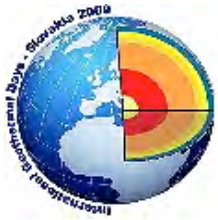

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VII.1.

GTR-H – GEOTHERMAL LEGISLATION IN EUROPE

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ABSTRACT

The IEEA, Altener funded GeoThermal Regulation – Heat (GTR-H (www.gtrh.eu)) project runs from October 2006 to October 2009 with the aim of identifying and reviewing the regulatory barriers and deficiencies for geothermal heat in unregulated EU countries. The GTRH project aims to develop a template framework for geothermal regulation in the EU which would provide the basis for the development of national framework documents. Four 'target' countries were chosen which had a poorly functioning regulation or no geothermal regulation; Hungary, Ireland, Northern Ireland/UK and Poland. Expertise in four regulated or 'Best Practice' (BP) countries France, Germany and Netherlands provided a review of best practice geothermal legislation.

Of particular note in the analysis of the barriers both in the 'target' and the BP countries were issues to do with resource ownership/usage, multi resource licensing, limits of geothermal reservoirs, financial barriers and support for geothermal. It has become clear that geothermal regulation in the projects partner countries as well as in the EU-27 and broadly in the international context is influenced predominantly by the preceding natural resources legislation. Following from the national framework documents, guidelines for the establishment a framework document for geothermal regulation in the EU 27 have been developed and disseminated to a broader international audience. The GTR-H project builds on previous EU projects such as K4RES-H in the renewable energy sector.

1. Introduction

This project is currently in its final stages and will conclude its major deliverables with a closing conference to be held in Dublin, Ireland on 30th September and 1st October 2009. The Irish based geoservices consultancy, the CSA Group who initiated and coordinates the project recently merged with the UK based International environmental consultancy SLR Consulting Ltd. and currently coordinates the project under the title of SLR Consulting (Ireland) Ltd.

The project consortium for GTR-H comprises a range of government bodies, intuitions and associations, each representing a country with the exception of the European Geothermal Energy Council (EGEC) representing the geothermal sector in Europe (partner names and logos are included in Table 1).

The project was designed with a process of discussion and consultation with key target actors and stakeholders at a national level at each stage of review and included a series of study tours to assess the effectiveness of the regulation in each case. The ultimate aim of the project is to increase overall sectoral investment in the exploration and exploitation of geothermal heat across the EU.

2. Background

The GTR-H project follows on from the Kistelek Declaration which was announced in Hungary in April 2005 and did the initial work in identifying the key stratedgies needed for development of geothermal resources and regulation in the EU as follows;

- Secure the environmentally friendly use of geothermal energy, in particular concerning protection of underground drinking water resources, emissions, etc.
- Regulate competing uses and securing sustainable use of geothermal energy
- Grant investors certain right to use geothermal energy in a given area and to a given extent, as the basis for business plans.

Both from the K4RES-H project conclusions and initial results from the GTR-H project it is apparent that the present lack of regulation for geothermal energy exploitation over most of the EU is inhibiting the effective exploitation of this underutilized resource. The project was planned to outline and encourage investment in geothermal energy by private and public sector partnerships.

3. Expected Results and Broader Impacts

The project has as its major measure of performance government level acceptance of the need to accommodate geothermal energy exploitation in national environmental, water and resource legislation in the Target countries. This is to be accompanied by actualization into consultation by the relevant ministry with geothermal stakeholders and initiation of drafting new geothermal legislation or adaption of existing legislation.

On a broader basis it is envisaged that there will be transferability of the framework to the remaining EU-27 countries to suitable legislative and regulatory schemes that facilitate geothermal energy exploitation

The framework will also assist in the creation of new market opportunities resulting from transparency in the international geothermal sector and therefore the opportunity for increased private sector cross border investment.

4. Methodology Overview

The review of best practice and deficient regulations and consultation with the stakeholders and key target groups has been the key element providing the data necessary to allow the definition of a framework which can accommodate the legislative, environmental, energy, planning and financial considerations. This has been completed for each of the target and best practice countries.

SLR Consulting (Ireland) Ltd. (Coordinator – Ireland)
Geological Survey of Northern Ireland (GSNI)
European Geothermal Energy Council (EGEC)
Hungarian Office for Mining and Geology (previously Hungarian Geological Survey)
Polish Academy of Sciences
Bureau de recherches geologiques et minieres
Geothermischen Vereinigung e.V
Stichting Platform Geothermie

Table 1: GTR-H Partners

The project consulted broadly with the national geothermal sector through each partner. The key target groups identified and consulted with as stakeholders in the geothermal sector are as follows: Decision Makers at national government level, Government agencies (water, energy, environment and planning), Trade and industry associations, Bank and

financing institutions, Legal representatives, Geothermal educational facilities and associations, Geothermal exploration/resource assessment consultants, Geothermal end users.

