Landsvirkjun

Annual Report 2020

Creating a Greener World Together

Annual Report 2020
Summary of activities

About Landsvirkjun's Annual Report 2020
Landsvirkjun's Annual Report has been published electronically since 2013, and we began posting it on our website in 2014. This year's report will be published in a slightly different format. The front page can still be found on our website, but the report is mainly a collection of PDF-files. In addition to the main document you are currently reading, you will find separate documents for our Financial Statements, Climate Accounting and the GRI Sustainability Report. All these documents can be accessed at landsvirkjun.is/arsskyrsla2020.

Date of publication
23. March 2021

Ragnhildur Sverrisdóttir
Project leader

Ívar Páll Jónsson
Editor

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Activities and operations of the year
Performance highlights

Electricity sales

13.3 TWst ↓4.9%

Operating revenues

453.5 m. USD ↓11%

Profit before unrealised items

138.7 m. USD ↓21.2%

Cash flow from operations

234.1 m. USD ↓20.9%

Net debt

1,675.8 m. USD ↓0.9%

Equity ratio

51.4% ↑0.8%

Carbon footprint

16,453 tonnes ↓25%

Greenhouse gas emissions

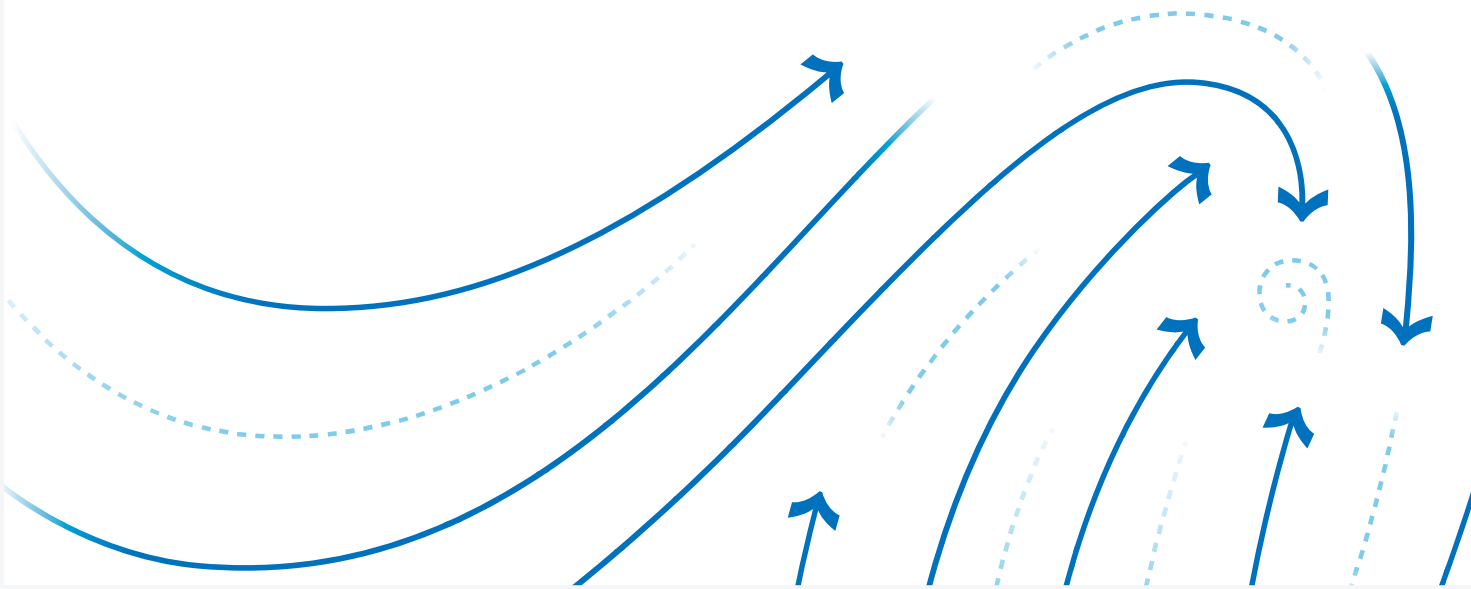
49,453 tonnes ↓6%

Carbon sequestration

33,000 tonnes ↑3%

Vehicles powered by renewable energy

31%



Foresight and a green future
Statement from the Chairman of the Board

Thinking ahead is essential in the energy sector. The power stations we build today provide power for tomorrow. Power projects are designed to meet the energy needs of the future and can take years to complete. We owe a great deal to the pioneers who had the foresight to develop energy production and energy systems in Iceland in the last century, fundamental to our quality of life today.

Periods of prosperity should be used to prepare for leaner times. Landsvirkjun has used the last decade or so to repay its debts and to build new power stations, financed mainly by the Company's cash flow. Landsvirkjun's equity ratio has never been higher, and our financial position will soon be comparable to similar energy companies in the Nordic region.

The Company's improved financial position has enabled us to support Icelandic society through extraordinary times as the COVID-19 pandemic swept the world. Landsvirkjun has stood firmly behind its customers by offering temporary discounts on electricity prices. We have also participated in vital economic responses to limit the pandemic's impact by launching numerous projects, improvements and research and development projects across the country.

The best defence is often an effective offence, and Landsvirkjun has everything it takes to continue its pursuit of a brighter future. Our Annual Report's title reflects our intention to make the world greener, and our policy supports all aspects of sustainability. We believe in generating green electricity and the efficient utilisation of energy resources to support initiatives that sustainably utilise these resources: Creating a Greener World Together!

