy of stimulating the development of smaller (or marginal energy reserves)

will result in:

- An increase in total recovery from the EU territory.
- More stable energy prices.
- Development of innovative technologies.
- Availability of cheap stockpiling facilities.
- Affordable, phased abandonment cost

Coal stockpiling seems not justifiable as long as shipping lanes remain open. Also, stockpiling is not recommended as it uses large surface areas in densely populated regions. During stockpiling, coal is deteriorating in quality and may form a threat to public health

QUESTION 7

The development of some renewable energy sources calls for major efforts in terms of research and technological development, investment aid and operational aid. Should co-financing of this aid include a contribution from sectors, which received substantial, initial development aid and which are now highly profitable (gas, oil, nuclear)?

ANSWER;

One of the most versatile renewable energy sources is geothermal energy. Geothermal energy knows many different both small and large scale, high and low temperature operations. Applications vary from storage of cold or heath, through heating of different size projects, to production of electricity with applications in space heating and cooling, industry, greenhouses, fish farming, and balneology.

Geothermal energy uses mostly existing technology and straightforward engineering and is therefore immediately applicable. Little RTD investment is needed for a large-scale geothermal application.

Geothermal energy is also very environmental friendly. Under the closed loop system as routinely applied nowadays, produced fluids and gases are reinjected. Hence, there is no emission neither of fluids on the surface waters, nor of gasses (CO_2 emission zero). The installation consists of the number of reasonably small pumping units and heat exchangers, with a limited contribution to horizon pollution.

With the recent development of ground source heat pumps using the earth as a heat source, virtually every single region within the European Community has access to geothermal energy. (e.g. Switzerland with its 7 millions habitants produces **434 GWh/y** by use 7 heat pumps).

The world Energy Assessment report (UNDP, UN-DESA and the World Energy Council calculates the current energy cost to be the order of 2-10 eurocents/kWh, comparable to the energy cost for hydro stations.

Most of the stimulation measures have earlier been described in the “Blue book on Geothermal Resources” (DG TREN). However, extra stimuli can be achieved by incorporating geothermal development percentage wise in new licence contracts for existing energy producers.

QUESTION 8

Seeing that nuclear energy is one of the elements in the debate on tackling climate change and energy autonomy, how can the Community find a solution to the problem of nuclear waste, reinforcing nuclear safety and developing research into reactors of the future, in particular fusion technology?

ANSWER:

Apart from the limited known world reserves, the largest problem to Nuclear Energy is the storage of radioactive waste. Although large amounts of money have been invested in the past in research into the fundamental and site specific questions related to public health, the debate still goes on whether or not subsurface nuclear waste disposal is safe.

The ambiguity is mainly related to a lack of understanding of the four-dimensional geological and hydrogeological systems. However, studies did show that retrievable subsurface storage is technically feasible and that the maximum level of exposure of individuals even after 100 000 years is still much lower than the ambient dose rate.

The question raised in the Green Paper whether it is at all necessary for every single waste producing country is justifiable. Indeed, in the case of hazardous waste disposal, one should always look for the safest location, even beyond national borders. Co-storage of waste should be safer, easier to monitor, with better retriesability, and improved pan-European research cooperation.

QUESTION 9

Which policies should permit the European Union to fulfil its obligation under the Kyoto Protocol? What measure could be taken in order to exploit fully potential energy savings, which help to reduce both our external dependence and CO_2 emissions?

ANSWER:

Underground sequestration of CO_2 can deliver the most significant reduction in CO_2 emission, beyond the Kyoto targets, quickly and verifiably. Already a first EU-funded full scale CO_2 sequestration demonstration project (SAS/: Saline Aquifer Carbon Sequestration) is operational, however, in order to prove safe and viable sequestration, more storage sites, of different geologic settings need to be developed and monitored. Close monitoring is an absolute necessity, as well as worldwide exchange of ideas and experiences.

Other geology based opportunities for CO_2 sequestration, including CO_2 injection in coal beds and closed underground mines, need further RTD investment