DEFICIENT REGULATION QUESTIONNAIRE
FEEDBACK REPORT

Authors:

Riccardo Pasquali (CSA Group)
Róisín Goodman (CSA Group)

Wieslaw Bujakowski (PAAS-MERI)
Beata Kepinska (PAAS-MERI)
Leszek Pajak (PAAS-MERI)
Grazyna Holojuch (PAAS-MERI)
Marcin Pussak (PAAS-MERI)
Barbara Tomaszewska (PAAS-MERI)

Tamás HÁMOR (MGSZ)

Garth Earls (GSNI)
Derek Reay (GSNI)

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1. INTRODUCTION

The GTR-H project has undertaken to carry out a review of the non-technical barriers associated with the development of the geothermal energy sector in 4 target countries in Europe based on a national stakeholder consultation process.

A series of national round table discussions were held in early 2007 in Poland, Hungary, Northern Ireland/UK and Ireland. These were aimed at obtaining the views of the active stakeholder groups in the geothermal energy sector on a national level. The event encompassed a presentation of the framework of the project from the four target country partners and presentations from their associated best practice partners. This provided an opportunity to stimulate discussion amongst the stakeholders to identify the main non-technical barriers based on some of the examples provided by the best practice countries. During the course of the presentations the national legislations and the effects of its enactment on the national geothermal sectors were highlighted.

The geothermal energy sector in the four target countries is at different stages of development and at present is restricted to the exploitation of shallow geothermal energy in Ireland and Northern Ireland/UK. In contrast, Hungary and Poland have significant amounts of installed geothermal capacity that has historically been used for space heating. In order to accurately identify the barriers to the development of the sector in each of the target countries and compare the responses in relation to the sector, the project partners developed a questionnaire to be submitted to the relevant national stakeholders at the time of the round table discussions and the individual interview.

Each of the target countries completed an analysis of the questionnaire responses obtained. These are included in Appendix B, C, D and E of this report.

This report is a review and analyses the responses obtained throughout the four target countries. It compares the overall importance of each individual barrier as it is perceived by the different national stakeholders as well as providing an overview of the importance of each one of these across the four countries.
2. QUESTIONNAIRE FORMS:

2.1 PURPOSE OF THE QUESTIONNAIRE

The purpose of this questionnaire was to provide a platform of comparison for the barriers identified in Poland, Hungary, Ireland and Northern Ireland/UK. The questionnaire was submitted to the stakeholders actively participating in the geothermal energy sectors at a national level in order to statistically quantify the barriers that are currently the most significant and are seriously impeding the growth of the sector.

2.2 QUESTIONNAIRE PRESENTATION AND STAKEHOLDER ATTENDANCE ANALYSIS:

A brief review of the main national perceived barriers in the four regulation deficient countries was carried out by the project partners at the initial stages of the work package prior to the development of the questionnaire.

Due to the different status of the geothermal energy sector in each of the countries a broad variety of main barrier topics were considered during the design of the questionnaire in order to cover barriers which might be reviewed during the course of the national round table discussions and stakeholder interviews. The following topics were considered:

- Regulation/Legislation
- Geothermal Resource data and information access
- Incentives, taxation, fees and royalty
- Professional Code of Practice

The questionnaire was presented to the national stakeholders during four round table discussion hosted by the national partners between February 2007 and April 2007. A copy of the blank questionnaire has been included in Appendix A.

The questionnaire listed 12 potential barriers and asked respondents to rate the barrier between 1 + 5 where 1 is an insignificant barrier to geothermal development and 5 is a severe/very significant barrier to the development of the sector. An option was given to include other barrier not listed and also an invitation to contact the project partner for further discussion/interview.

A total of 127 responses to the questionnaire were obtained throughout the course of the round table discussions and interviews. The most attendance came from Hungary and Northern Ireland/UK with 45 and 32 responses respectively. In Ireland and Poland a total of 28 and 22 responses were obtained respectively.

The majority of the stakeholders canvassed across the four target countries were the national and regional government agencies, constituting 29% of the overall attendance. Industry and technical service companies with 12%, national government with 10%, geothermal energy users and exploration or resource assessment consultants with 9% respectively constituted the second largest group of attendees. The smaller stakeholder groups include trade and industry associations with 7%, the geothermal education facilities and associations with 6%, the construction, component manufacturers and drillers with 5%, the NGOs, investors and legal institutions constituted the lowest responses with 2% for the first two and 1% respectively.

A number of other stakeholder groups present at the national round table discussion in the four target countries were identified by the project partners. These constitute 6% of the total respondents and were identified specifically as being third level academic institutions, research and development institutions, geothermal heating plant operation companies, engineering and planning consultants, public associations and geothermal energy users from the agricultural sector.

