

## Environmental and Social Data Sheet

### Overview

Project Name: REYKJAVIK ENERGY GEOTHERMAL  
 Project Number: 2015-0480  
 Country: ICELAND  
 Project Description: *The project is a programme of investments comprising extension works on two geothermal power plants outside Reykjavik and refurbishments of the district heating system and electricity distribution system in Reykjavik.*

EIA required: yes

Project included in Carbon Footprint Exercise<sup>1</sup>: no

(details for projects included are provided in section: "EIB Carbon Footprint Exercise")

### Environmental and Social Assessment

#### Environmental Assessment

The programme covers investments related to geothermal drilling and power production, power distribution and heat distribution. Geothermal drilling and industrial installations for carrying hot water and steam fall under Annex II of the EIA Directive 92/2011/EU, that has been transposed to Icelandic law as the EIA Act No. 106/2000 as amended by Act No. 74/2005, leaving it to the competent authority to decide if an EIA is needed.

EIAs, including public consultation, were conducted during authorisation of the now existent geothermal power plants at Nesjavellir in 2000 and Hellisheiði in 2005. Of the activities in the present programme, the drilling of make-up wells to sustain production and of re-injection wells is in general foreseen and covered by these EIAs. Re-injection of geothermal fluids resulting from the operation is further a requirement of the resource and operating licence for the Hellisheiði power plant. Some activities at the power plants, included in the scope of the programme to be financed by the Bank, were not covered by the original plans and the EIAs at the time of construction. These new activities are re-injection of geothermal fluids at Nesjavellir (as geothermal fluids have so far been dumped in Lake Thingvellir) separation and re-injection of H<sub>2</sub>S at Hellisheiði (to meet a new legal requirement) and a 5.5 km-long steel pipeline from the geothermal field in Hveralið to Hellisheiði. These schemes were individually screened out by the competent authority, who concluded they were not likely to result in significant environmental impact and full EIAs were not required. Corresponding permits have been issued in 2014 and 2015.

The original EIAs address both the risks to the project and the risks that could be triggered by the project. All lava fields younger than 10 000 years are deemed nature conservation areas in Iceland. Specifically, the geothermal power plant involves the construction of buildings and pipelines, and the drilling of boreholes, in a relatively untouched landscape of high aesthetic and recreational value. The need to reduce the visual impact of the buildings has been considered during the design, mitigated through berms. Restoration of disturbed areas, as required by the environmental permits (from 2005) has taken place both, largely by restoring areas on site and partly by compensation measures carried out off-site.

A specific scheme of the project is aimed at reducing the disposal of separated water and water from condensation at Nesjavellir. About half of the separated water and most of the condensate water is injected to the lower groundwater layers via injection wells, while the rest is released at the surface of Lake Thingvallavatn. The impact of thermal pollution from the power station is now perceptible in Lake Thingvallavatn. The promoter has a duty to minimise

<sup>1</sup> Only projects that meet the scope of the Pilot Exercise, as defined in the EIB draft Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: above 100,000 tons CO<sub>2</sub>e/year absolute (gross) or 20,000 tons CO<sub>2</sub>e/year relative (net) – both increases and savings.

the power station's impact on the quality of groundwater, and the impact on Lake Thingvallavatn shall be monitored in particular. In order to stop the discharge of separated water and condensate water on the surface and limit the thermal pollution additional injection wells are being drilled to dispose of separated and condensate water.

Under Icelandic Regulation no. 514/2010, on the Concentration of Hydrogen Sulphide in the Atmosphere, limits are set to 50 µg/m<sup>3</sup>, based on the maximum daily running 24-hour average. The concentrations may exceed those limits no more than three times every year. The concentration of ambient hydrogen sulphide in urban areas was below regulation limits in 2014. Emissions from the Hellisheiði Geothermal Power Plant have occasionally exceeded this limit. However, as part of the project to be financed, a hydrogen sulphide abatement unit (Sulfix) is developed to ensure that the limits are met regardless of weather conditions. It will remove up to 25% of the power station's hydrogen sulphide emission. Additionally, a steam hood will be built at the power plant, to ensure increased dispersal of hydrogen sulphide and further reduce its concentration. At Nesjavellir emissions have constantly stayed below the limits and there are currently no plans for an abatement unit.

The plants also emit CO<sub>2</sub> during operation, although in limited quantities. The annual averages of CO<sub>2</sub>-emissions have ranged between 5 and 10g/kWh at Nesjavellir and have been reduced to 15 g/kWh at Hellisheiði, compared to 350 g/kWh for a modern gas fired power plant. In recent years the combined annual emissions from Nesjavellir and Hellisheiði Geothermal Power Plants have been about 60,000 tons of carbon dioxide and about 140 tons of methane before implementation of the SulFix-project. The restored and avoided degradation of production delivered by this project represent about 8% of the current emissions of the two geothermal power plants.

Regular monitoring is being conducted by the promoter on environmental aspects in the geothermal area in and its vicinity. The environmental factors include surface temperature, microseismic, groundwater and air qualities, noise, fauna and flora.

The other activities in the project relate to distribution of electricity and heat and fall neither under Annex 1 nor under Annex 2 of the Directive. The resulting schemes, characterised by proven technology, short implementation periods and limited environmental impact, should result in relatively low risk investment programme. All relevant consents have been granted.

The promoter has a strong environmental capacity, which ensures that the environmental aspects of the programme will be sufficiently covered.

### **EIB Carbon Footprint Exercise**

The estimated annual emissions of the project in a standard year of operation amount to 5 kT/CO<sub>2</sub>e/year in both absolute (gross) terms with a small estimated emissions savings of 1 kT/CO<sub>2</sub>e/year in relative (net) terms. This is below the limits for the project to be included in the Bank's Carbon footprint exercise. The emissions are about 8% of the average historic emissions of 600 kT of CO<sub>2</sub> and 140 tonnes of methane. The baseline emissions are based on the Icelandic energy mix of geothermal and hydro.

### **Other Environmental and Social Aspects**

The promoter holds ISO 9 001, ISO 14 001 and OSHAS 18 001 certifications. No appeals have been raised against any of the projects.

## **Conclusions and Recommendations**

The procedures followed, the promoter's capabilities and the residual impacts of the project and its associated infrastructure are acceptable to the Bank. The project is therefore in line with the Bank's environmental and social standards.