Theistareykir Geothermal Power Plant, A Sustainable Construction

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Keywords

Geothermal Power Plant, Geothermal utilization, Environmental Impact Assessment, Project planning and construction, Northern Sustainability Project, Geothermal Sustainability Assessment Protocol

ABSTRACT

The geothermal area at Theistareykir in north east of Iceland has great potential for geothermal utilization, with an estimated capacity of up to 200 MW_e. In November 2017 commercial operation of the first phase of the Theistareykir power plant started. Today the Theistareykir geothermal power plant operates at 90 MW_e.

Preparation work and research on the sustainable utilization of geothermal energy at Theistareykir began in 1999 by an association founded by local municipalities and regional utility companies, later merged into the National Power Company of Iceland, Landsvirkjun. The objective was to harness the geothermal resource in a sustainable way.

In addition to planning, licensing and environmental impact assessment, the first 15 years were used for explorational drilling to confirm potential steam availability, stakeholder management with consultation to land owners and users of the planned construction area as well as a definition of vegetation reclamation program. At project launching in April 2015 nine steam wells with total of 58 MW_e capacity had been drilled.

Landsvirkjun in co-operation with stakeholders launched the Northern Sustainability Project with the objective to capture expectations and concerns of planned construction and operation of the power plant. The project develops and monitors social-, environmental- and economical indicators for the power plant.

Theistareykir Geothermal Power Project was chosen as a Pilot Project for testing of a new Geothermal Sustainability Assessment Protocol, GSAP. The result was that the project has been

carried out in harmony with the environment and in consensus with the society. Safety and environmental matters were at the forefront during the project execution.

This paper summarizes in brief the history of the Theistareykir geothermal power plant project along with the challenges and solutions the project team went through during the planning, design and construction of power plant.

1. Introduction

The geothermal area at Theistareykir in north east of Iceland has great potential for geothermal utilization, with an estimated capacity of up to 200 MW_e. The Theistareykir geothermal field is a part of the north-east highlands of Iceland. The area is located 27 km south of town of Húsavík and some 25 km north of Lake Mývatn, see figure 1. The geothermal area at Theistareykir is registered in the Icelandic Nature Conservation Register as the fumaroles located there are very active. Stóravítishraun lava field is approximately 525 km^2 runs through the area. The area is considered to be of historical relevance with over 50 registered heritage sites. It is uninhabited, but has a ramblers' hut and is used as a grazing common for 5,000 sheep every summer.

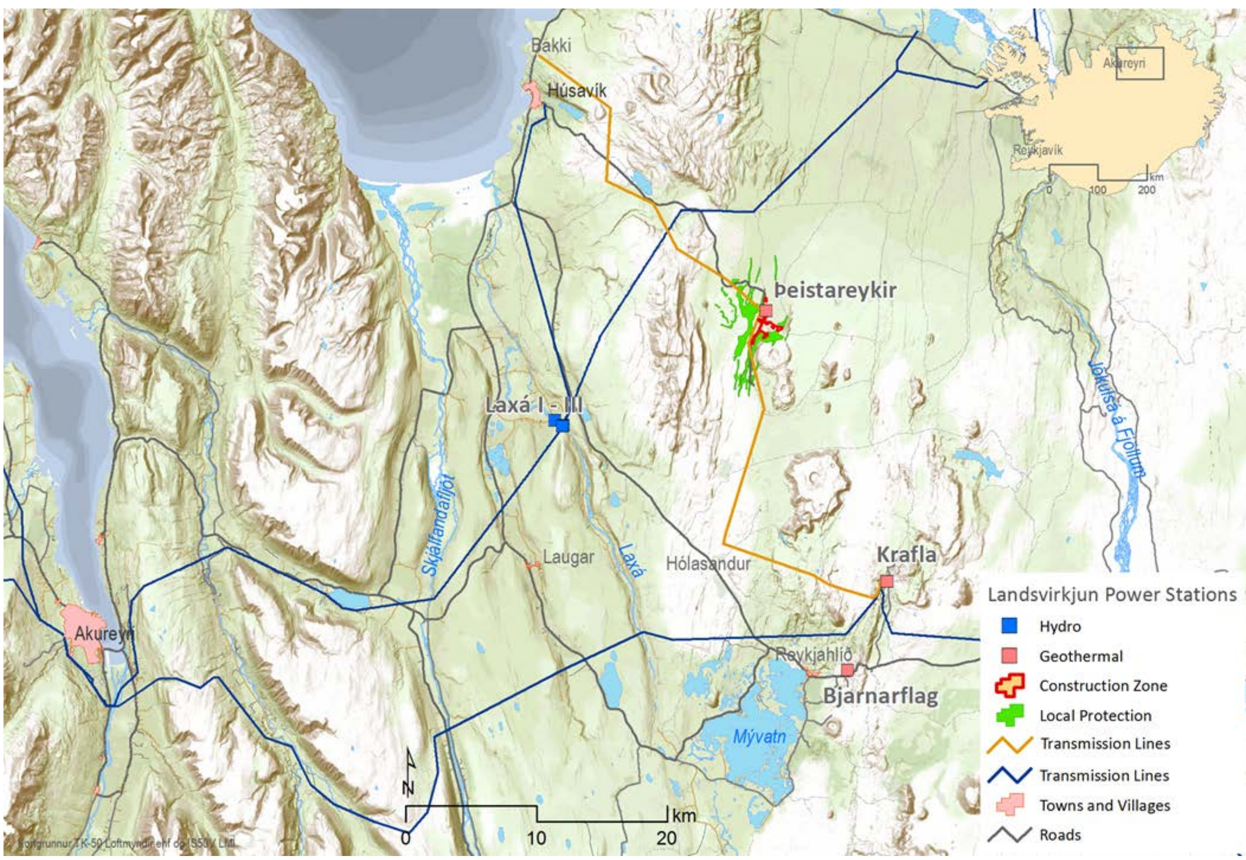

Figure 1: Map showing part of north-east Iceland and the location of Theistareykir area.

Exploration of the area started as early as in the nineteen-seventies. Preparation work and research on the sustainable utilization of geothermal energy at Theistareykir began in 1999 by an association founded by local municipalities and regional utility companies, later merged into the National Power Company of Iceland, Landsvirkjun.