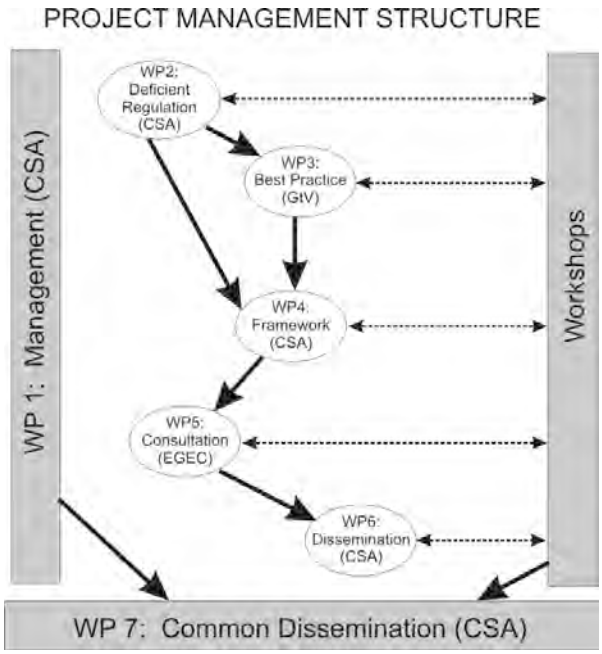

Table 2: GTR-H project structure

The project has provided for dissemination of information and discussion and interaction between all partners at every stage of the project as this is seen as key to the success of a regulatory framework. Regular committee meetings with workshops allowed discussion of the issues raised and solutions to be found. Provision was made for the observation of team partners in local workshops therefore giving opportunities for alternative country views to be included in the local discussion and a broader view of the potential solutions to be considered throughout the process.

The results have been summarized to produce a 'matrix' which relates the identified barriers to geothermal development to the solutions been applied in the best practice countries and further afield. This has been adapted to provide a basic framework of the issues that are likely to arise and a proposed approach for dealing with them in any national regulation being considered. Details are provided below.

5. Results so far – A preliminary Framework

The following summary sets out a preliminary draft text indicating some of the issues for inclusion and consideration in a geothermal framework for nacional regulation/legislation as concluded from work so far completed in the GTR-H Project. The issues to be dealt with generally separate into three main areas as follows; legal guidelines, financial incentives guidelines and general guidelines for flanking measures.

5.1. Legal Guidelines

5.1.1 Define Geothermal energy

Of primary imporatnce in the development of any geothermal regulation is a clear definition of geothermal energy. The consortium has discussed this and laiased widely and has agreed that the following definition as defined by the Directive on RES, 2008 is most appropriate:

'Geothermal Energy is the energy stored in the form of heat beneath the surface of the solid earth'.

Additional parameters could be used for specifications to account for resource type extraction. Depth, temperature, flow rates, end use, systems capacity/size could be used to steer the permitting process and exact parameters should comply with existing resource regulations:

5.5.2.Clarification of geothermal resource ownership

Primary national legislation (through existing or modified natural resource legislation or separate geothermal legislation) needs to clearly define the ownership of the resource at a national level as well as nominating an authority with power to issue licences for exploration and development of the resource. There are a Lumber of issues that may be relevant in different countries as follows;

- The ownership of the geothermal resource may be treated like a mineral or petroleum resource. Initially countries could chose between the existing mineral or the petroleum exploration and development legislation.

- The state may own the geothermal resource or govern the right to use of the resource and grants licences to a company to explore for and produce geothermal energy.
- A new single Geothermal Act could follow at a later date to take account of lessons learned after several years of geothermal exploration.

5.1.3. Adoption of a licensing system

A system of licensing for exploration and exploitation for geothermal resources should be in place as a primary requirement to develop and regulate the national geothermal sector.

