



Sultartangi Power Station

Sultartangi is the fifth large-scale power station built by Landsvirkjun. Previously, the company has built stations in Iceland's south central highlands at Sigalda and Hrauneyjafoss on the river Tungnaá, Búrfell on the river Thjórsá, and an underground station at Blanda in north Iceland.

Construction at Sultartangi began in 1997 and the station became fully operational in January 2000. It utilizes water from the Sultartangi reservoir which was dammed in 1982-1984 at the eastern foot of Mt. Sandafell, approximately 1 km upstream from their confluence.

The Sultartangi dam is the longest in Iceland. In conjunction with the construction of the power station, the dam crest was raised by 1.0 metre, increasing the reservoir area from 18 to 20 km². A headrace tunnel transports water from the reservoir through Mt. Sandafell to a surge basin on its southwestern side. At the end of the surge basin is the station intake, where penstocks lead down to the powerhouse. Two 60 MW Francis turbines drive the generators.

A tailrace canal exits the powerhouse at the foot of Mt. Sandafell and extends 7 km along the riverbed to a spot 800 m above the Búrfell dam to enter the river there.

The switchgear house west of the station contains SF₆ isolated phase buses. It is linked to a 220 kV transmission line from Hrauneyjafoss Station to the relay point at Brennimelur. Also a new 400 kV line, currently operating at 220 kV, was laid from the switchgear house to Búrfell Station.



Culture and Nature

All human endeavours reflect the thought of the age when they were made. The thoughts and achievements of each generation are an important part of the national culture.

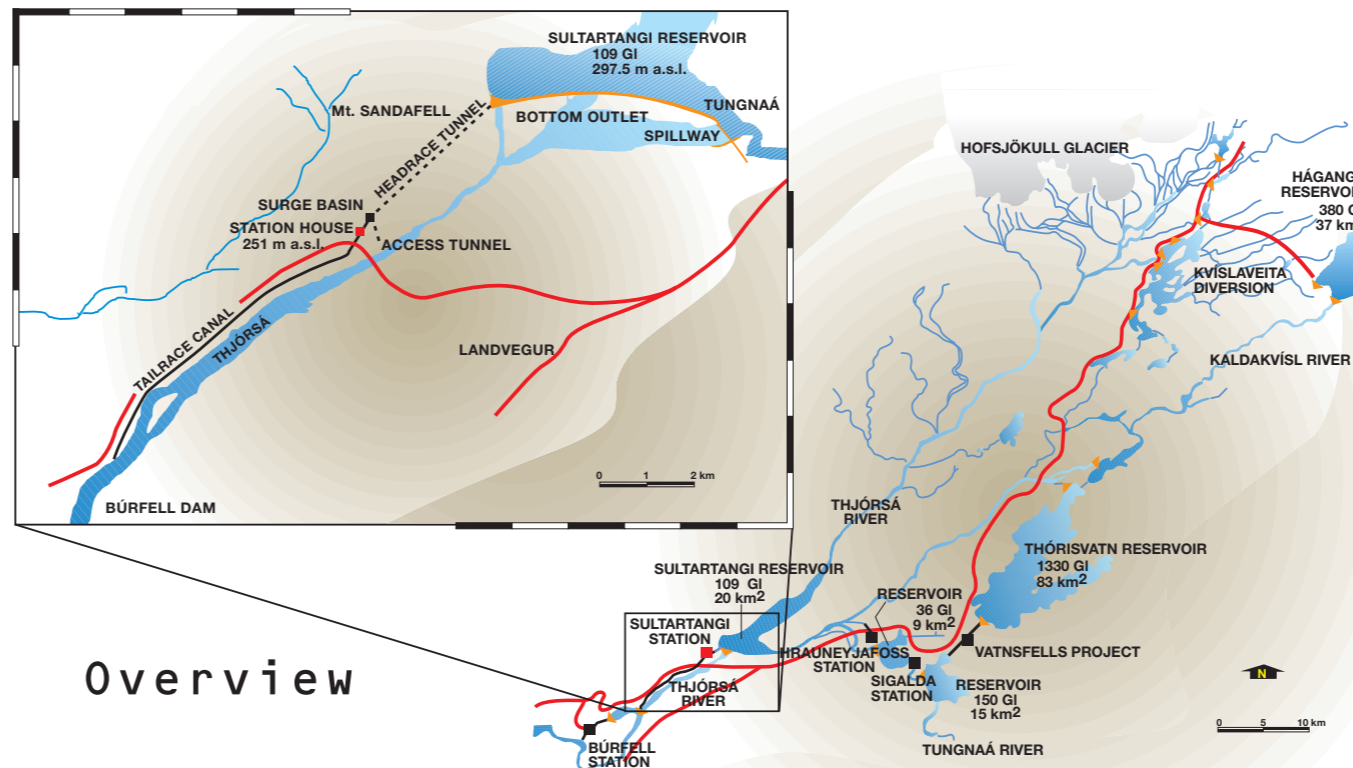
Each of Landsvirkjun's power stations is the product of know-how and thought – and each new power station shows the evolution of hydropower harnessing technology and design. This is part of our cultural history, and at the same time part of the link between culture and nature.