In addition to planning, licensing and environmental impact assessment, the first 15 years were used for explorational drilling to confirm potential steam availability, stakeholder management with consultation to land owners and users of the planned construction area as well as a definition of vegetation reclamation program. At project launching in April 2015 nine steam wells with total of 58 MW_e capacity had been drilled. The construction of the power plant was carried out from spring 2015 and late 2017 the first 45 MW_e production started followed by additional 45 MW_e in spring of 2018.

This paper summarizes in brief the history of the Theistareykir geothermal power plant project along with the challenges and solutions the project team went through during the planning, design and construction of power plant. In addition, the paper presentments the Northern Sustainability Project and the result of Geothermal Sustainability Assessment Protocol, GSAP, which the Theistareykir was chosen as a Pilot Project for testing.

2. Preparation and beginning of the project

2.1 Initial stages

Surface exploration in the Theistareykir area started in the nineteen-seventies and continued intermittently to the mid nineteen-eighties (Gíslason et al., 1984). In the late nineteen-nineties interest in the field was renewed, this time the project was initiated by local residents who wanted to explore how they could harness the geothermal energy in the area to create employment opportunities in the municipality.

Preparation work and research on the sustainable utilization of geothermal energy at Theistareykir began with the establishment of Theistareykir Ltd. in 1999. The association was founded by Húsavík Energy, Akureyri Electricity Utility and Akureyri Heating and Water Utilities, Adaldælahreppur County and Reykdælahreppur County.

Theistareykir area is a green field area which had mainly been used by local farmers up until this point. Figure 2 shows how access to the area via gravel road before research drilling started.

Exploration drilling started in 2002 with the completion of well ThG-01, a vertical well reaching 1953 m below the surface (Gautason et al., 2010). One exploration well was drilled in 2003.

Landsvirkjun became involved in the project 2005. The land utilization and protection plan for the Theistareykir area was developed in cooperation with the municipalities and energy companies in 2006. Full consultation was sought from various stakeholders during the development of the plan. A regional plan was subsequently developed for the high temperature areas at Theistareykir and other areas in Thingeyjasýsla Municipality covering the period from 2007 to 2025. By the year 2008 six exploration wells had been drilled at the Theistareykir area.

Figure 2: Theistareykir area in 2001 before first research drilling started.

Research drilling and planning continued over the next years. In 2010 the Environmental Impact Assessment was published and preparation works in the area started 2012. In the beginning of 2013 nine exploration wells had been drilled. In the beginning of 2014 Theistareykir Ltd. and Landsvirkjun merged.

In 2011 the consultant work for Theistareykir was tendered out, followed by a contract with the engineering firm Mannvit-Verkís. By the end of 2011 the project was ready to enter design and construction phase. However due to market situations, the construction delayed until 2015.

2.2 Environmental Impact Assessment

An Environmental Impact Assessment (EIA) of Theistareykir geothermal power plant was carried out during 2007-2010 in accordance with law on environmental impact assessment no. 106/2000 and was finished with the Planning Agency opinion in November 2010. The EIA was made for a 200 MW_e power plant construction, built up in modules for sustainable utilization of geothermal energy by gradually increasing production.

In the EIA the impact on the following were evaluated in the EIA:

- Geothermal system and energy resources
- Landscape
- Geology
- Hydrology
- Flora
- Fauna
- Land invertebrates
- Biodiversity in hot springs
- Air
- Visual impact
- Social impact
- Cultural remains

see (Theistareykir Ltd. 2010).

The Planning Agency believeed that with regard to visual impact, impact on landscape and impact on tourism, including noise impact, that the overall environmental impact of an extensive project such as Theistareykir power plant, will be significantly negative.

It was the Planning Agencys opinion that environmental impact due to the construction of the project and related operation depends on working arrangements and implimentation of mitigation measures presented during the EIA process and monitoring of procedures and impacts during construction and operation periods.

3. Health, safety and environment

3.1 Health and safety

Landsvirkjun follows a zero-accident policy with a focus on employee wellbeing in the workplace. The policy is a priority and is a key factor in creating a positive work environment.

One of Landsvirkjun's goals is to create an accident-free workplace at Theistareykir via an active safety system, supervision and training. All employees at the Theistareykir site attend an HSE induction course. All on-site contractors take an active part in implementing these safety measures by operating in accordance with Landsvirkjun's safety policy, registering all accidents, near-misses and dangerous circumstances. Learning from these occurrences is believed to be a key factor in preventing future incidents.

According to incidents and accidents log during the construction at Theistareykir there were logged 6 accidents with absence from work, with 1052 lost working hours, and 29 accidents without absence from work. The working hours during construction is approximately 1.100.000 hours. Figure 3 show when during the construction the incidents and accidents took place and working hours for that year.

The last accident with absence from work took place in August 2016. Although these results show that there is room for improvement, especially in the early stages of the construction.

Landsvirkjun is continually evolving its safety practices via active on-site surveillance and the analysis of any accidents and incidents. Landsvirkjun hopes to continue its progress in HSE practices at Theistareykir by supporting a cooperative effort between employees and management.

3.2 Environment

During construction on site a great focus has been on keeping any environmental disturbance to a minimum. Finishing work has been completed alongside construction to keep the environment as clean as possible. Certain environmental aspects have been monitored, such as effect on the construction to the local fauna, from the onset of construction and this will continue now that operation has begun. This will give the opportunity to assess the effects on these aspects and what these effects are.

