

The Swiss Deep Heat Mining programme: activities & perspectives

by

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ABSTRACT

Theoretical research and development work had already been under way in Switzerland for 20 years in what was at that time still referred to as Hot Dry Rock geothermal energy technology, when at the end of 1995 the Federal Office of Energy expressed their interest in it as a potential component of a future new energy mix.

The result was the creation of the DHMA and subsequently the formulation of the Deep Heat Mining programme, for the first stages of which the Federal Office of Energy undertook the funding. DHMA were further charged with managing the programme, which they had set up. In the ten years since the start of 1996 the necessary studies and investigations have been undertaken, resulting in a positive verdict on the feasibility and on the potential usefulness of implementing EGS technology in the Swiss context.

The positive verdict encouraged the team to start looking for geologically promising sites in socio-politically promising locations and to start the search for interested investors – this was not to be a state-owned site and power plant. Initial interest from the local utility in the city canton of Basel (Industriewerke Basel – IWB) provided a starting point for other utility companies to invest in the pilot project, the construction and development of which is underway.

SUMMARY OF WORK AND PROGRESS

The majority of studies undertaken by the DHMA after the start of work in 1996 were executed as sub-contracts. Starting point was a review of the experiences gained in the international Hot Dry Rock research projects during the past 30 years. These were accompanied by simple and pragmatic economic modelling and sensitivity studies.

Multi-parametric, GIS-based data analysis, including geological, hydrological, environmental, engineering and socio-political aspects, led to the selection of the city of Basle for a first pilot plant, with Geneva as the reserve choice. For all the necessary pre-studies the Office of Energy provided seeding money, with the understanding that the pilot plant itself would have to be financed by local / private organisations.

At this stage a project management and engineering company, Geothermal Explorers Ltd. was set up. This company was necessary for the handling of contracts and to manage the broad spectrum of specialists necessary for a project of this rather novel nature in Switzerland.

With the support of IWB, a plant has been conceived, to be sited in an industrial zone within the limits of the city of Basle, which at the present state of the art, can only be designed in final detail upon completion of the reservoir stimulation and following

generation and testing of the underground heat exchanger. The original target was a co-generation plant, contributing heat to the district-heating network and power to the electrical supply. A wide range of technical solutions has been examined in studies, which are still underway. Thermal cycles and working fluids of every sort, singly and in both simple and multiple hybrid combinations are being examined in a "what-if" pre-planning study for selection of the ideal energy conversion system.

The choice of site, the concepts of possible co-generation and hybrid energy systems and the decision to operate under commercial pressures with staff and advisors from multiple industries are parts of a concept to give the EGS hot fractured rock technology the best chance of success.

During the past two years the modes of financing of the new plant and the structure of the owner company, GEOPOWER BASEL AG, have been worked out. In parallel, much effort has been put into project preparation tasks, finding the best spectrum of subcontractors and steadily building up a powerful project team. All permissions to prepare and drill on the main site having been received in the course of 2005, the site preparation, including power supply, water supply, drainage and water return systems, have been undertaken.

By the end of 2005 four monitoring wells were ready for the installation of micro-seismic instruments. Two additional wells will be ready by March 2006 and the instrumentation and data acquisition equipment tested. This monitoring system has involved much thought and effort, because of the depth of the crystalline host rock surface at around 2700 metres and the enormous investment involved in drilling a number of monitoring holes to at least this order of depth.

The operational and logistic planning, and the design for the first deep well are largely completed. Drilling is now programmed to start towards the end of April 2006.

OUTLOOK

After some 30 years of research and development, we have learned which questions to ask and which challenges to address. However, we are not quite sure of all details of all responses, so it is necessary to put ourselves from the EGS world under pressure and to build several pilot plants on several different types of site.

The Swiss DHM programme has arrived now, after ten years of preparation, at the point of pilot plant construction. It is important, not only internally in Switzerland, that the project is successful. The project team realise this responsibility and everything possible will be done to ensure this. However Nature does not obey laws set by mankind and surprises are to be expected.

Only if project planning and management at Geothermal Explorers can meet and deal with such surprises can any serious projections for hot fractured rock EGS be made.