Works of art decorate most of Landsvirkjun's power stations, and they also reflect the changing focus through time. The tradition of installing artworks in power stations dates back to the infancy of electricity production in Iceland, testifying to the view that harnessing of waterfalls is an advance for civilization and therefore worthy of being linked with the works of the country's foremost artists.

Ásmundur Sveinsson was commissioned to make the relief "Source of Light" as a mural for Ljósafooss Station, which went on stream in 1937. His theme is energy and the human know-how which creates light and warmth by harnessing nature. On the intake wall of Sultartangi Station is "Sun Wave" by Sigurdur Árni Sigurdsson, the winning entry in a contest for works of art to decorate the building. Unlike Ásmundur Sveinsson, whose relief highlights man's command over nature in order to create a better life for himself, Sigurdur Árni Sigurdsson addresses in his work the interaction of man and nature - the thought underlying the work takes on a visible form when the sun casts shadows from it. "Sun Wave" consists of seventeen steel plates of different sizes, arranged to create a wave form or energy wave. At

high noon each day, the sun casts vertical shadows from the plates onto the intake wall. When the sun is highest in the south at the summer solstice it casts the longest vertical shadows, which merge to create a horizontal line behind the wave form, and a hole in each steel plate projects a dot of light to punctuate each of the shadows.

This work can be said to represent the link between the power station and the perpetual motion machine driving the water cycle on which energy production is based. The work of art and the building are thus brought into the context of the solar mechanism – they also have their place in nature.



Overview

Key figures and specifications:

Capacity and energy:

Rated head 44.6 m
Rated capacity 2 x 60 MW
Rated discharge 316m³/s
Energy production 880 GWh p.a.

Discharge and reservoir capacity:

Drainage area 6.320 km²
Average discharge into reservoir 304 m³/s
Reservoir area at level 297.5 m a.s.l. 20 km²
Usable storage 109 GJ

Earth dam:

Length 6,100 m
Maximum height 23 m
Mean height 12 m

Headrace canal:

Length 100 m
Maximum depth 38 m

Headrace tunnel:

Length 3,377 m
Width 12 m
Height 15 m

Surge basin:

Bottom elevation 270 m a.s.l.
Bottom area 15x85 m
Water level at rated capacity 295 m a.s.l.

Penstocks (2):

Length, each 40 m
Diameter, each 6 m

Powerhouse:

Length 58 m
Width 16 m
Height from draft tube bottom 45 m

Switchgear house:

Length 28 m
Width 12 m
Height 12 m

Tailrace canal:

Length 7,245 m
Maximum depth 40 m
Bottom width 12 m
Water level at powerhouse 249.9 m a.s.l.
Water level at river Thjórsá 245.0 m a.s.l.

Landsvirkjun

Landsvirkjun was established on July 1, 1965, on the basis of plans for development of power-intensive industries in Iceland. Landsvirkjun produces, distributes and sells wholesale electricity to local public utilities and, under special agreements, to power-intensive industries. The company is financially independent and has been able to finance development of the power system with its own cash generation and borrowing. Landsvirkjun's ownership is divided among the Icelandic State (50%), the city of Reykjavík (45%) and the town of Akureyri (5%).

Landsvirkjun's mission is to provide its customers with the best energy solutions to create the basis for modern quality of life. Employees and management at Landsvirkjun strive to make it a reliable and environment-friendly company, a leader in its field, and is prepared to tackle new challenges for the benefit of its customers, staff and owners. The guiding aim is to create a flexible company which knows its customers' needs and fulfils them in accordance with individual requirements. Landsvirkjun is a sought-after and diversified workplace where employees are able to develop their talents and initiative. The company aims to deploy its initiative, knowhow and financial strength to enhance its value still further.

Energy and the environment

General and industrial demand for electricity has been increasing greatly in recent years. Iceland's power-intensive industries have witnessed large-scale development since 1996, including the expansion of the ISAL aluminium smelter at Straumsvík, the construction of Nordic Aluminum's smelter at Grundartangi and the expansion of the ferrosilicon plant at the same site. A further expansion programme is already under way at Nordic Aluminum and the outlook is that power-intensive industries will soon account for over 70% of Iceland's electricity consumption.



A similar trend has been taking place globally. Demand for energy is growing rapidly. In most parts of the world, the increased need for electricity is met by using fossil fuels, but at the same time mankind faces the potential catastrophe of the greenhouse effect. This makes energy sources which do not cause undesirable atmospheric emissions more important than ever before. After the Sultartangi Station went on stream, Iceland ranks as the world's leading consumer of electricity per capita. At the same time, no Western country can boast such a low level of greenhouse gas emissions from its electricity production. The careful development of energy resources and power-intensive industry in Iceland represents a major contribution towards action against the greenhouse effect.



Sultartangi station



Design of structures and machinery:
Verkfráðistofa Sigurðar Thoroddsen

Electrical equipment design:
Rafteikning

Architects:
Vinnustofa arkitekta

Main contractors:
Project supervision:
VSÓ Consultants
Lahmeyer International

Civil work:
Ístak
Sudurverk and Arnarfell
Fossvirkí Sultartangi, joint venture consisting of Ístak, Skanska Int. Civil Engineering, Sweden and E. Pihl & Son, Denmark.

Electromechanical equipment:
Sulzer Hydro, Germany
ESB International, Ireland

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