Jónas Þór Guðmundsson

Sustainability in a challenging year
Statement from the CEO

Hörður Arnarson

Landsvirkjun's operations and results were inevitably affected by the pandemic in 2020, which significantly impacted both the Icelandic and global economy. Many of our customers reduced production due to declining demand and falling product prices. Energy market prices fell sharply but recovered somewhat in the second half of the year. Some of Landsvirkjun's power contracts are linked to aluminium prices and electricity prices in the Nord Pool market.

Fortunately, our improved financial position enabled us to show our support to our customers. We offered temporary discounts on electricity prices and participated in robust measures to reignite the economy by embarking on various construction projects and other projects all over Iceland.

We want to strike a careful balance between revenue and responsibility. Our goal is to make sustainable development an integral part of the Company's core business; that every aspect of our business reflects sustainability in environmental, economic, and social matters. We achieved a significant milestone this year when the Carbon Disclosure Project (CDP) confirmed Landsvirkjun's leadership in environmental transparency and action on climate-related changes by giving the Company an A- grade on their Climate list. Our climate change strategy assumes that we will become carbon neutral by 2025.

Landsvirkjun is also a UN Global Compact participant, an initiative based on commitments to implement universal sustainability principles. We published our second sustainability performance report this year in accordance with the Global Reporting Initiative (GRI) standards, which detail selected criteria in economic, environmental, and social issues relevant to the Company's operations. Our progress on the initiatives mentioned above is further detailed in our Climate Accounting[1] and GRI Sustainability reports[2] which are part of the Annual Report.

1 www.landsvirkjun.com/annualreports/climate-account
2 www.landsvirkjun.com/annualreports/gri

Our goal is to make sustainable development an integral part of the Company's core business

The Company

Landsvirkjun is the largest energy company in Iceland and is owned by the Icelandic state. The Board is appointed by the Minister of Finance and Economic Affairs on an annual basis and is responsible for the finances and the operation of the Company.

Board of Directors
Landsvirkjun's Board of Directors was re-appointed on the 22nd of April 2020. Jónas Þór Guðmundsson was re-appointed as the Chairman of the Board and Álfheiður Ingadóttir was appointed as the Vice-Chairman of the Board.