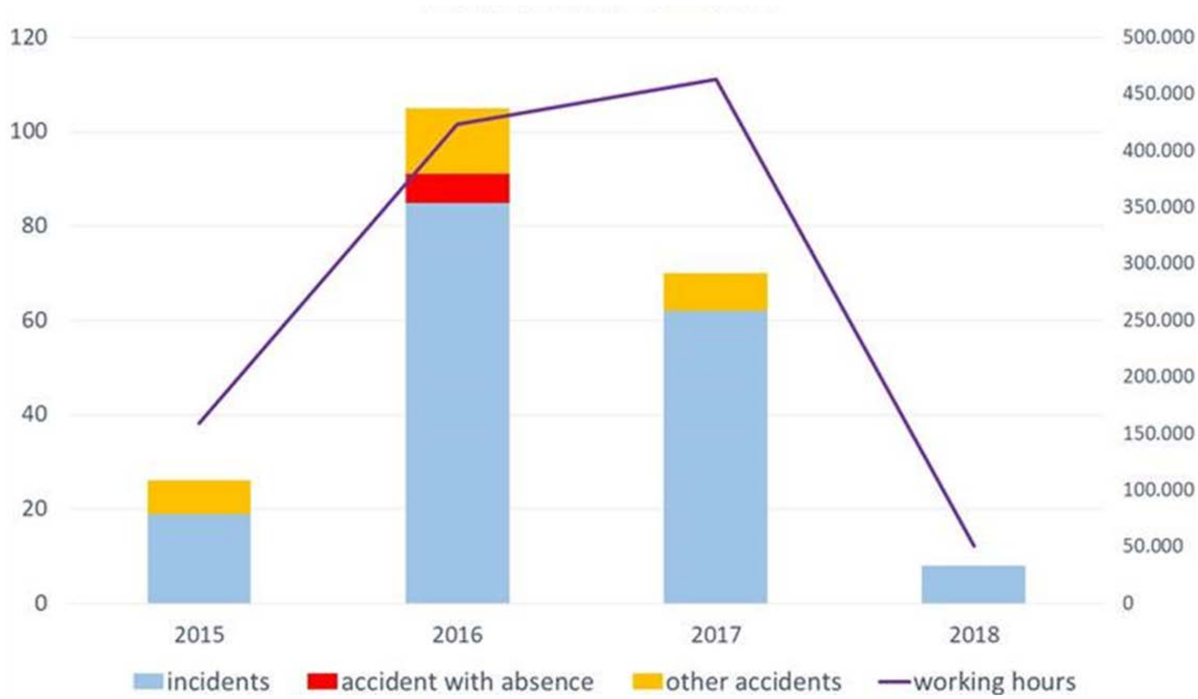

Figure 3: Incidents and accidents compared to working hours during construction at Theistareykir power plant

An example of how to complete finishing work alongside construction is work on re-vegetation projects for the roadside and roadside extraction areas and vegetation have been reallocated within the project area. In addition This works was carried out alongside all other construction.

Land reclamation projects began as a result of any land lost due to the construction of the power plant. Around 160 hectares of land has been re-vegetated to replace land submerged by the construction and around 136.000 plants have been planted. These projects were completed in cooperation with the municipalities of Thingeyjarsveit and Nordurthing, in the summer of 2014.

This work will continue. A five-year plan has been developed for the reclamation of grazing land. Landsvirkjun has also developed a project for carbon sequestration, via re- vegetation and forestry projects in the Theistareykir area.

4. Conceptual design and progress flow diagram

4.1 Conceptual design

According to design criteria the Theistareykir geothermal power plant was to be robust and based on proven design. That is, the power plant should be based on standard technology. One of the reasons for this is the location of the power plant, in the north-east Iceland highlands where services can be challenging, especially during winter season.

To fulfill this requirement the turbines, generators and cold end were chosen to be 45 MW_e single flow single flash. This type of turbine is common in the Icelandic national grid. This results in that all setup for buildings and steam supply system is built up for 45 MW_e modules. Figure 4 shows the layout for the Theistareykir geothermal power plant site. Figure 4 also show how Theistareykir power plant can potentially be expanded in a modular way up to 200 MW_e by adding new drilling sites to the power plant production area and thereby expanding the utilization of the geothermal field.

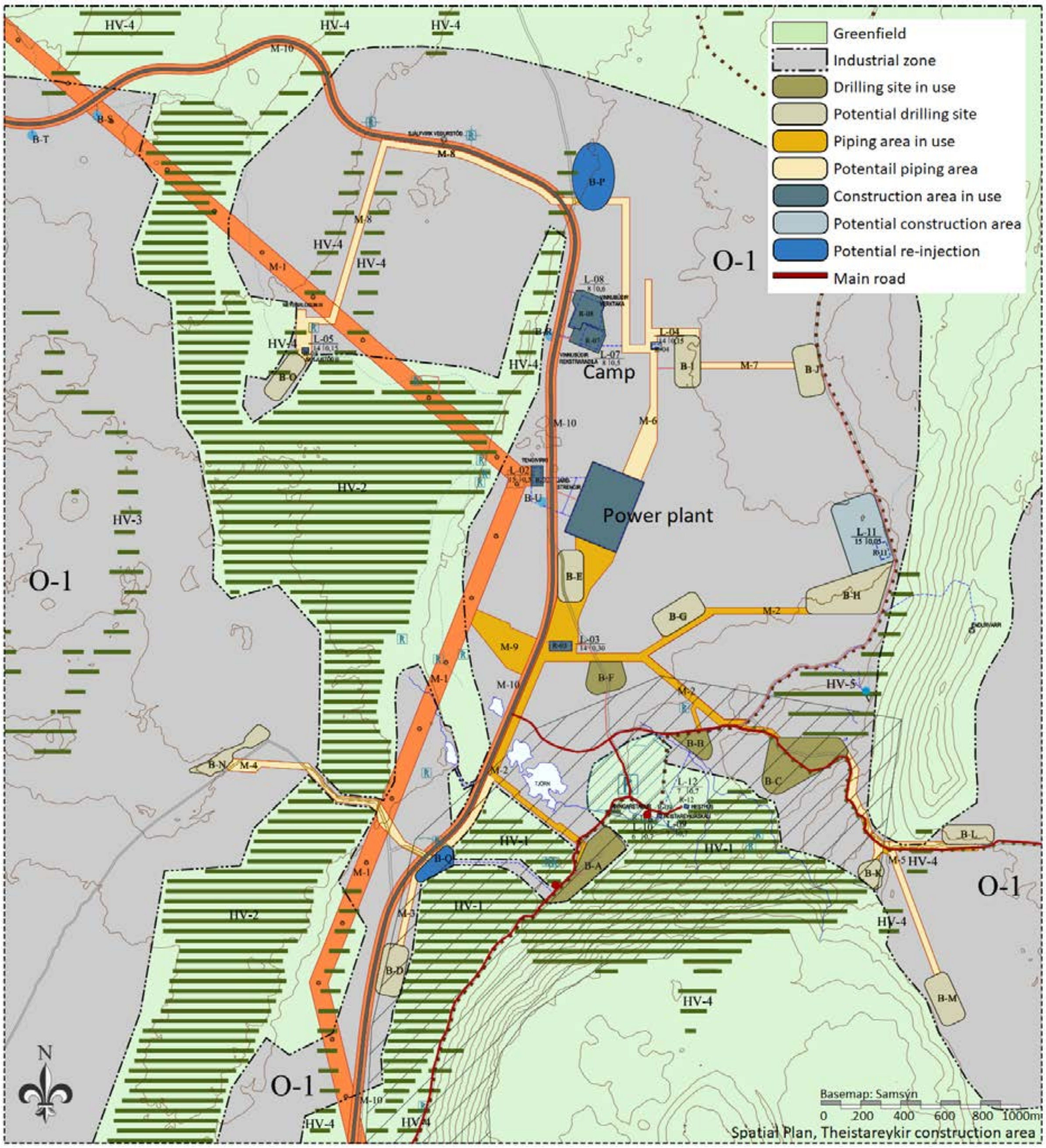

Figure 4: Theistareykir power plant, Site layout

4.2 Progress flow diagram

Figure 5 shows a simplified progress flow diagram for Theistareykir Geothermal Power Plant.