- For shallow geothermal exploration and development where licensing is required the local authorities could be the licensing body. Initially for deep geothermal resources exploration and development the licensing authority could be the department responsible for mineral or other resources exploration.
- The provision of one e-government portal for deep geothermal exploration applications is recommended.
- The application procedure for deep geothermal exploration and exploitation licences should be clearly stated in specific guidelines to potential applicants. The application process should be managed by the relevant licensing authority. These guidelines should help streamline application submissions.
- The system should grant the licensee the exclusive right to exploration and exploitation of geothermal resources over a defined area for a defined period.
- The administrative process for the granting of a deep geothermal exploration licence should not exceed an overall period of six months.
- Geothermal exploration licence duration should be no longer than six years and should include facility for annual (or bi-annual) reviews by the licensing authority based on a submitted and agreed work programme by the potential licence holder.
- Deep Geothermal Energy exploitation permits should have duration of no less than 20 years thus lasting the normal minimal lifetime of an average well doublet. A renewal option for a period not less than 5 years should be made available to the licence holder subject to review of the production rates and their associated impacts on other natural resources.
- Programme plan and results data relating to any geothermal energy projects (shallow or deep) should be submitted to the appropriate national licensing authority. These data should fulfil all requirements of the primary legislation for the natural resource, planning, EIS, groundwater (including monitoring data) (others are required to be added here based on EU legislation).
- Confidentiality of submitted data associated with licensed geothermal operations should be set out in the primary regulatory structure as for other strategic natural resources. Where the resource is included in other legislation (ie: mineral, petroleum legislation) a confidentiality period during the granted licence period and for a period subsequent to the surrender of the licence should be outlined specifically for geothermal energy. This should clarify the periods where data is confidential while also providing guidelines for making monitoring data available to the licensing/monitoring authority during the licensing period and subsequent to surrender. This period should be between 4 to 6 years after surrender of the license.
- Groundwater abstraction permits for geothermal energy production should be based on the national groundwater abstraction/pollution control regulatory regime with due regard to specific issues of geothermal systems.
- The cost of geothermal exploration licences should be set lower than the petroleum and mineral exploration licensing costs to reflect the comparatively lower economic return potential and to promote a national renewable energy action plan.

5.1.4. Simplification of regulations and Adm.-nistrative procedures

- Shallow geothermal energy usage should be regulated where necessary through local planning laws where large sized commercial systems are installed: A flow rate cut-off for pumping groundwater as a heat source could be applied to define which projects require a license in order to comply with national groundwater abstraction legislation.

- Small size domestic systems and closed loop collectors should be the subject of a simple information submission form to a nominated government agency to ensure suitable monitoring at national level of resource usage and protection especially in vulnerable areas. These should require no exploration licence; however, the reporting of new heat pump installations to the competent authority is required for registration reasons.
- Existing national planning, natural resource, environmental, water abstraction and building legislation should be used, with modifications if necessary, to regulate the shallow, commercial geothermal sector.
- Deep geothermal energy abstraction should fall in line with the EU groundwater policy (directive 2000/60/EC, Groundwater Framework Directive) where implemented and national groundwater legislation by requiring the use of re-injection or closed circuit systems.

5.1.5. Nomination of an administrative body

A national geothermal authority or independent expert body (competent professional body or cooperative network of competent authorities) is recommended to have the responsibility to promote the geothermal energy sector, issue licences for exploration and development of the resource, review licence case specific applications and facilitate the geothermal licensing application system. The key issue here is that professional competence specifically in the geothermal area should be a prerequisite for the authority responsible for reviewing, issuing and monitoring licenses.

- Initially the licensing authority could be the department responsible for mineral exploration if appropriate. For shallow geothermal, the local authority could be the licensing authority. For deep geothermal exploration and production the department responsible for mineral exploration and development could be the licensing authority with input from the regional authority
- The authority responsible for granting the license can be a different authority from the one that monitors the project.
- The authorities need to recruit geothermal energy experts with professional accreditation and use established geothermal standards.

5.1.6. Reporting for geothermal resources inventory & statistics

- There is a need for each country to adopt a national strategy that establishes the geothermal potential, identifies targets and increases the public awareness of geothermal energy.
- Insufficient data base: Presently, statistics on the heating sector and inventories of the geothermal resources in general are weak. A speedy establishment of robust market data and reliable statistics that allow the establishment of a baseline as well as progress monitoring is essential.
- Shallow and deep geothermal resource borehole drilling should be reported as part of the permit requirements to the relevant national government agencies, to ensure that there is a record of installed shallow and deep geothermal system. This will help the implementation of a successful national geothermal energy development strategy. There should be a requirement to furnish basic borehole information to a centrally maintained borehole inventory that will be used for planning decisions at the local level.
- Yearly monitoring data from large commercial producing systems should be submitted to the relevant licensing authority together with all other data of significance to the resource parameters and its exploitation.
- Monitoring data should include heat production, temperature of the carrier fluid at surface, flow rates, pressure, temperature of the injected fluid; chemistry of the produced water.
- Monitoring data should be made publicly available subject to the set confidentiality period of the exploitation licence. Domestic systems should exempt from this.

5.2. Financial incentives guidelines

A key conclusión of the GTRH project is that Financial Incentives (FIS) can play an important role in promoting geothermal heating and cooling, if they are well designed, carefully managed and accompanied by appropriate

flanking measures. Without proper design their positive effect is limited and can be even counter-productive to the development of the geothermal sector in the medium and long term.