Jónas Þór Guðmundsson
Advocate Supreme Court
Chairman of the Board

Álfheiður Ingadóttir
Biologist
Vice Chairman of the Board

Guðfinna Jóhanna Guðmundsdóttir
Attorney at law

Gunnar Tryggvason
M.Sc in Power Engineering

Jón Björn Hákonarson
Chairman of Fjarðabyggð Town Council

Reserve members of the Board
Arna Ír Gunnarsdóttir, Social Worker.
Ásta Björg Pálmadóttir, CFO.
Hákon Hákonarson, Mechanic.
Jens Garðar Helgason, Director.
Ragnar Óskarsson, Teacher.

Executive Board of Directors
Landsvirkjun's Board of Directors appoints the CEO. The Board and the CEO are responsible for the operation of the Company. The Deputy CEO oversees the joint affairs of the Company, as well as directing policy development and ensuring the quality of corporate governance. Landsvirkjun currently has five executive directors.

CEO – Hörður Arnarson
Hörður Arnarson completed his electrical engineering studies at the University of Iceland in 1986 and went on to obtain a doctorate from the Technical University of Denmark in Copenhagen four years later, in 1990. Hörður began working for the food processing developer Marel in 1985 and become CEO in 1999, a position he held for ten years.

CEO'S Office, Deputy CEO – Kristín Linda Árnadóttir
The Deputy CEO's primary role is to oversee the development and implementation of company policy, supervise cross-divisional matters, pave the way for advancement and coordinate changes across all levels of the organisation.

Executive board and CEO as of March 2021.
Various changes were made to Landsvirkjun's Executive Board on the 1st of March 2021.

From the left: Rafnar Lárusson, Executive Vice President of Finance and IT; Jóna Bjarnadóttir, Executive Vice President of Community and Environment; Ríkarður Ríkarðsson, Executive Vice President of Business Development and Innovation; Kristín Linda Árnadóttir, Deputy CEO; Ásbjörg Kristinsdóttir, Executive Vice President of Project Planning and Construction; Hörður Arnarson CEO; Gunnar Guðni Tómasson, Executive Vice President of Hydropower; Tinna Traustadóttir, Executive Vice President of Sales and Customer Services and Einar Mathiesen, Executive Vice President of Wind and Geothermal. The previous Board can be seen in the chapter titled Executive Board.

Energy Division, Executive Vice President — Einar Mathiesen

The role of the Energy Division is to ensure that electricity generation and delivery is secure and efficient and fulfils the terms of the agreements signed with Landsvirkjun's customers.

Sales & Customer Services Division, Executive Vice President —Tinna Traustadóttir

The role of the Sales and Customer Service Division is to maximise long-term revenue, handle customer relationships and manage power contracts. Three units operate within the Division: Business Analysis and Market Development, Key Account Management and Business Services. In addition to servicing energy-intensive users and the wholesale market, the Division is also responsible for sales of ancillary services to Landsnet and the marketing of green certificates. The Business Service unit is responsible for supporting business goals and providing excellent service to customers with a clear focus on digital solutions.

Business Development & Innovation Division, Executive Vice President — Ríkarður Ríkarðsson

The role of the Business Development and Innovation Division is to develop new business opportunities and to manage Landsvirkjun's participation in energy-related innovation. The Division is responsible for planning and supervising innovation projects and collaborates with municipalities, other companies, clusters, and other parties to pursue innovation.

Research & Development Division, Executive Vice President — Óli Grétar Blöndal Sveinsson

The role of the Research and Development Division is to manage the preparation of new power projects and to research the existing power systems. We ensure the efficient implementation of new power projects and increase the flexibility of energy production options, and support innovation in energy production with a long-term view of future energy supplies.

Project Planning & Construction Division, Executive Vice President — Gunnar Guðni Tómasson

The role of the Project Planning & Construction Division is to oversee Landsvirkjun's power station projects from the preparation stage to their completion. The Division monitors costs and safeguards the quality and progress of projects in accordance with the expectations, plans and needs outlined by the Company.