The analysis of the stakeholders attending the round table discussions reflects the status of the geothermal sector in the four target countries (figure 1).
Stakeholder Organisations present at the WP2 Roundtable Discussion  
(Hungary, Ireland, Northern Ireland, Poland)

Geothermal Energy User 9%
Construction, Component Manufacturers, Drillers 5%
NGO 2%
Other 6%
National Government 10%
Government Agency/Regional Authority (Water, Energy, Environment, Planning etc.) 29%
Exploration or Resource Assessment Consultant 9%
Geothermal Education or Association Facility 6%
Investor 2%
Industry & Technical Service Company 12%
Legal Institution 1%
Trade & Industry Association 7%
Banking & Financial Institutions 2%

Figure 1: Percentage of stakeholder group participation in the four deficient regulation target countries.

This questionnaire has provided a quantification of the most significant barriers to the growth of the geothermal energy sector across the four countries. The results of the responses obtained are discussed in the section below.
3. QUESTIONNAIRE RESULTS AND DISCUSSION:

3.1 NATIONAL BARRIERS TO THE GEOTHERMAL SECTOR

The analysis of the barriers identified in the target countries reflects the status of the geothermal sector in the four countries. The histograms in Figure 2 below, show the barriers ranked as significant barriers (rated 4 or 5 in the questionnaire) by the different national stakeholders.

Hungary:
In Hungary a historically well developed geothermal energy sector is engaged primarily in the space heating, spa and bathing and horticulture areas. The main non-technical barrier perceived by the stakeholders is the lack of incentives to stimulate the uptake of geothermal energy compared to conventional fossil fuel technologies. In the Hungarian country report the lack of incentives were shown as having a negative effect on the growth of the sector. 67% of the national stakeholders perceive investment in geothermal energy a more significant financial burden than in other EU countries. Current and potential investors in the sector in Hungary feel that with the current legislation, there is an insufficient long term security and interest generated.

Ocen geothermal energy ownership in Hungary is defined as a natural resource in the Mining Act. However, even though a licensing structure is legislated for under this act, the license does not grant the exclusive right to make use of a resource at depth leaving the area open for the development of competing geothermal projects under the same license.

Additional legislation relating to environment, water and energy have also been identified as having shortcomings to provide sufficient security to the sector. Historically the environmental impact of discharged geothermal waters to the environment has depleted the availability of the resource from local aquifers and has generated opposition to the promotion of geothermal over other renewable energies by the national government agencies. This is also reflected by 55% of the Hungarian stakeholders who agree that there is lack of clarity on legal and regulation requirements and 53% feeling that current legislative infrastructure is inadequate.

**Figure 2:** Barriers to geothermal energy rated as highly significant in the 4 target countries.

*Note: Number refers to the number of respondents indicating this as a significant barrier.*
Ireland:
The three main barriers to the development of the sector in Ireland are entirely related to regulation. 50% of stakeholders in Ireland identified the lack of specific law or regulation relating to geothermal resources as the principal barrier to geothermal energy development. This is a direct result of the lack of definition of ownership of geothermal energy and its recognition as a natural resource in the mining and petroleum legislation. The absence of a national definition of geothermal energy and lack of a licensing structure for both the exploration and exploitation of deep geothermal resources is perceived by stakeholders as a direct barrier to the development of the deep geothermal energy sector in which present interest has been developed. The Irish country report identified a number of legislative acts relating to the environment and exploitation of groundwater resources in which processes relating to geothermal energy abstraction are already legislated for. However, the latter only constitutes a portion of the processes associated with geothermal energy usage and are currently not applied to the shallow geothermal sector. As a consequence of this 46% of stakeholders see the current regulation as lacking clarity on legal and regulatory requirements associated with shallow geothermal energy abstraction and 28% believe the regulation to be inadequate for providing the basis for successful growth of both the shallow and deep geothermal energy sectors.

Northern Ireland:
The barriers highlighted by the national stakeholder in Northern Ireland / UK were slightly different to the ones observed in Ireland though the sector are at similar stages of development. 37.5% of stakeholders in Northern Ireland / UK feel that the lack of incentives or grant schemes from government are a barrier to the development of a deep geothermal sector as the high capital costs of drilling deep boreholes to exploit medium to high enthalpy reservoirs is a deterrent to the development of the sector and has no specific supports from government. The already well established shallow geothermal sector is currently supported by a grant programme (the office for the development of the renewable energy sector) through the Department of Enterprise Trade and Investment, managed by Action Renewables for the installation of ground source heat pumps in the residential sector.

