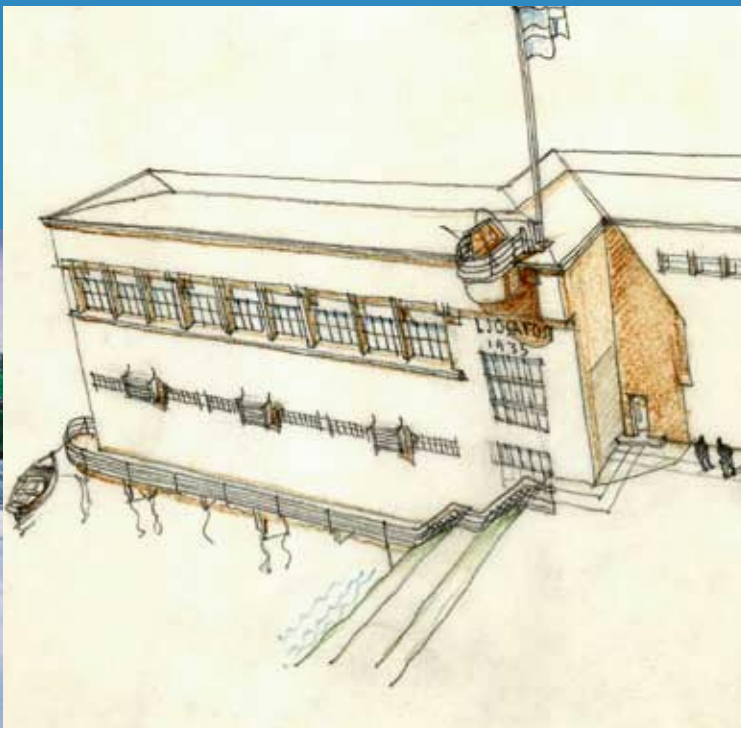
Sog Power Stations

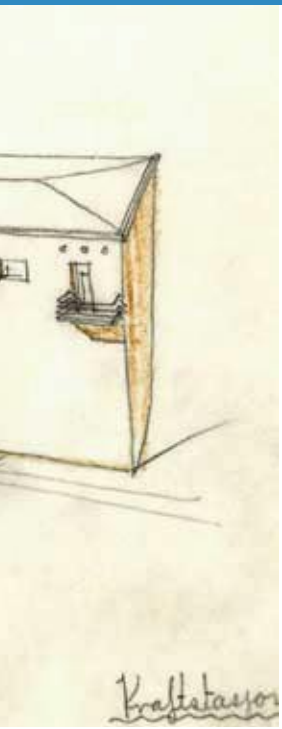
Landsvirkjun
National Power

Sog Power Stations

Ljósifoss

Ljósifoss Station, the first phase of the River Sog developments, went on line in 1937 using two turbines with a combined installed capacity of 8.8 MW. A third turbine with a capacity of 5.5 MW was installed in 1944. The head is 17 m. Ljósifoss utilizes only part of the water in the River Sog and the rest flows past it over the waterfall. A dam was built at the outflow point of Lake Úlfljótsvatn, raising its surface by one metre. The station is located on the riverbank east of the Ljósifoss waterfall, and the water is piped to its turbines and back out downriver.





Original drawing
of Ljósifoss station, 1935.
Architect Sigurður Guðmundsson.

Ljósifoss station
after renovation 2000.

Írafoss

Írafoss Station harnesses two waterfalls, Írafoss and Kistufoss, in the lower part of the River Sog, with a combined head of 38 m. A dam has been built above Írafoss at virtually the same altitude as the Ljósifoss Station outflow. Intake structures are situated on the east bank of the river, where the water enters a steep shaft to the underground powerhouse. From there, the water flows along an almost horizontal tailrace tunnel underneath the course of the river, which curves beneath the dam and re-enters the river at its west bank, below Kistufoss. The station went on line in 1953 using two 15.5 MW generating units, and was expanded with the addition of a 16.7 MW turbine in 1963.

Steingrímsstod

Named in the honour of Steingrímur Jónsson, former director of the Reykjavík Electricity Works, the Steingrímsstod Station went on line in 1959. It harnesses the 20.5 m head where the Upper Sog drains from Lake Thingvallavatn into Lake Úlfljótsvatn through a semi-circular chasm along the ridge that separates the two lakes. A dam was built at the outflow point from Lake Thingvallavatn, where the main headrace runs in a tunnel through Dráttarhlíd into an open-air surge tank above the powerhouse. A shaft leads from the surge tank to two turbines with a capacity of 13.5 MW each.

Renovations

A complete renovation of the Sog Power Stations took place 1996–2000. Now these old stations produce more electricity than ever before. Because of the renovation much space in Ljósifoss Station has become vacant and is used as exhibition and educational facility. Travellers are welcome to visit many of our stations during summer and Landsvirkjun takes pride in designing its power stations to produce an absolute minimum of environmental impact and that they will be useful for more than one purpose. The history of the Sog Power Stations and resent renovations are clear examples of how power stations and tourism can florish together. A similar story can be told all over the country.