Finance Division, Executive Vice President — Rafnar Lárusson

The role of the Finance Division is to provide the foundation for efficient operations and to promote maximum results in all units of the Landsvirkjun Group.

Our team

Our team is our most vital asset. We work hard to retain the expert knowledge and skills of our employees and to safeguard their wellbeing. There were two hundred and seventy permanent employees in 2020, working all over the country. Additionally, one hundred and sixty young adults and fifty-five university and technology students accepted summer employment positions at Landsvirkjun.

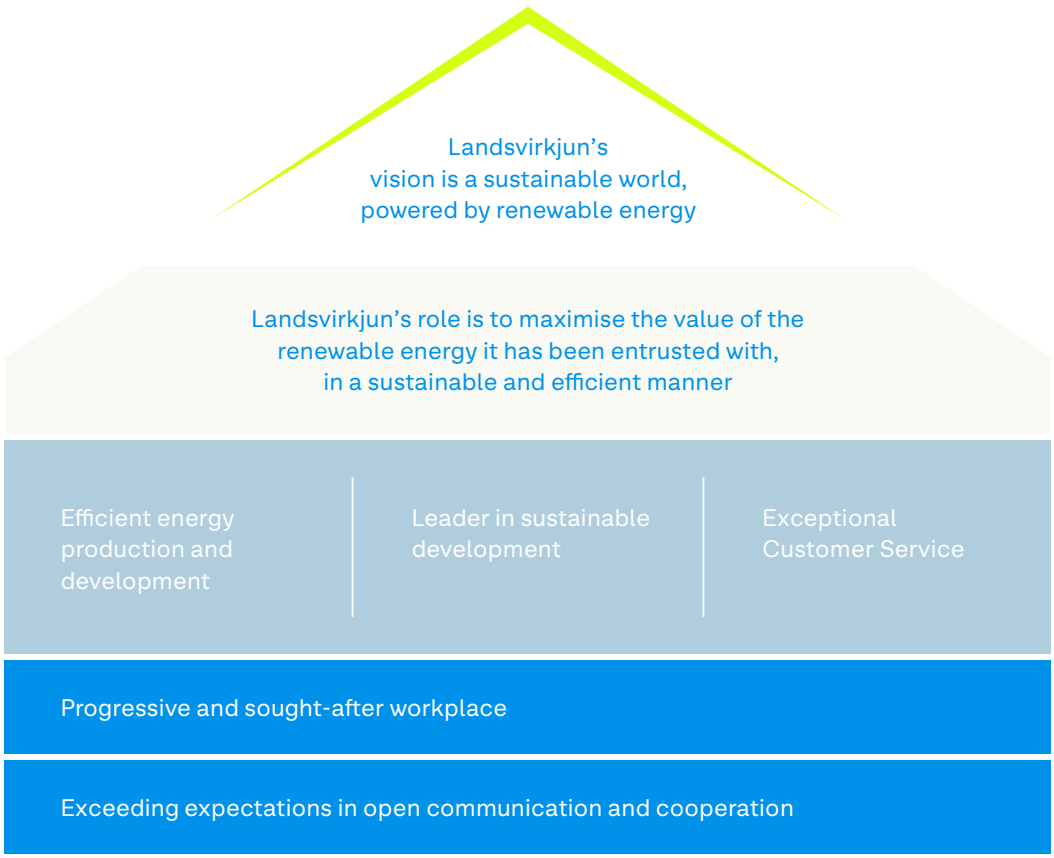
The environmental group in the capital area included five project managers, forty-eight young adults and two individuals from an internship project for autistic students from the Kopavogur High School. The project is now in its fourth year and has so far been a success.