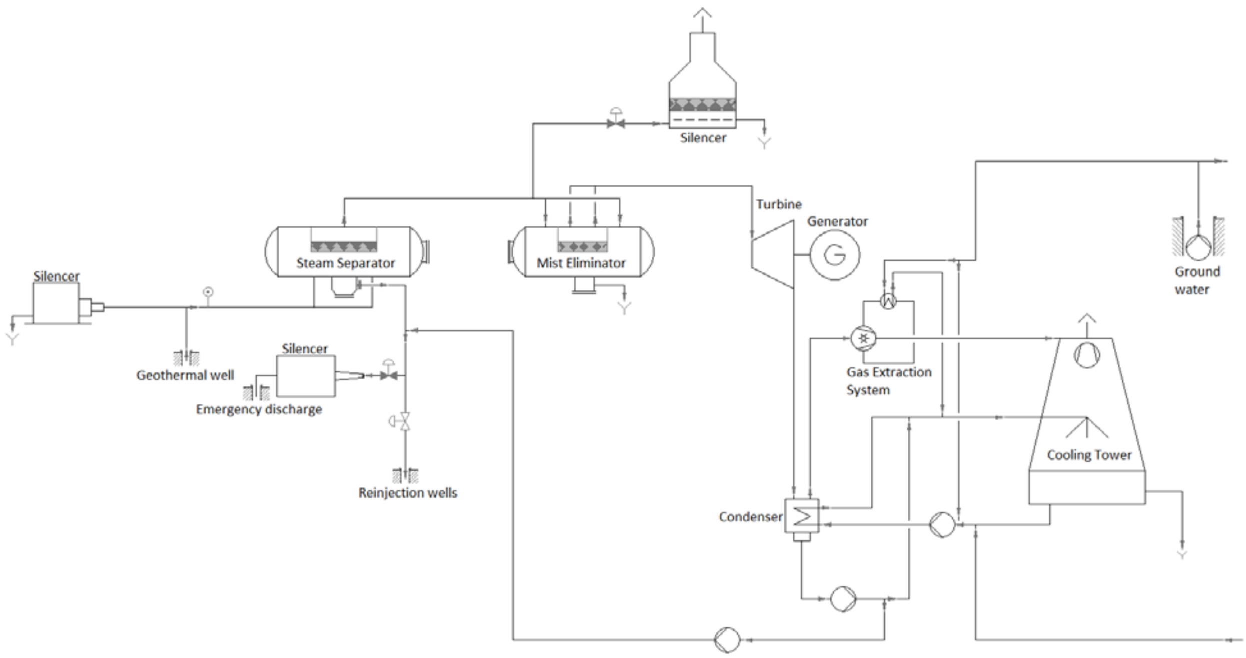

Figure 5: Simplified progress flow diagram for Theistareykir Geothermal Power Plant

The two phase geothermal fluid flows from the production wells through steam gathering pipelines to a steam separator. The steam flows to the mist eliminator while the separated water is mixed with condensed water and is re-injected into the reservoir. In case of regulation or a trip is needed the steam can all be exhausted through silencer.

The steam flowing through the turbine, which is designed as a single cylinder condensing with twelve reaction type stages. The generator is directly shaft coupled to the turbine. From the turbine the steam enters a closed type shell and tube condenser and condensates. The condensate water is either used for mixing with the separated water or used as make-up water in the cooling water circulation. The turbine, generator and cold end was provided by the consortium of Fuji Electric Co., LTD. and Balcke-Dürr GmbH.

The steam contains traces of non-condensable gases up to 0.2%. Geothermal gases are extracted from the condenser with hybrid system of steam ejectors and vacuum pumps to prevent the accumulation of geothermal gases. The geothermal gases are then vented to the atmosphere, above the cooling tower's fans. For more details on the progress flow see Hardarson et all 2018.

5. Research and preparation

5.1 Exploration drilling

A total of nine deep exploration wells were drilled in the Theistareykir area from 2002 until 2013. All the exploration drilling was drilled by Icelandic Drilling. Figure 6 shows drill rig at Theistareykir area in 2006.