Similarly 34% of the stakeholders feel that the access to geological and geothermal information, the availability of proven geothermal resource risk data are preventing the market growth in Northern Ireland / UK. The GeoReports programme from the British Geological Survey (BGS) and the Carbon Trust permits residential costumers to obtain a site characterisation report with all relevant data at a fixed cost (of approx. €400) for a basic or more detailed report. The ‘Abstraction and Impoundment’ licensing, enacted and enforced by the Department of the Environment both in Northern Ireland and in the UK (not currently enforced in the Republic Of Ireland), provides a clear basis for the regulatory requirements including the environmental impact and planning regulation requirements for the abstraction of groundwater for the purpose of geothermal energy.

The availability of proven geothermal resource data (34%) was highlighted as a barrier from end-users of shallow geothermal systems in addition to lack of knowledge of technical delivery systems, contributing to geothermal energy having a lower profile compared to other renewable energy systems. Even though Northern Ireland has a well established shallow geothermal sector and deep geothermal exploration drilling was carried out in the 1970s, which established some data on geothermal reservoirs. Stakeholders feel that access to geological information along with the lack of proven geothermal resource and risk data constitute significant barriers. These highlighted issues have a direct effect on the perceived security of long term investment in the geothermal energy sector.

The need for the implementation of a suitable code of practice within representatives of the shallow geothermal industry was highlighted by 34% of stakeholders as being a significant barrier to sector growth. This is partly being addressed through the implementation of the European Certified Heat Pump Installer (EU-CERT.HP) in Ireland and Northern Ireland for heat pump installers. However a feeling that not all stakeholder groups and technical experts involved in the design and commissioning of shallow systems are being targeted and that inspections by non-accredited installers is not carried out to a specified standard is cited as an issue that needs to be addressed.

Poland:
In Poland many of the barrier to the development of the geothermal energy sector were found to be of equal importance. 72% of stakeholders identified lack of specific regulation, inadequate regulation, lack of incentives and high costs of licenses and royalty as the most significant barriers to the development of the national geothermal energy sector. These barriers can be classified primarily as legal and economic.
Open comments in the questionnaire indicate that the state policy and strategy for the development of renewable energy sources and in particular in relation to geothermal energy coherence and in particular the administrative process for the granting of licenses is considered too long and complex. This has been identified as resulting in low private sector investment. National stakeholders in general feel there is a lack of consultation between the political decision makers, the non-professional bodies and the scientific community working in the geothermal sector. The economic barriers highlighted by the national stakeholders reflect the perceived high cost associated with the implementation of new geothermal energy projects. Initial investment requires a significant expenditure for licensing, data purchase and implementation of drilling programmes for deep geothermal resource access. Polish energy legislation makes provision for a centralised system of fixed heat prices for consumers. The price set for geothermal energy makes it uncompetitive in comparison to conventional fossil fuels. This makes the economics of implementation of geothermal resource exploitation less attractive. The lack of CO₂ credits that should be provided for geothermal energy extraction also contributes to less attractive economic models for geothermal power plants to private sector investors when compared with conventional plants. The Geological and Mining Law along with the Water legislation in Poland enact the requirements for geothermal energy exploitation. Under the requirements of the Mining a contradiction in the requirements for the implementation of geological work programmes was identified as inhibiting the uptake of concessions for the purpose of geothermal exploration and exploitation. Specific articles of mining law require a geological work programme to be submitted for the granting of licenses and concessions for the purpose of geothermal energy. Another article of the same law states that no geological work programmes are required for concessions to be made for the purpose of geothermal energy abstraction. This causes conflict and uncertainty in the legislative mechanism to private sector companies. A geological assessment and work programme are also required for the completion of open loop and closed loop collectors used for ground source heat pumps. Even though a concession or license is not required for closed loop systems, a significant cost is incurred by the heat users, including those of single residential systems, to obtain a competent person’s report to be submitted under the mining legislation. In addition any geothermal energy abstraction using thermal water below a 20°C temperature require hydrogeological impact studies to be completed under the requirements of the Water Law. This cost alone is perceived by stakeholders as impeding the development of the geothermal and ground source heat pump sector in Poland. In addition the mining legislation in Poland does not take sufficient account of the impact of geothermal reservoir exploitation outside the licensed areas. The licences are generally restricted to the surface access area of deeper resources and not to the hydrogeological impact of a working geothermal energy abstraction system. This means that competing developments may be licensed in direct vicinity of previously licensed geothermal plants having detrimental impact on their lifetime and operability. This results in poor security of investment in the deep geothermal energy sector by investors.
3.2 BARRIER RANKING IN THE FOUR DEFICIENT REGULATION COUNTRIES:

