

Dissemination of Geothermal Knowledge and Information, an Example from Iceland

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ABSTRACT

Dissemination of knowledge and information can be easily done by using the Internet. Most organisations, associations and projects offer information on Web pages, which have become their main information vehicle, both on knowledge and technology. There are however other ways to distribute knowledge.

This poster presents the ways which are common for dissemination of knowledge and information on geothermal knowledge. An example will be taken from Iceland where energy utilization is a great success, where almost 90% of houses are geothermally heated and about 17% of the electricity and half of the primary energy consumption is from geothermal. An example of research organisations and power companies will be given.

1. INTRODUCTION

Iceland is one of the Nordic countries, situated in the Mid Atlantic Ocean. From a geological point of view it is a rather young country, still being formed by volcanic activity. The Mid Atlantic Ridge stretches across the country, from the coast in the southwest to the coast in the northeast of the country. This area is the so-called volcano active zone in Iceland, where most of the geothermal activities occur.

Iceland has about 300,000 inhabitants. It has contributed considerably to the success of utilization of geothermal energy. In Iceland almost 90% of houses are geothermally heated and about 17% of the electricity and half of the primary energy consumption is from geothermal. Late in the 18th century, research began into this energy resource, and in 1946 the Icelandic government instituted systematic and comprehensive energy research, which continues to this day. The research has led to a classification into high geothermal areas, where temperature is over 200-350°C at 1-3 km depth and low geothermal areas, with temperature below 100°C at 1-3 km depth.

The geothermal utilization in Iceland is done in the awareness and participation of the local government and the inhabitants. It is sometime said that what you need to do to proceed from surface manifestation to utilization are four things:

- Opportunity, active geothermal areas have to exist. That means the crust has to be hot enough with faults and fissures so the hot water can move from the sedimentary layers to the colder one on the surface.
- Skills, qualified people have to be in the forefront of the utilization.

- Time, the awareness that research and preparation can take many years.
- Cost and luck.

It is not enough to have the opportunity, skills, time and money if you don't have the support of the local people. An important factor is to keep the government, local people and other investors informed about the progress of the project, as well as informing them about the benefit of the utilization.

Geothermal energy utilization is a long process and many things need to be considered, among them is the information part and the dissemination of geothermal knowledge. The main issue of this poster is to present what can be done to promote geothermal knowledge. An example is taken from geothermal power companies and research institutions in Iceland.

2. DISSEMINATION OF KNOWLEDGE AND INFORMATION

Dissemination of knowledge and information should be rather easy in this computerised world that we live in. However, there are other opportunities and methods to be used. This paper will focus on geothermal and the categorization below describes what has been successful in Iceland over the past years in an alphabetical order:

- Education
- Occurrences, experience life
- Oral presentation
- Publications of printed material
- Web based activities

Further description is below.

2.1 Education

Good relation to universities and high schools where geothermal experts hold courses and give lectures at Universities are important.

The most important educational and development aid activity in Iceland is the United Nations University Geothermal Training Programme (UNU-GTP) which has been run in Iceland since 1979. It is financed mainly by the Icelandic ministry of foreign affairs, and run by the Icelandic National Energy Authority. About 60% of all the training activities is provided by ÍSOR (Iceland GeoSurvey). Yearly, over 20 geothermal fellows from developing countries participate in a 6 month intensive geothermal course in Iceland and also 6-9 complete a 2 year MSc degree program in geothermal sciences. The UNU-GTP has been extremely successful in world-wide capacity building in the geothermal field. In addition UNU-GTP has

for a few years started geothermal short courses for decision makers in developing countries with geothermal potential. Recently the Icelandic international development aid has started a geothermal dissemination programme in Africa and Central America.

2.2 Occurrences, experience life

Places or events where public can smoothly and in an interesting way learn and experience geothermal energy is one way of promotion. Table 1 lists the geothermal information centres and additional opportunities. On Figure 1 the information centres, swimming pools, and walking paths through geothermal areas are marked.

Swimming pools are one example where people can experience geothermal energy. Therapeutic baths like the Blue Lagoon in Iceland are of similar category. The pools are marked on the map in Figure 1. Natural baths are found in a lot of places in Iceland, but not marked on the map, because they can be difficult to reach.