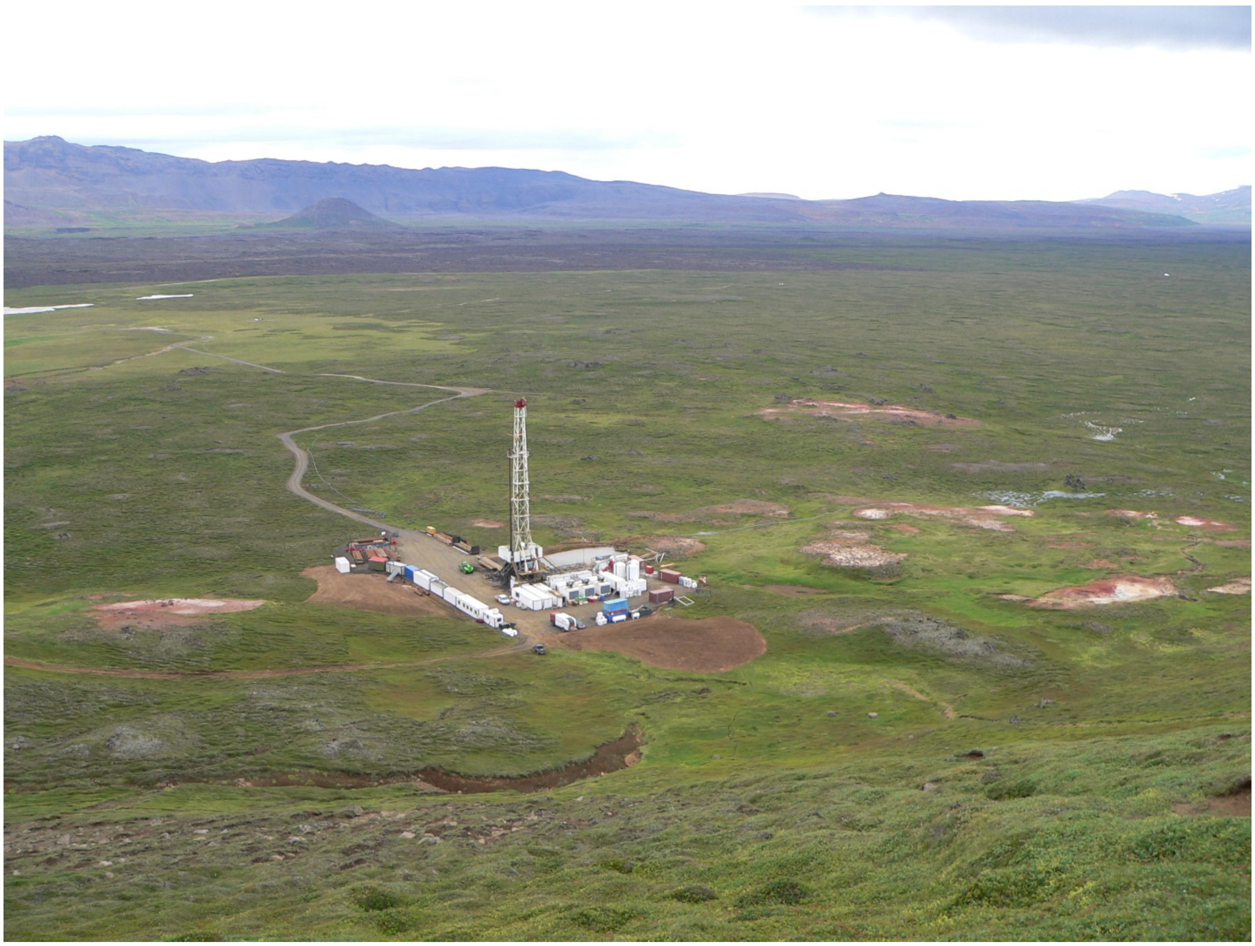

Figure 6: Exploration drilling with the rig Jötunn at Theistareykir area 2006 (Thg-3).

The exploration wells provided data from a ~4 to 5 km^3 volume of the geothermal reservoir. To date the highest bedrock temperatures recorded in the area close to 380°C. This is one of the highest temperatures recorded in a production well in Iceland so far. The first phase of exploration drilling in the Theistareykir area confirmed that the area has great potential for electrical production using conventional methods (Gautason et al 2010). The results of the exploration drilling provided confidence for decision of starting construction of 90 MW_e power plant at the Theistareykir site.

5.2 Preparation for construction

To prepare the site for construction preparation works where been carried out from 2011 to 2014. The preparation works included construction of an access road, groundwork on the powerhouse foundation, the construction of water facilities, electrical distribution system to the site and within the site and other infrastructure. These preparation works were essential for the time schedule of the construction of the power plant.

The access to Theistareykir from Húsavík had been a gravel road. From 2011 to 2014 the access road was upgraded in stages from 2011 to 2014. In the year 2014 preparation at site started with groundwork for the powerhouse foundation and installation of water supply system. In addition, camps were erected and all infrastructure was prepared.

During this period drilling of two cold water boreholes, two re-injection boreholes and other smaller re-injection boreholes were carried out.

By the end of 2014 the site was ready for start of construction which would begin spring of 2015.

6. Construction

In April 2015 the formal decision to start construction for 45 MW_e power plant at Theistareykir was made. By then all civil works and turbine, generator and cold end manufacturing had been tendered and contracted. The purpose of this first stage of Theistareykir Power Plant was to supply additional electricity and additional stability to the north-east of Iceland. In the middle of the year 2015 a power purchase agreement with silicon smelter at Bakki, industrial area near Húsavík. Therefore, it was formally decided in September to add additional 45 MW_e to the Theistareykir project.

In 2015 and 2016 most of the works at site involved civil works, erecting the power plant and working at the steam supply system. In 2016 drilling started again at site. In end of 2016 the first set of turbine, generator and cold end arrived at site. In 2017 and 2018 installation of mechanical parts and electric and control equipment went on alongside finishing of civil works. In the fall of 2017 commissioning for unit 1 started and in middle of November unit 1 started commercial operation. In beginning of 2018 commissioning for unit 2 started and in middle of April 2018 unit 2 started commercial operation.

As of April 2018, Theistareykir Geothermal Power Plant is in full operation. There are still some finishing work remaining which will be completed by end of summer 2018.

6.1 Drilling

At the time when the decision for start construction for unit 2 was made there was steam available for about 57 MW_e. During the winter of 2015 to 2016 additional drilling at Theistareykir was tendered out. The Icelandic Drilling company had the most favorable bid and a contract for 10 additional wells was made. From spring 2016 until fall 2017 eight boreholes were drilled at Theistareykir, ThG-11 to Thg-18. These new wells are all directionally drilled. They are around 2500 m long and reach around 2000 m in depth. The wells have steel casing down two 800-1000 m and the production zone is drilled with 8 ½” drill. Figure 7 show location of all wells and direction of wells at Theistareykir area. Table 1 show the result of drilling exploration/production wells at Theistareykir area. The biggest wells at the site is around 21 MW_e. As of now the estimated power capacity from the wells at Theistareykir equals around 105 MW_e.