Barriers to the development of the geothermal energy sector in the four target countries have been described in the previous section. To describe the difference in stakeholder perception, a comparative analysis based on the ranking of the barriers between the different countries is shown in figure 3 below. Based on the stakeholder responses and the historical importance of the geothermal energy at a national level, this analysis reflects the present status of the sector in individual countries highlighting the principal areas of technical barriers to be addressed in later phases of the project. This analysis provides an indication of the flexibility that will be required from a template regulatory framework for geothermal energy.
Lack of geothermal regulation described how the status of the regulation in the four target countries represents a major barrier identified in the four target countries. This is shown in the comparison of stakeholder responses across the four countries where lack of specific regulation relating to geothermal resources was perceived as the most important barrier in all four countries. Even though Northern Ireland/UK and Ireland do not have specific laws for the exploration and exploitation of geothermal energy, some of the related legislation regarding energy and water abstraction is felt to lack clarity. In agreement with this the second most important barrier identified in Hungary, Poland, Ireland and Northern Ireland/UK has been the lack of clarity of specific regulation.

From a regulatory point of view all partners perceive that the shallow geothermal sector, even though of equal importance, should be legislated for through a softer set of regulations that will not require high capital investment in licensing and feasibility studies to residential customers particularly. However, this should be complemented with a common code of practice for both drillers and installers particularly in the countries where this is not currently being carried out. The licensing of such systems should be carried out to assist potential pollution prevention from closed geothermal collectors but also to establish and accurate record of installed capacity at a national level. This should be aided by the continuation or implementation of government incentive schemes.

Similarly this report has shown that both Hungarian and Polish legislation have significant shortfalls in the mining, water and energy legislation, whilst related legislation to the environmental and water abstraction sector provide a good basis for the legislation of the geothermal energy sector in Ireland and Northern Ireland/UK. However, this regulation relates to the processes used for extracting and exploiting geothermal energy and does not define the ownership of heat or right process or resources in Ireland and Northern Ireland. For this reason a strong perception by all stakeholders in the four target countries that the current legislation is inadequate and requires amendments.

**Access to Geological Information:**
Access to geological information on geothermal resources and access to information on geothermal energy exploitation system are perceived by the stakeholders in the four target countries as another important, but not the most significant barrier. The reasons behind this are different and reflect the difference in the geothermal energy sector in each country. In Poland and in Hungary, where historically geothermal energy has been used since the 13th century, these barriers were identified because of the legislative issues that restrict the access particularly to geological information on geothermal resource. A review of the mining law in both these countries has shown that for deep geothermal energy abstraction, information is restricted to...
the applicants of licenses and is not made public for five years subsequent to the granting of the license. Even though this procedure provides greater security of investment based on the intellectual property of data and provides the basis for competitiveness in the granting of licenses, it is perceived as impeding the deep geothermal sector. Specifically, the stakeholders have identified the cost of accessing geological and geothermal data when applying for a license in Poland as a significant barrier.

In Ireland and Northern Ireland/UK, these two barriers were highlighted for different reasons. Both these countries have a well-established shallow geothermal market that has independently grown despite lack of specific data relating to the potential for geothermal energy. Some data is becoming available more recently and in the last two years, studies relating both to the shallow and deep geothermal potential have been commissioned by the government agencies in charge of promotion of renewable energies based on previously compiled geological data. This has proved most effective for the development of the shallow geothermal sector but is perceived by the private sector partners as being insufficient to provide security of investment. The access to geological information in Ireland has been partially removed as a barrier since the completion of this survey where by ministerial decree, all data relating license areas in open ground or mineral/oil licenses relinquished to the minister have been made publicly available free of charge.

**Financial Barriers:**
A number of financial barriers associated with developing and running geothermal plants were identified during the course of the analysis. Stakeholders in Hungary and Poland identified the high cost of royalty and licensing as being prohibitive to the development of larger scale geothermal projects. In Poland two separate fees (requiring separate applications) are applied per square kilometre of license area under the geological and mining law. In Hungary the licensing application and fees are governed by the mining law for exploration and exploitation of geothermal energy. Even though the costs for an exploration license are not deemed particularly high, this was identified as a barrier by the national stakeholders.