Landsvirkjun's Policy
Goals and future vision

Landsvirkjun continues to evolve in a dynamic and continuously developing operating environment. Innovation is the ability to adapt to progress, and the regular review of our policy allows us to anticipate and prepare for both immediate and incremental changes in our environment. Our previous policy was developed between 2009 and 2011 and proved successful in many areas. Updating our policy became necessary to respond to changes to the external environment and innumerable new challenges and opportunities. The cross-divisional review process began in 2019 with conceptual work and policy update proposals, led by the Strategy and Sustainability Division.

Three meetings were subsequently held by Landsvirkjun's Board to discuss the proposals, and the new policy was approved on the 17th of August 2020. The policy has been introduced to employees and implementation is currently underway. All our employees will be involved in shaping the priorities for each policy target and creating measurable goals for the coming years.

↓ **Landsvirkjun's Policy**
Landsvirkjun's values are Progressiveness, Prudence and Reliability.



Management System
Reliability, efficiency and safety

Landsvirkjun has developed a management system based on years of experience, knowledge, and effective work practices. The Management System supports the Company in fulfilling its obligations towards its clients, employees, and other stakeholders, as well as aiding us in the development of company policy based on the values of sustainable development. The Management System provides information on what we do and how we work. We believe that integrated management and work procedures ensure reliable operations, increasing efficiency and employee safety.

Landsvirkjun's Management System is certified according to international standards for quality management, environmental management, security, health and safety and IT security. Landsvirkjun is certified according to an equal pay standard. Landsvirkjun's internal electrical management system (RÖSK) conforms with the Iceland Construction Authority's safety requirements.

Landsvirkjun's electricity generation is certified by the German Certification Body TÜV SÜD as 100% renewable energy, which is testimony to the Company's commitment to the development of renewable energy sources and confirmation that Landsvirkjun fulfils the most stringent production requirements.

↓ Certifications

TÜV SÜD

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ISO 9001 Quality Management	ISO 14001 Environmental Management	ISO 27001 Information Security Management	ISO 25001 Occupational Health and Safety Management	ÍST 85:2012 Jafnlaunakerfi
ISO 680163	EMS 680165	IS 513566	OHS 680166	EQ 694780