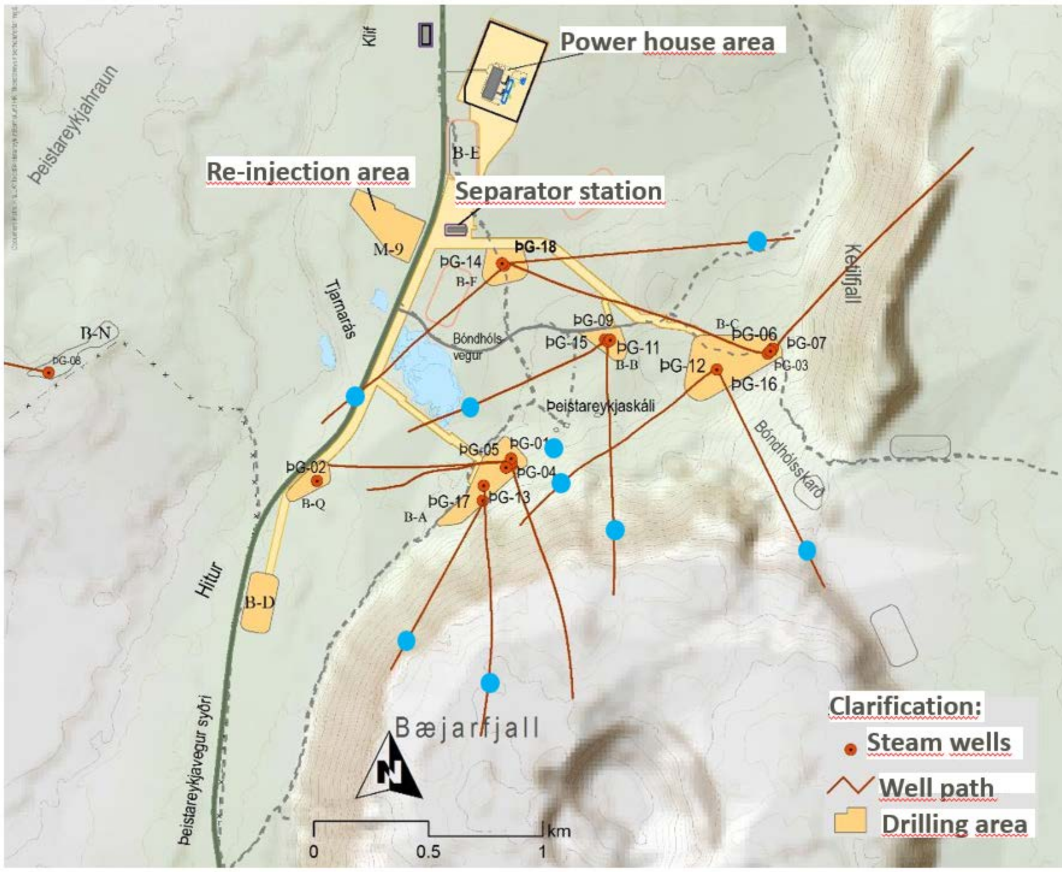

Figure 7: Operational wells at Theistareykir area

6.2 Civil construction

In 2015, work began on the construction of a power station and steam supply. The powerhouse consists of two turbine halls, a service building and a workshop, in total around 8,000 m^2. A steam separator station, re-injection system and pumping station for the cold-water supply were also part of the civil works. Figure 8 shows the civil construction of the power station in the background and drilling for ThG-12 in front.

Table 1 – Information about wells at Theistareykir (blue dot marks mean drilled 2016 and 2017)

	Well no	Power estimate (MW_e)	Remarks
	ThG-01	6.9	Confirmed/ In use
	ThG-02	-	Not to be used
	ThG-03	7.0	Confirmed/ In use
	ThG-04	21.3	Confirmed/ In use
	ThG-05	8.4	Confirmed/ In use
	ThG-06	7.3	Confirmed/ In use
	ThG-07	4.7	Confirmed/ In use
	ThG-08	-	Not to be used
	ThG-09	3.6	Confirmed/ In use
●	ThG-10	-	Failure in early stage of drilling
●	ThG-11	14.4	Confirmed/ In use
●	ThG-12	5.7	Confirmed/ In use
●	ThG-13	7.3	Confirmed/ In use
●	ThG-14	-	To be tested for re-injection
●	ThG-15	2.0	Estimate / Not in use
●	ThG-16	1.9	Confirmed/ In use
●	ThG-17	14.8	Confirmed/ In use
●	ThG-18	2	Estimated/ Not connected

Figure 8: Civil construction well underway; foreground is the drill site for ThG-12, autumn 2016.

The steam supply system consists of steam pipes from wellheads, steam gathering pipes from drill sites, main steam pipes from steam separators to mist eliminators and from there to the power station and re-injection pipeline. Size of pipes varies from DN500 up to DN1000. Total length of pipelines is around 6,5 km. In addition, there are two steam separators, two mist eliminators and two rock mufflers which are utilized as silencers.

The civil works were tendered out as two separate contracts, one for power station and one for steam supply system. Civil contractor, LNS Saga, now Munck Íslandi, was awarded both contracts.

6.3 Mechanical installation

The tendering progress for turbine, generator and cold end with all auxiliaries started early 2014. In March 2015 a contract for the works was made with the consortium of Fuji Electric Co., LTD. from Japan and Balcke-Dürr GmbH from Germany. The works involved the complete design, manufacture, supply, transportation, installation and commissioning of two sets of 45 MW_e geothermal single flow Turbine, Generator and Cold End Equipment including all associated works and Spare Parts.

The in-workshop design and manufacturing took place from 2015 to fall 2016 for unit 1 and early 2017 for unit 2. Heavy items for unit 1, turbine, generator and condenser, arrived on site in November and December 2016 for unit 1 and April 2017 for unit 2. Installation for the units was carried out during 2017 and first months of 2018. Figure 9 shows the turbine for unit 2 being transported to its base in the beginning of summer 2017.

