

Possibilities for finding low temperature
geothermal seawater near Vogavík and
Vatnsleysuvík

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POSSIBILITIES FOR FINDING LOW TEMPERATURE GEOTHERMAL SEAWATER

NEAR VOGAVIK AND VATNSLEYSUVIK.

The resistivity of rock depends on the temperature and porosity of the rock matrix and the salinity of the pore fluid. It is usually difficult to separate the effect from these variables. The outer part of the Reykjanes Peninsula is, however, somewhat of an exception in this matter. The uniform geological formations and the fact they are saturated by seawater, combined with existing data from several wells in the region have made it possible to estimate roughly the temperature at a certain depth from resistivity soundings.

Vogavik.

As a part of the exploration of the three high temperature fields in the region an extensive resistivity survey was carried out, covering the whole of the outer Peninsula. The results allow us to predict two new geothermal fields in the region. A third area of interest is centred near Snorrastadatjarnir in the vicinity of Vogavik, where anomalously low resistivity of 6-8 ohmm is recorded below the fresh water lens, down to depths of at least 300-400 m. This can be compared to a regional value of 10-12 ohmm. Correlating resistivity with temperature indicates that seawater at temperatures in excess of 50°C could be found in the uppermost 400 m in the area. This is roughly twice the regional value. No drilling has been done in the area to investigate the validity of these results and none are planned.

Low temperature geothermal seawater at Snorrastadatjarnir may be a feasible alternative to high temperature geothermal energy from Svartsengi for fish farming in Vogavik. However, our present knowledge does not allow any estimate on this. The following research plan is proposed to confirm and assess its resources.

1) Drilling of an exploratory borehole near Snorrastadatjarnir down to approximately 500 m depth. The well must be cased down to 100 m depth to avoid influence from the fresh water lens with a casing width in excess of 6" for possible pumping from the well. Positive results of the first well, with regards to temperature and yield, would lead to the drilling of another well into the same aquifers for long term pumping. This would bring the data necessary to calculate and model the resources of the reservoir. The design of the second well would depend on the results of

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the first well.

2) If the results of the two research wells are positive and encouraging for a continued effort, this would be followed by a thorough mapping of the areal extent of the reservoir by additional resistivity soundings. For this upto 30 soundings may be needed.

3) Simultaneously the drilling of several wells for exploitation could start. The wells would be dimensioned very wide, for example 17 1/2" and cased down to at least 100 m. At this stage it is not possible to predict how many wells would be needed to fulfill the energy requirements of the fish farm.

Vatnsleysuvik

No information is available on the existence of low temperature geothermal seawater in the vicinity of Vatnsleysuvik as no data on resistivity exists from this area and no wells have been drilled. Consequently geothermal exploration at Vatnsleysuvik would have to start with an extensive resistivity survey in its vicinity. For this 20-30 soundings would be needed. If an area similar to Snorrastadatjarnir would be discovered its exploration would follow the same lines with the advantage of the experience obtained there.

A rough estimate of cost:

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| A 500 m deep well with a 6 1/2" casing to 100 m depth | \$100,000 |
| Operation of a downhole pump in 3 months | \$20,000 |
| Reservoir engineering work and modelling | \$20,000 |
| 30 resistivity soundings with interpretation | \$40,000 |
| A 500 m deep well with a 17 1/2" diameter and casing down to about 100 m depth. | \$200,000 |