Geothermal areas open to the public with walking paths and informative posters are a common and useful way to experience geothermal activity live. Those areas have to be accessible for handicapped people as well as for unhandicapped.

Table 1: Information Centres in Iceland where geothermal knowledge is presented.

Power station	Installed power	Geothermal information centres	Walking path	Admittance	Swimming pool
Hellisheidi	203 MW	A visit includes a guided tour through the plant and various multi-media presentations.	No	Free	No
Krafla	60 MW	Information on geothermal energy and the Krafla eruptions, including a short, entertaining film on how geothermal steam is used to generate electricity.	Yes	Free	Yes
Nesjavellir	120 MW	An account is given of energy generation from a high-temperature geothermal system as well as the process utilised by the plant, and of the Reykjavík district heating system.	Yes	Free	No
Reykjanes	100 MW	The exhibition shows how man utilizes different energy sources and how we benefit from it in our everyday lives. The exhibition's most impressive showpiece is a geothermal turbine generating 50 MW of "green" electrical power, enough to keep Reykjavík City running on a good day.	Yes		No
Svartsengi	76 MW	The Blue Lagoon is situated only several hundred meters away from the Power station.	No		Yes
Geysir		Geysir Centre is a museum by the largest geysir in the world, where modern multimedia shows combined with ample information enlighten visitors about some of Iceland's amazing natural phenomena, and allow them to feel some, as is the case with the earthquake simulator.	Yes	Cost	Yes
Hveragerdi		Information is available on the nature of the geothermal field, the relation of geology, tectonics, volcanic activity and microbiology to geothermal activity. Information on boreholes and production is presented too.	Yes	Free	Yes

