

Research and Development Projects to meet Injection Demands at Hellisheidi and Nesjavellir

The outcome of research, development, and implementation projects in the years 2015-2023 is that it is possible to inject all the separated water at the power plants. The projects will continue in 2024 and will focus on modifying the injection practices to reduce impacts on the production.

Hellisheidi Geothermal Power Plant

- Since 2015, geothermal water has been injected into unused production wells in Sleggjubeinsdalur and, since 2017, at Skarðmýrarfjall. These wells receive a large amount of geothermal water. The injection process is going well and considered to provide good pressure support to production field. In some cases, there is too close proximity to production wells, and efforts are being made to reduce injection into them.
- Two injection wells are located at Lakahnúkur. One was put into operation in 2019 and other in 2020. It is under consideration to connect two unused wells near Gígahnúkur (HE-35 and HE-10) to ensure the injection capacity of the power plant.
- Monitoring of the effects of injection on the geothermal system continues closely, and the injection practice is changed if deemed necessary due to negative impacts on the geothermal system.
- ON Power has operated an earthquake monitoring network in the Hengill area since 2016. The number of seismometers has varied over the years, but currently, ON Power operates 9 seismometers at both Hellisheidi and Nesjavellir with the aim of investigating the interaction between injection, production, and seismic activity.
- Several research projects have been underway in recent years to monitor seismic activity at both of ON Power's power plant sites and to use it to better understand the area. These projects include COSEMIQ, SUCCEED, Carbfix2, S4CE, and DEEPEN.

Nesjavellir Geothermal Power Plant

- The results of tracer tests show that geothermal water discharged into shallow injection wells (300 m - 600 m) appears in groundwater and springs at Lake Thingvallavatn, indicating that injection water from Nesjavellir Power Plant mixes with groundwater and springs in Lake Thingvallavatn. Efforts are being made to manage injection in a way that minimizes this mixing.
- Injection into wells that reach into the geothermal reservoir began in November 2019 when injection started in NJ-18, which takes about 10-15% of the geothermal water injected from Nesjavellir Power Plant. The injection well NN-10 was drilled in 2022 and came into operation in the spring of 2023. About 25% of all injection water goes into this well, meaning these two wells together account for about 35% of the geothermal water coming from Nesjavellir Power Plant. It is highly unlikely that geothermal water injected into these wells will mix with groundwater. By injecting the geothermal water deeper, the amount of geothermal water going into shallow injection wells is reduced, thereby decreasing the mixing of geothermal water with groundwater and springs in Lake Thingvallavatn.
- The development of thermal and chemical pollution in Lake Thingvallavatn is monitored semi-annually, and it will be interesting to see whether increased injection into NN-10 has a positive effect on the temperature in the lava and thus runoff into Þingvallavatn.
- Thermal images were taken in 2022 of Nesjahraun near Þingvallavatn, where thermal pollution from Nesjavellir Power Plant is impacting. Such images provide a good overview of the heat distribution, and it is planned to use them to monitor temperature changes in the area over the years.
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