**Strategy for Geometric Energy:**
Geothermal taxes and the lack of incentives in Poland were highlighted by the national stakeholders for a number of reasons. Even though these were originally interpreted as being related directly to the cost of licensing and exploitation of geothermal energy at national level, a more in depth analysis has revealed that these are in fact related also to the delivered cost of heat generated through deeper geothermal project as opposed to coal or gas. The lack of incentives such as CO$_2$ credits in Poland and high VAT rates imposed on renewable energy sources and particularly geothermal, make the delivered cost of heat uncompetitive due to the low cost of coal. This has been shown to constitute a significant barrier to private sector investment in geothermal project by not providing the required long term financial security for the development of projects with such high capital investment costs leading to significantly longer payback periods.

Across all target countries the barriers identified have now highlighted that the correct financial conditions for the sale of geothermal heat must be taken into account in national energy legislation through incentives allowing renewable geothermal heat to be sold competitively against the current prices of coal.

The provision of drilling insurance or specific risk funds for deep geothermal energy exploration is crucial in order to maintain or develop the required financial security required with these high capital investment cost projects.

**Resources & Technical Capacity:**
National stakeholders in Northern Ireland and the UK highlighted a very different set of barriers than there Polish or Hungarian counterparts. This is a direct reflection of the maturity of the shallow geothermal sector in Northern Ireland and Ireland. Previous experimental projects of deep geothermal projects in the 1980s in Northern Ireland and Ireland but little or no development of deeper geothermal resources have provided a a starting point limited for profiling potential resources. However, the lack of proven geothermal resources or understanding of the exploration risk associated particularly with deep geothermal resources were considered a major barrier. A lack of adequate geothermal information to assess the potential of both shallow and deep resources is identified as a limiting factor as well as the limited technical capacity and understanding of the technology and exploitation systems presently used to provide heat from geothermal resources. The lack of incentives for installation of ground source heat pumps systems and to cover the exploratory risk of deep geothermal energy were highlighted in both Northern Ireland and in the UK.
**Public Awareness:**
Northern Ireland stakeholders highlighted the lack of publicity and promotion of geothermal potential and exploitation systems as a barrier to the development of the geothermal energy sector. This is also evident in Ireland, though this is changing rapidly thanks to the implementations of a dissemination campaign by national government agencies promoting the use of renewables. This was specifically targeted to residential home owners and property developers to promote the use of shallow geothermal resource. However though awareness of the technology for ? is increased the lack of data of the suitability of geological conditions in Ireland to the implementation of deep geothermal resources remains a significant barrier.

A series of solutions through government funded studies in Ireland and Northern Ireland/UK have been proposed to mitigate the shortcomings of the regulatory and financial conditions currently impeding the growth of the sector. These included the implementation of national demonstration projects for both shallow and deep geothermal resources and the development of a targeted drilling programme supported by the relevant national government agencies to obtain the required geological information to reduce private sector capital investment risk.
4. DISSEMINATION OF RESULTS:

The results of the analyses of this questionnaire were agreed to be disseminated to all the national stakeholders involved in the four national geothermal energy sectors.

The barriers and potential solutions identified during the analysis of the geothermal sector in the best practice countries will be circulated through a process of consultation during the round table discussions to be held as part of work package 4.

This data will be made available on the GTR-H website (www.gtrh.eu) for public consultation.


Results were also presented at the ENGINE Workshop 6 - Policy Makers Awareness - Athens, September 2007.
5. CONCLUSIONS:

- Three main barrier types in the four deficient regulation countries were identified, these are:
  - Legislative / Regulatory (all four countries)
  - Financial (Poland)
  - Resource Data Availability (Northern Ireland/UK, Ireland)

- The lack of clarity in the national energy, water and environmental legislation as well as the lack of specific regulation for geothermal energy were identified as the primary regulatory barriers in all four countries.

- A correct definition of geothermal resources (both shallow and deep) as well as the definition of its ownership is crucial to the implementation of legislation and development of the geothermal sector.

- Availability and access to geothermal resource data is crucial to reducing the risk and increasing sector investment in exploration of deep geothermal resources. The cost of this was perceived as a financial barrier in Poland, but the lack of its availability as a promotional barrier for the sector in Ireland and Northern Ireland.

- Energy legislation and financial incentives in Poland have shown that an uncompetitive heat price driven by high VAT rates and high taxes inhibits the growth of the geothermal sector. Provisions for a suitable taxation regime should be made in the energy legislation governing the heat price sales.

- In most countries the existing water and environmental legislation provide a good basis or start point for regulating the shallow geothermal sector.

- A lack of professional code of practice was highlighted in the countries where the sector is currently unregulated.

- Geothermal energy requires better publicity and public awareness to stimulate sector growth.

- Drilling insurance funds and specific risk funds need to be put in place to stimulate investment in the deep geothermal sector.

- Softer regulation is required for the shallow geothermal sector to ensure an acceptable working standard at a national level and minimal environmental impact is achieved.