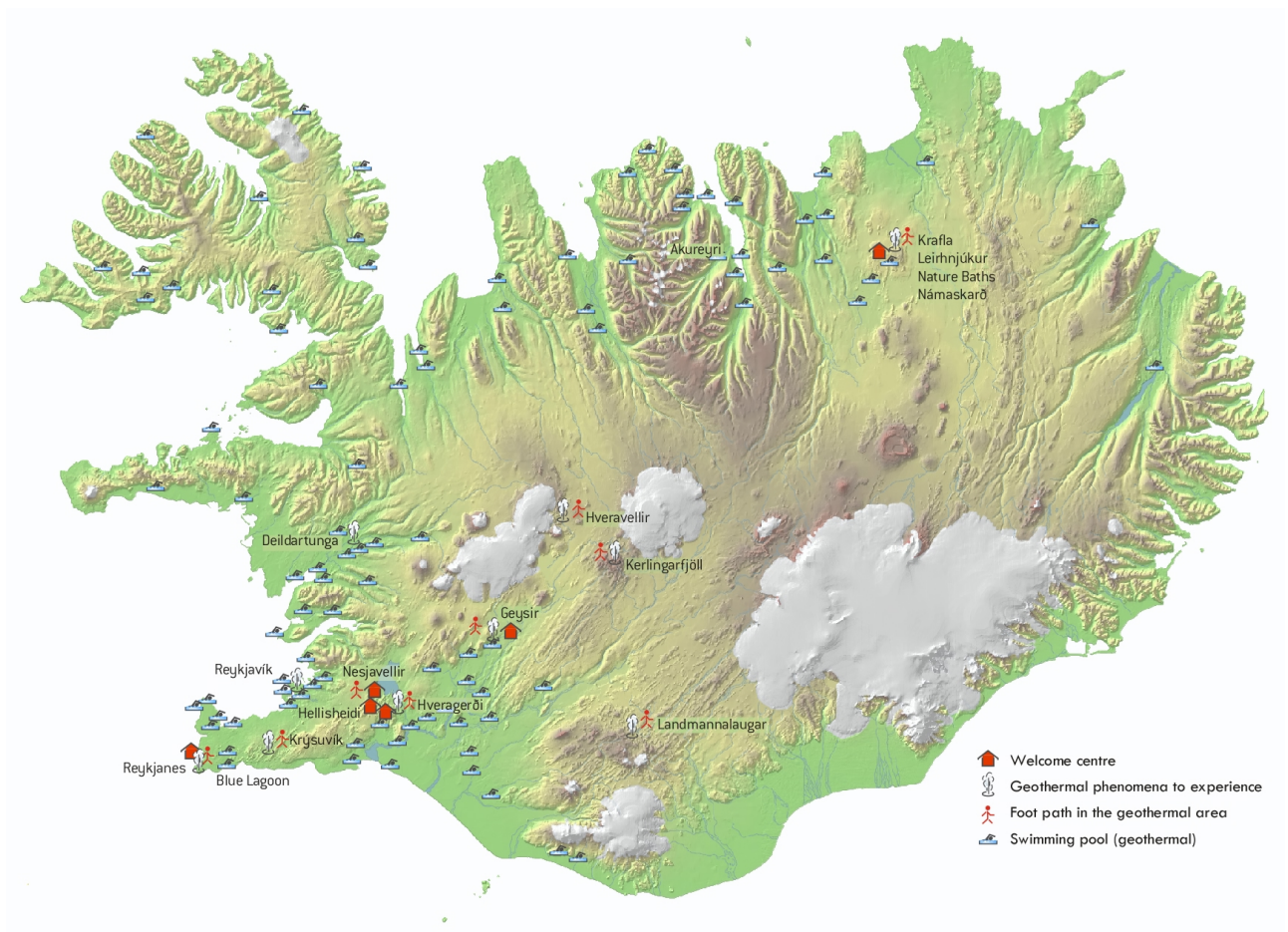


Figure 1: Map marked with all geothermal information centres in Iceland, located and run by the power companies. Walking paths through geothermal area and swimming pools, heated with geothermal water are also marked.

2.2.1 Information Centres.

Information Centres, see Table 1, Figure 1, are one way to promote geothermal knowledge to the public. In Iceland they are run by the power companies and are open to the public with free admittance. Also some power stations are open for visitors. The power companies provide information about the power production with geothermal energy as well as general information about the geology of the area. The Centres offer guided tours so the visitors have better access to information.



Figure 1: From the information Centre at Hellisheidi power plant.



Figure 2: Inside the information Centre at Reykjanes power plant.

2.2.2 Museums

Museums are categorized under occurrences, because they offer a lot of opportunities to promote knowledge and information, but will not be further discussed here.

2.2.3 Researchers night

European Researchers' Night is a pan-European event involving a wide range of scientific and research organisations – including museums, laboratories and academic institutions – hosting a variety of entertaining and fun events planned to run late into the night of Friday, each

year in September. Iceland has taken part in this event since 2003. The aim is to give the public, and in particular young people, the opportunity to meet researchers within the context of festive and ‘fun’ activities and to highlight the appeal of pursuing a research career.



Figure 3: From the Researchers' Night in Reykjavík 2008.

Events are expected to include:

- Science cafés.
- ‘Open-house’ evenings at research facilities or museums allowing an exclusive ‘behind-the-scenes’ glimpse of the research profession at work.
- ‘Science in the streets’ activities demonstrating the concrete applications of research findings.
- X-ray laser demonstrations.
- An array of other activities – film showings, science dinners, a crime in science museum, etc - aimed at encouraging closer contact with researchers and giving young people, in particular, the chance to meet, talk and, most of all, have fun.

2.3 Oral presentation

Participation in international organizations, meetings, conferences and workshops are well now in the scientific community. In a smaller society like Iceland open meetings in local societies, clubs and organizations are common and experts are often asked to give lectures to promote the public.

TV interviews or radio broadcasts are a useful medium to spread knowledge and information of all kinds.

2.4 Publications of printed material

Publications of printed material, both scientific as well as books and newspaper or magazines articles are widely used to make the public aware of the possibilities and importance of geothermal in our society:

- Books
- Articles in newspapers or in magazines
- Scientific documents
- Information brochures

2.5 Web-based activities

Most organisations, associations and projects have their own Web pages, which have become their main information vehicle. Another web-based function is online databases, or dataviewers, where specific data are formed in a computer and made accessible for scientists and the public. For example: Geological Data Viewer , Iceland Continental Shelf Portal
<http://www.landgrunnsvefsja.is/vefsja/icsp.html>.

CONCLUSION

Iceland is one example where utilization of geothermal energy has been successful. In this geothermal development, local authorities as well as power companies and research institutions have been active in dissemination of knowledge and information.

There are many ways to distribute geothermal knowledge and information, both for the public as well as for scientists. This paper and the poster give examples of what has been done in Iceland and might be a useful source of information for others.

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