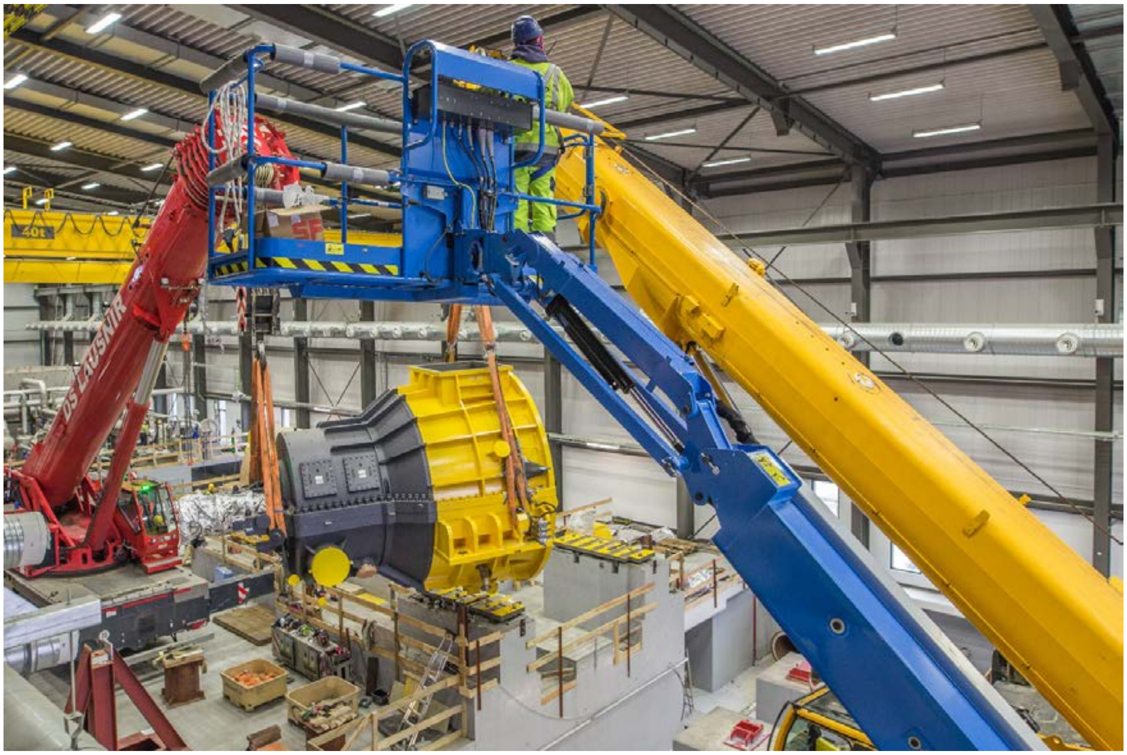

Figure 9: Turbine for unit 2 transported to its base, summer 2017

In the fall of 2017 commissioning of unit 1 started. In October the unit passed the performance test without any problems. From middle of October until beginning of December trial operation of the unit took place, with a formal start of commercial operation at the end of November 2017.

The same procedure took place for unit 2 from middle of February 2018 until middle of April 2018 when unit 2 started commercial operation.

6.4 Electrical works

Electrical works were tendered out as three separate contracts:

1. Main Transformers
2. Control systems
3. Station Services and Auxiliary Systems

The contract for Main Transformers consisted of the design, manufacture, delivery, installations and commissioning of a unit step-up transformer and an interconnection transformer for each generating unit. The contract was awarded to Tamini, an Italian company.

The contract for Control systems consisted of the design, manufacture, purchasing, delivery, installation, programming and commissioning of the distributed control system (DCS), programmable automation controllers (PAC) system for steam gathering system, station service and auxiliaries and PAC for turbine, generator units and cold end equipment. The contract also included the plant's control networks. The contract was awarded to ABB Denmark.

The Contract for Station Services and Auxiliary System consisted of design, manufacture, delivery, installation and commissioning of the station service transformers, medium voltage switchgear, 400 V AC MCC, 110 V DC MCC and all distribution. The contract also included marshalling cubicles for all HW signals and wires to HW equipment and instrument air supply system. The contract was awarded to Icelandic contractor Rafeyri.

Work and installation of all electrical and control works was carried out during 2017 and 2018 along installation of turbine, generator and cold end for unit 1 and 2.

7. Commissioning and first months of operation

As mentioned in section 5.3, Mechanical installation, commissioning for unit 1 took place during the fall of 2017 and for unit 2 in beginning of the year 2018.

To confirm that the equipment is working according to requirements and also to give operators change to learn from the commissioning team the commissioning progress for both units was carried out as follow:

- Cold commissioning, carried out by the contractor, witnessed by the owner.
- Hot commissioning, carried out by the contractor, witnessed by the owner.
- Performance test of all equipment, carried out by the contractor, witnessed by the owner.

- Handing over. All equipment handed over from the contractor to the owner for trial run purposes.
- Trial run period. The owner runs and test all equipment. The contractor is responsible for the unit and has a commissioning supervisor at site.
- Taking over. The owner takes over the responsibility for the unit. This is the start of commercial operation of the unit.

Unit 1 started commercial operation by end of November 2017 and unit 2 in middle of April 2018. Both units have proven to fulfill the requirements made according to contracts. The performance of the units and the supply systems in handling unexpected events has met the requirements, especially has the performance of the units to participate actively in regulating the grid frequency been better than expected (Hardarson et all 2018). Figure 10 shows Theistareykir Geothermal Power Plant in full operation in May 2018.

Figure 10: Theistareykir Geothermal Power Plant in full operation

8. Related projects

8.1 Geothermal Sustainability Assessment Protocol, GSAP

The Theistareykir assessment is the first test of a draft Geothermal Sustainability Assessment Protocol that has been adopted from a similar Hydro Sustainability Assessment Protocol that has been used internationally for many years with positive result. The primary objective was to learn about the applicability of a sustainability modelled on the Hydropower Sustainability Protocol, to geothermal power projects. A second objective was to gain insights into the performance of the specific project under assessment, and to identify opportunities for improvement of this and other geothermal projects in Iceland.

The assessment focuses on the preparation stage of the project, before key decisions such as the granting of licenses and final investment decision were taken. Experience shows that choices made in the preparation stage have the largest influence on sustainability, and therefore the assessment tool for the preparation stage was the first to be developed, and applied in this test. As Theistareykir was already under construction, the assessment was able to look backwards in history (to understand the choices made during preparation) as well as the present status (to understand how plans have been implemented, or had to be adapted). The focus however, is on the preparation stage, in particular the period between the founding of the project company Theistareykir Ltd. in 1999, and the decision by the Landsvirkjun board to authorize tendering of the first steam turbine in 2014.

The result of the assessment show that Theistareykir has low adverse environmental and social impacts, and positive socio-economic effects for the project region, primarily by enabling industrial development and economic diversification in the sparsely populated north-east. Landsvirkjun is a strategic company for the Icelandic economy and for its owner, the Icelandic state, and has been a strong supporter of sustainability initiatives. Preparation of the project has been thorough, and there is only a limited number of issues that have to be considered as gaps, against the definitions of proven best practice in the Geothermal Protocol. There is a broad stakeholder support for the project, although a transmission line was delayed because of some stakeholder opposition. The construction of the Transmission Line was not a part of the Power Plant construction and was therefore not a part of the assessment. It´s importance for the operation of the power plant is however at highest level and should have been monitored accordingly. The Transmission line construction was finalized without having any negative impact on the Theistareykir project

These issues are reflected in the findings of the assessment, and in the range of high scores that summarize the findings. Theistareykir meets Proven Best Practice on 10 topics: Communication and Consultation; Demonstrated Need and Strategic Fit; Siting and Design; Environmental and Social Impact Assessment and Management; Geothermal Resource; Financial Viability; Project Benefits; Procurement; Labor and Working Conditions; and Cultural Heritage. The scores for all topics are summarized in Sustainability Profile, see figure 11.