Landsvirkjun

The founding of Landsvirkjun in 1965 may be traced to the Icelandic government's interest in increasing the utilisation of energy resources by attracting foreign investors for power-intensive industry in Iceland. At this point, Landsvirkjun was established for the purpose of constructing and operating power plants which could both sell electricity to power-intensive industries and provide the general market with electricity at reasonable prices. Up to this time, the electrification of Iceland had been managed by government and municipalities around the country; however, these utilities were incapable of financing new energy projects.

Through its own means, Landsvirkjun has managed to develop its power system since 1965, with installed capacity expanding from about 90 MW to 1212 MW, rising to over 1900 MW with the new Kárahnjúkar Hydro Station. At the same time, electricity prices on the general market have declined in real terms, while electricity sales in foreign currency to power-intensive industries have increased up to about 80% of the company's electricity production. Furthermore, the quality and security of supply from Landsvirkjun ranks among the best in the world.

Production and demand of electricity

From the time Landsvirkjun was first started until the end of the 1970s, the company built three power stations on the rivers Thjórsá and Tungnaá. During these early years, electricity sales were increasing to the Straumsvík aluminium plant, and sales were also negotiated with the company Icelandic Alloys at Grundartangi. Towards the end of the period, weather conditions and mushrooming demand resulted in a power shortage in Iceland, making construction of the Sigalda and Hrauneyjafoss plants in the late sventies a race against time. In 1983, Landsvirkjun became a national electricity company, whereas its operation up till then had been limited to the south and west of Iceland. The period of 1982 to 1996 was characterised by only a small increase in electricity demand and no success in attracting foreign investors to power-intensive industry projects in Iceland. It was in those years that Landsvirkjun built the Blanda Hydro Station, with many criticising

the resulting surplus supply of electricity. In 1995-96, however, circumstances became favourable for attracting foreign investors in power-intensive industry. Landsvirkjun negotiated contracts for increased energy purchases by the Straumsvík aluminium plant, Icelandic Alloys and a new aluminium plant, Nordurál. All those contracts were completed in just under a year. This introduced a period of intense development at Landsvirkjun, which increased its production by about 60% in five years. The power plants at Blanda, Búrfell and the geothermal plant, Krafla, initially built by the Icelandic State, were enlarged, and new plants were constructed at Sultartangi and Vatnsfell in south Iceland.

In 2002 negotiations were concluded for electricity sales to Alcoa Fjardaál at Reydarfjördur. Construction therefore began on Kárahnjúkar Power Plant at the beginning of 2003, which results in another 60% increase in Landsvirkjun's electricity production.

Culture and Nature

The idea of harnessing the River Sog was first raised in 1906 as a way to supply electricity to Reykjavík. After some debate, the Sog project was felt to be beyond the resources of the municipal authorities at that time. In 1933 Parliment passed an act granting the City of Reykjavík sole rights to develop hydropower facilities on the River Sog. The City then commenced development on the river. In 1966, ownership of the Sog Stations was transferred to Landsvirkjun at its foundation as part of the shareholders' capital contribution.

All energy policy decisions, whether or not they involve utilization or conservation of resources, have consequences for the future. It is impossible to say what will in fact be best for the future. Therefore, careful groundwork and firm vision of the future built on the assumption of today, is needed when decisions are made. The disputes that arose about the harnessing of the River Sog in its time were quite different from what we hear today. Environmental issues are, and positively so, of greater and greater importance. It is clear, however, that in hindsight the harnessing of the River Sog brought great progress and Ljósafoss Station improved the living standards of the people in SW-Iceland. Decisions made in the past about harnessing hydropower and later geothermal energy in Iceland have without a doubt been beneficient for everyone.

Specifications:

Drainage area:	1000 km^2
Average discharge:	110 m^3/s
Gross head:	
Ljósifoss:	17.0 m
Írafoss:	38.0 m
Steingrímsstöd:	20.5 m
Installed power capacity:	
Ljósifoss:	15 MW
Írafoss:	48 MW
Steingrímsstöd:	27 MW
Planning and design:	
Structural engineering:	A.B.Berdal and J.P. Nissen
Mechanical and electrical engineering:	Halgrim Thoresen
Architect:	Sigurdur Gudmundsson
Architect of renovations:	Ögmundur Skarphédinsson
Main contractors:	
Ljósifoss I:	Höjgaard & Schultz, Denmark
Ljósifoss II:	Almenna byggingafélagid
Írafoss:	E. phil & Søn, Denmark, Östlunds byggnad A/B, Sweden, A. B. Grövmaskiner, Sweden
Steingrímsstöd:	E.phil & Søn, Denmark, Almenna byggingafélagid Verklegar framkvæmdir
Manufacture of turbines and generators:	
Ljósifoss I:	
Turbines:	Karlstads Mekaniska Werkstad, Sweden
Generators:	ASEA, Sweden
Ljósifoss II:	
Turbines:	S. Morgan Smith Co, USA
Generators:	General Electric Int. Co, USA
Írafoss:	
Turbines:	Karlstads Mekaniska Werkstad, Sweden, Tampella, Finland
Generators:	Westinghouse Electric Int. Co, USA, ASEA, Sweden
Steingrímsstöd:	
Turbines:	Maschinefabrik B. Maier A.G., Germany
Generators:	ASEA, Sweden

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