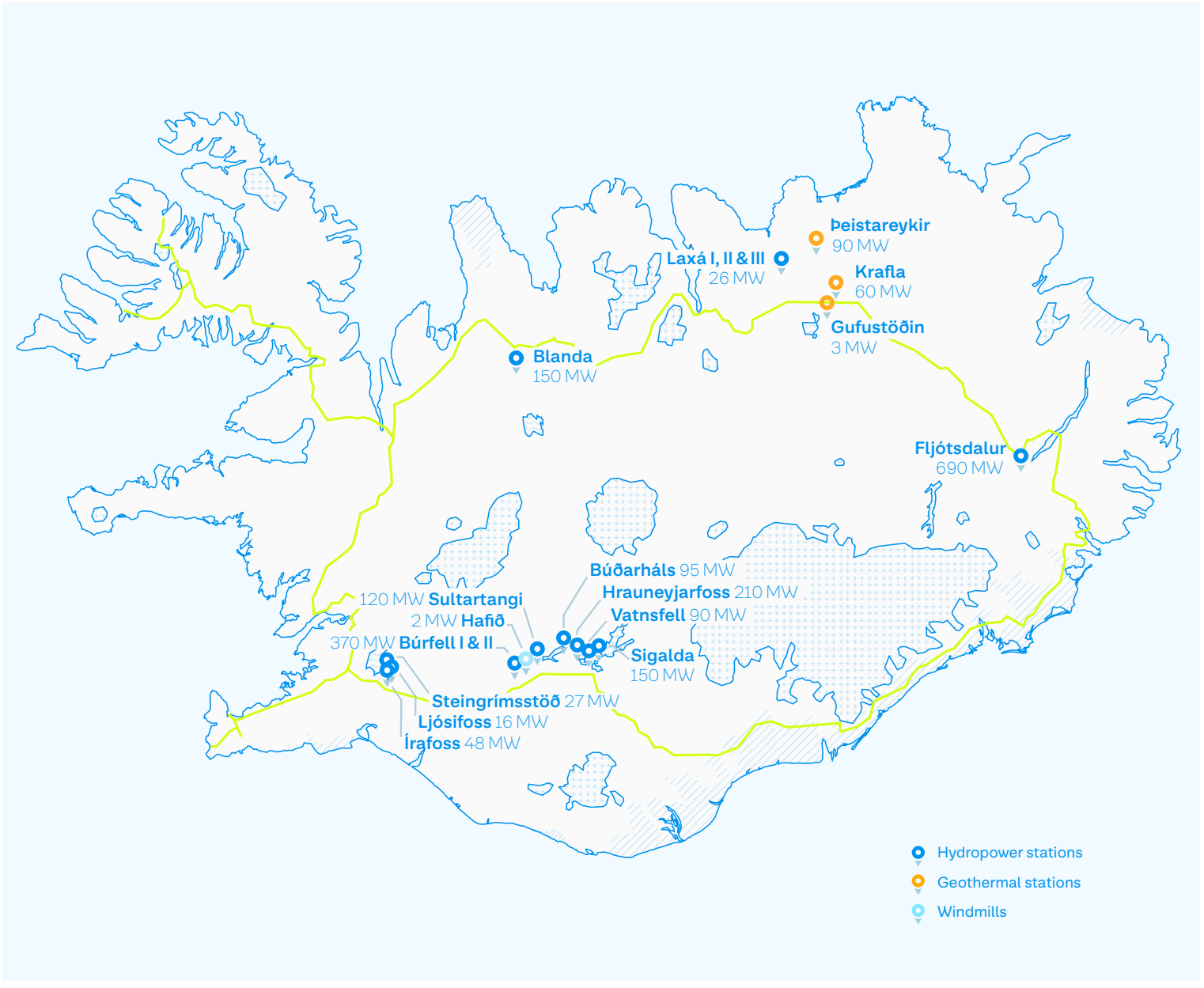
Our team is our most vital asset

Energy production
Utilisation and overview of power stations

Iceland generates almost 100% of its electricity from renewable energy resources. Landsvirkjun produces 75% of this energy.

Landsvirkjun fed 13,304 gwh of electrical energy into the Landsnet transmission system in 2020, a decrease of 3.7% compared with the previous year. We operate fifteen hydropower stations, three geothermal power stations and two wind turbines in five areas of operation all over Iceland. We believe in an integrated approach where prudence, reliability, and operations in harmony with the environment and society are fundamental to our operations.

↓ **Landsvirkjun's power stations**



Hydropower 12,458 GWh

- The total energy generation of Landsvirkjun's hydropower stations was approx. 12,458 GWh in 2020, compared with 12,867 GWh in the previous year, or 93% of Landvirkjun's total production in 2020.[3]
- Landsvirkjun operates fifteen hydropower stations all over Iceland, divided into four areas of operation.
- There are seven power stations in the Þjórsá area, with nineteen generating units and several waterway structures. The area spans from the Hofsjökull Glacier and down to the Búrfell Hydropower Station.
- There are three power stations in the Sog area with eight generating units and several waterway structures by the Þingvallavatn Lake and Úlfljótsvatn Lake.
- The Laxá power stations belong to the Blanda operational area. There are three stations in the area, with five turbines. The waterway at the Blanda Hydropower Station spans a length of 25 km.
- The fourth operational area is the Fljótsdalur Hydropower station, the largest hydropower station in the country, with six generating units and extensive waterway structures including, tunnels measuring 70 km in length.

Geothermal Energy 972 GWh

- The total energy generation of Landsvirkjun's geothermal steam power stations was 972 GWh in 2020, compared with 1,084 GWh in 2019, or 7% of Landsvirkjun's total production.
- Landsvirkjun operates three geothermal steam power stations at Krafla, Þeistareykir and Bjarnarflag, with a total of five generating units.
- We are committed to utilising geothermal energy in a sustainable and responsible manner. An integral part of this approach is maintaining the balance between utilisation and the natural renewal of the geothermal reservoir. Separated hot water, which is not utilised for electricity production, is injected back into the geothermal reservoir.