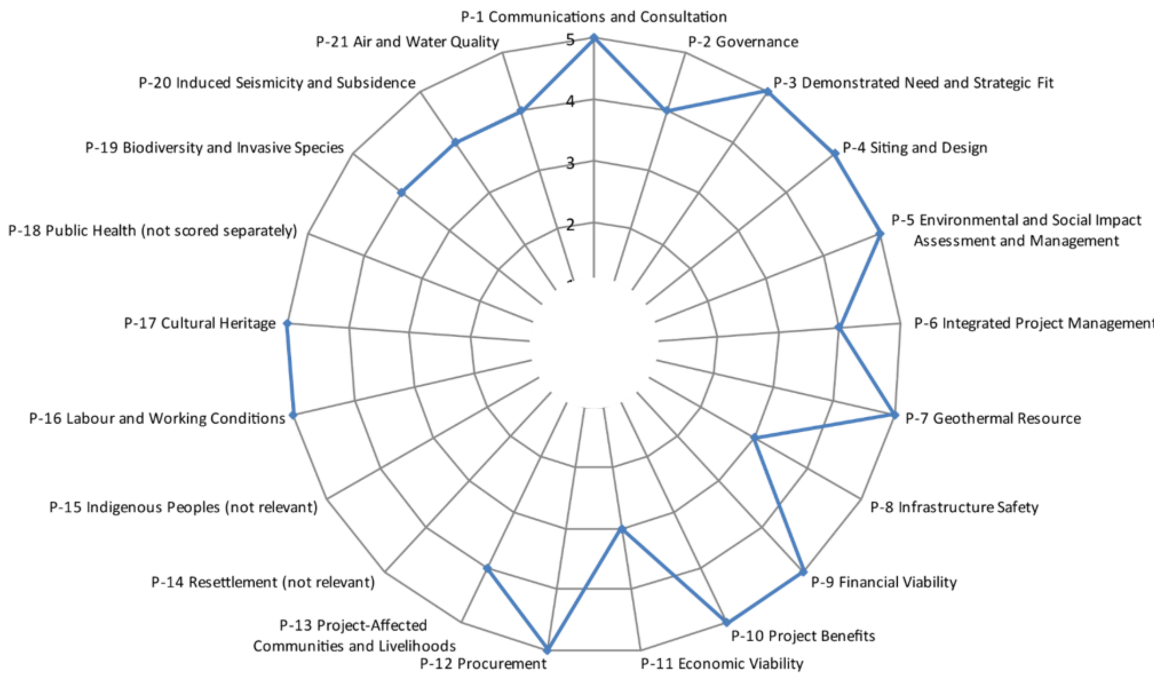

Figure 11: Sustainability Profile

The project exceeds Basic Good Practice on 6 topics, each of this with one significant gap against Proven Best Practice: Governance; Integrated Project Management; Project-Affected Communities and Livelihoods; Biodiversity; Induced Seismic and Subsidence; and Air and Water quality. The project meets Basic Good Practice on 2 topics: Infrastructure Safety, having 6 accidents with absence from work while operating a Zero Accident Policy; and Economic Viability, where the assessment was focusing on the project´s macroeconomics effect that had not been evaluated as part of the project preparation. One topic, Public Health, was Not Scored to avoid duplication with other topic. Two topics, Resettlement and Indigenous Peoples, are not relevant to Theistareykir (Hartmann 2017). The outcome has been encouragement for all participants of the project throughout the construction phase and the project execution.

8.2 Northern Sustainability Project

At the early preparation stage of the Theistareykir project Landsvirkjun, in co-operation with the Icelandic power grid operator Landsnet, set up the Northern Sustainability Project. The main objectives of the project was to capture expectations and concerns of stakeholders regarding the proposed construction of the Theistareykir Power Plant and its future operation, to define and monitor sustainability indicators for social-, environmental- and economical effects that the project has in the sparsely populated north-east.

The project is conducted by Húsavík Academic Center (HAC) that serves as a center for interdisciplinary research in Thingeyjarsýslur and offers its services and facilities to researchers working in the region, whether they are independent or affiliated with institutions or universities. By co-operation with HAC, an independent research center located in the middle of the region to be monitored, the sustainability project and it´s result should be able to deliver a high value information not only to the project owners, Landsvirkjun and Landsnet, but also to the Municipalities deciding and submitting permissions for the constructions, the Icelandic Energy Authorities granting the licence for utilization of all reasources, as well as individual stakeholders.

The outcome is hoped to become a platform to build up a knowledge and a database, based on a scientific approach, that will improve decision making for projects like construction of a Power Plant.

The sustainability indicators have already been developed and the first results are available at the following website: http://www.gaumur.is

9. Conclusion

Theistareykir geothermal power plant project has been ongoing since 1999 when preparation work and research on the geothermal field began by an association founded by local municipalities and regional utility companies. From the beginning one of the main criteria were to prepare and construct a geothermal power plant utilizing natural resources in a sustainable way. Value creating and feasibility of the project are guiding principles. At the same time safety and environmental matters have been at the forefront during the project execution.

When preparing and building a green field Geothermal Power Plant by utilizing a clean natural resource sustainability is a mandatory requirement. As the energy resource is owned by the Icelandic state, i.e. the people in Iceland, all owners should benefit from the project irrespective of their personal stakes in the project.

Landsvirkjun is a member of the UN Global Compact which is a global criterion for social responsibility. Landsvirkjun committed to upholding three of the UN’s Sustainable Development Goals at the beginning of 2017: Goal 5 on Gender Equality, Goal 13 on Climate Action and Goal 7 on Affordable and Clean Energy.

Now, at the end of project execution time the predefined objectives of the plant´s function and power capacity has been met, the construction cost is according to budget and the planned time frame has been kept. In addition the GSAP sustainability profile, as result of the assessment itself, makes us, the project group, as well as Landsvirkjun, the owner of the power plant, very proud of this contribution to a sustainable green energy utilization. It is Landsvirkjun’s hope that the Northern Sustainability Project will proof, through the years to come, that the company has reach its objectives which are to prepare and construct a 90 MW Geothermal Power Station utilizing natural resources in a sustainable way and the outcome, the Theistareykir Geothermal Power Plant will be a testament to the positive impact of Landsvirkjun in Iceland.

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