

# Hellisheiði power plant

## Project management during the early stages of planning

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### Abstract

*In the early stages of planning of the new power plant at Hellisheiði it was decided to combine the experience of the operators at the Nesjavellir power plant and the ideas and knowledge of the consultants. This was gained by forming of working groups dealing with different aspects of the power plant.*

**Keywords:** *project planning, multiple uses.*

### 1. Introduction

Hellisheiði ca. 25 km east of Reykjavík (Figure 1) is part of the Hengill high temperature geothermal field. It is located on the southern side of the Hengill Mountain, but Nesjavellir, where Orkuveita Reykjavíkur operates now combined 90 MWe and 200MWt plant, is located north of the mountain. Orkuveita Reykjavíkur has for a long time planed to utilize this part of the geothermal field and build there a geothermal power plant. Orkuveita Reykjavíkur has accordingly bought up the land and conducted extensive research in the area. In 2001 the board of the company decided to start preparations for building a combined heat and power plant at Hellisheiði. Initial estimates are for 120 MW in electricity and 400 MW in thermal.

### 2. First steps

In the beginning of a new geothermal project the most important part is to get good information on the geothermal field itself. The initial studies are not very expensive but time consuming. Extensive research in geology, geophysics and chemistry had been carried out. It was therefore logical to start with a brainstorming session with all relevant scientists to consolidate the existing knowledge and to find out where more work was needed. The main result of this meeting was a scientific agreement on the initial premises for a mathematical model for the whole Hengill geothermal area.

Environmental assessment takes long time and needs careful planning. Consultants were hired and assessment program written in good time. For this purpose information, other than geothermal, have to be compiled and many of these were not



*Figure 1. Location of the Hellisheiði area*

available. That led to various new research projects. To obtain enough cold groundwater for the power plant study of the ground water system was essential. In spite of heavy rain in the area almost no water can be seen on the surface. This resulted in the drilling of 23 100 to 200 m deep boreholes and extensive mathematical modelling to map the flow of water and the boundary between different ground water streams. For the environmental assessment it is necessary to have information about the vegetation and wildlife at the possible site for the plant itself, all piping, power lines, roads, boreholes etc. Specialists in botany, zoology, ornithology, archaeology and others were brought in to carry out research in their various fields. It should be kept in mind that birds have to be counted when they are nestling and botany studies can only be done during the short summertime.

### 3. Working groups

There are many different solutions and possibilities to be studied at the beginning of a project and probably many ways to decide which way to go. We decided to start with a “kick off meeting” with a group of consultants and employees of Orkuveita Rykjavíkur to discuss our knowledge of the geothermal field and what possible technical solutions have to be found and finally to prepare a time schedule. All kind of ideas were thrown in the air and discussed freely. At the end of the meeting several different working groups were formed to work with different aspects and possibilities.

**Group 1: Process design**

The main purpose of this group of five experts was to study different possibilities of process design and to come up with a proposal. The group studied different techniques and principal solutions. Information and ideas were collected both from Iceland and also from other countries using geothermal energy. The work ended with three principally different solutions that were studied in greater detail. After model studies and cost estimation similar design as in Nesjavellir was recommended.

**Group 2: Boundary conditions for electrical production**

This group got the task to find and define external conditions, which could influence the design of the plant. They ended up dealing mainly with the new laws for deregulation of the electrical market and trying to forecast future markets for electricity. They did also study necessary uptime of the power plant.

**Group 3: Hot water production**

The aim of this group was to estimate needed capacity i.e. forecast growth in heat demand and to study different solutions of transporting the heat from the plant to the distribution system in Reykjavík. It should also discuss the maximum size of units fitting in the total heating system for Orkuveita Reykjavíkur. It turned out that this group got a very difficult task as it had to take into account a very flexible heating system with hot water coming from three low temperature geothermal areas, from the Nesjavellir power plant and a peak station located in Reykjavík. Three different solutions for transferring the heat were studied and solution chosen.

**Group 4: Service**

This group should study the local or remote control of the power plant and define what space is needed for employees, workshops, storage etc.

**Group 5: Other activities**

The purpose of this group was to come up with ideas of activities that might be connected with the power plant without being part of it. This included tourism, sports and energy use activities such as fish farming etc. The group got the working name "the crocodile group" in honour of the proposed crocodile farming in another part of Iceland. The group discussed lot of interesting ideas but most of them are difficult to accomplish and will hardly be realised without participation from investors in the tourist trade. The main results were that the premises must be made accessible for visitors both to the power plant and to the surrounding mountains.

**Group 6: Natural forces**

This group got the task of defining external forces such as earthquakes, moving fissures, weather conditions and other natural forces that have to be taken into account in designing and selecting site for the power plant.

**Group 7: Research**

This group coordinated all research work and decided what was needed and when. It so happened that this group had three members only, the head of research and the project managers both from Orkuveita Reykjavíkur and the chief consultant. Therefore this group has also functioned as a steering comity in the planning period.

**Group 8:**

This group was formed to deal with a special task i.e. for studying whether it is “possible” to inject geothermal water at shallow depths close to Reykjavík. This question rose in working group 2 in connection with one of their case studies.

**Group 9: Borehole platforms**

This was not one of the initial groups but during both environmental and cost studies it became quite clear that the classical borehole platforms used in Iceland needed further studying.

**4. Discussion**

The idea of forming working groups to discuss different subjects has proven to be quite successful. The members come both from the power company and the consultants. One great advantage of this broad participation is that it activates people that otherwise would be left out of the process. This ensures both that the ideas and experience of operators come into the discussion and they are informed and more open minded towards the project. The groups don't perform much work themselves but discuss ideas, call for studies and research and summarize the results. The groups carry different weight and work at different time schedule. It is however very important to keep a tight rein on their time schedule as they can always find some new matters to discuss and take into account. After some time it was necessary to call their work to an end and move into more conventional channels of project works. This is quite natural since the project had to move from the idée stage, decide upon solutions and begin design.

**5. Conclusion**

It is very important at the beginning of a project to seek new ideas and possibilities. This has been achieved by involving large number of people in kick off meetings and working groups. This method can be recommended if time schedules and work process are closely controlled.