It can be shown that national government financial incentives for the installation of shallow ground source heat pump systems have significantly increased uptake in shallow geothermal sectors throughout Europe. The key positive effects of well designed and managed financial incentive schemes are:

- Reduction of the upfront investment costs,
- Psychological effect: signal of the public authority to the potential users

5.2.1. Reducing Financial burden

- There should be no licence fee or royalty payment for geothermal systems (shallow or deep) because the heat is not permanently removed from the rock. The heat resource is renewable and therefore not "mined" in the conventional sense.
- Exploration permit fees for the licence area should be a once off set fee included in the initial licence application. There should be no additional fees (programme related) to carry out exploration during the licence period.
- The application of Royalty fees to producing deep geothermal energy plants should be especially discouraged if national legislation stimulates the usage of re-injected geothermal systems on the basis that no resource is being removed (or 'mined').
- Groundwater abstraction fees and permitting should be waived in accordance with national groundwater legislation if the producing net water abstraction budget from shallow and deep systems is 0m3/d or below the national guidelines.

5.2.2. Recommendations for financial incentive schemes

National taxation law is encouraged to promote increased capital investment in geothermal energy (eg: renewables tax incentives, preferential VAT rates). Other renewable energy resources are actively incentivised by national governments in Europe with prices for electricity generation from other renewable technologies helping national markets to diversify electricity production. This is currently not the case for national and European heat markets. Incentives for delivering heat from renewable energy sources such as geothermal energy should be encouraged through national taxation systems.

- Grants or other financial support schemes for both commercial and residential sector systems should be available.
- For large commercial systems these could be made available subject to a review of the projected production of the system by the applicant.
- Residential sector support could be granted subsequent to the submission of drilling or system installation notification to the relevant national government agency.
- Financial incentives have to be based on the long term, and measures should only be announced when they are available in order to minimize confusion and maximize the impact of the measure.
- Administrative procedures should be as simple as possible
- Deep geothermal energy projects should be promoted by national, regional and local government authorities by financial incentives.
- Appropriate exemptions or allowances from the national planning regulation and environmental impact assessment regulations should be considered for the development of geothermal energy projects in order to assist in the development of the sector.
- National research and development funding schemes should clearly have geothermal energy research and pilot projects and spin-off activities amongst the priority fields.

5.3. General Guidelines for Flanking Measures

- Any technical parameter linked to the eligibility for a FIS should be strictly oriented to European standards and certification.
- Incentives could include financial assistance for initial feasibility studies, grants or low interest rate loans for capital investment.
- Geothermal energy should receive incentives equal to the support received by other renewable energy sources in the form of grants, low interest rate loans, risk insurance, preferential VAT rate, feed in tariffs etc.

- Preferential VAT rates for heat sales from operating geothermal power plants should be below the higher rates of 19-21%. These should be designed to encourage fossil fuels substitution and provide a competitive price for geothermal energy based on national domestic and commercial energy rates.
- A geothermal insurance and risk fund (particularly for deep exploratory and/or development drilling is encouraged to be made available based on the substitution for fossil fuel use and on the potential for national CO_2 emission savings that can be achieved through the development of geothermal energy projects. This type of risk fund typically covers the risk associated with the drilling for the exploration and assessment of the resource.
- A ground source heat pump guarantee fund for large commercial systems >30kW and exploiting aquifers shallower than 100m should be considered.
- Specific agreements on electricity service fees for heat pumps are encouraged.
- Incentives could be based on the CO_2 emission avoidance from operating geothermal plants and/or a set of agreed feed in tariffs based on a national feed in tariff strategy.
- The development of a CO_2 emission credits system for the operation of geothermal energy projects should be encouraged at national level to incentivise sector investment.
- Innovative applications of geothermal energy should benefit from specific discount.
- In countries where national drilling permits are required for the completion of geothermal energy boreholes a cost waiver should be applied or the cost reduced for the geothermal sector. This should be considered for a period of 15 – 20 years until the sector is established.
- Where applicable there should be a waiver/reduction on natural resource data acquisition costs to a licence applicant for review of geothermal energy data prior to application submission.
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6. Conclusions

The work of the GTR-H project having reviewed the current geothermal energy frameworks in Europe, can summarise its recommendations as being the need/requirement for national primary legislation to demonstrate that geothermal energy is regulated effectively. This legislation must firstly define geothermal energy clearly and then based on this definition appropriate regulation must be adopted (through new legislation or adaption of existing legislation) in order to ensure development of the sector and protection of the geothermal resource. Amendment and redrafting of the document is currently continuing and opinions are welcome from Readers of this document. Backup documents referring to target and best practice country profiles can be found on www.gtrh.eu as well as later drafts of the ocument and notices of the final conference in Dublin on Septenber 30th and October 1st 2009.

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