Wind power 6.7 GWh

- Landsvirkjun operates two wind turbines for research purposes in an area called Hafið just north of the Búrfell Hydropower Station. Each turbine has an installed capacity of 0.9 MW. They produced 6.7 GWh of electricity in 2020 compared with 6.6 GWh in 2019.

3 You can find more detailed information on hydropower in the chapter Natural Resources.

Power station operations
Operations were successful in 2020, despite the effects of the COVID-19 pandemic, detailed in a separate section below.

The monitoring, maintenance and supervision of our power stations were routine during the year despite the pandemic, but inspections and maintenance were in some instances either delayed or rearranged.

There were fifty-eight unforeseen interruptions in 2020 compared with eighty-nine in 2019. Landsvirkjun's goal is to ensure that generating units in the power stations are available 99% of the year, not accounting for routine maintenance periods. This goal was achieved this year, as units were available 99.6%, the same availability as the previous year.

Landsvirkjun's operates in accordance with an integrated, certified Quality Management and Environmental Safety Management System including ISO 9001, ISO 14001, OHSAS 45001, and the Internal Electrical Safety Operation System (RÖSK), which fulfils the criteria set out by the Iceland Construction Authority on electrical safety issues. Landsvirkjun has been certified as a producer of green electricity by the German company TÜV SÜD who specialise in the certification of green electricity.

Refurbishment projects
We carried out eighty-seven investment and renovation projects in our power stations in 2020. The most extensive project was the renovation of the tailrace canal and overlying bridge at the Sultartángi Hydropower Station.

We continued work on a complete overhaul of six turbine units at the Búrfell Hydropower Stations by refurbishing turbine Unit 1. Five of the six turbine units have now been overhauled.

Other larger projects included repairs to the spillway channel below the Hrauneyjafoss Dam, repairs to riprap protection below the spillway at the Sporðöldulón Reservoir, the refurbishment of Unit 2 at the Krafla Geothermal Station as well as the replacement of the electric governor, voltage regulator and repairs to the transformer, and overhaul of generator breaker and thrust bearing in Unit 3 at Sigalda Hydropower Station.

Various projects were postponed or delayed because of the pandemic.

Effects of the COVID-19 pandemic on operations and maintenance

Iceland's National Police Commissioner declared a state of Uncertainty on the 27th of January due to the COVID-19 pandemic. Landsvirkjun's Emergency Response Team was activated on the 28th of January. A specific pandemic response plan, previously updated in 2009 because of the swine flu, was initiated immediately. All supplies at the power stations were inspected and secured.

The first COVID-19 infection in Iceland was diagnosed at the end of February, and the danger level was subsequently increased to the Alert Phase. Landsvirkjun's team met the same day to review preparedness plans for the Emergency/Distress Phase. Emergency shift plans and other necessary measures were prepared for the power stations. The team also discussed ways to reduce the likelihood of power station employees becoming infected by external employees/contractors on-site. Landsvirkjun took numerous measures to secure the Company's operations and prepared for the Emergency Phase to be activated. Visits to power stations were restricted, all trips abroad were postponed, and operations and construction teams were separated in power station areas.

The National Commissioner of Police in Iceland declared a state of emergency on the 6th of March. Landsvirkjun's Emergency Response Team met the same day to initiate the emergency plan and review the Company's response to COVID-19. Emergency shift plans were activated in all operational areas to ensure that employees did not come into contact with each other during shift changes to reduce the likelihood of infection.

Restrictions were introduced on the 16th of March, and Landsvirkjun's employees were asked to work remotely from home wherever possible. The overhaul of turbine units at Búrfell was postponed on the 26th of March to reduce the likelihood of infection in the area.

The first wave of the pandemic ended in mid-May, but restrictions at power stations remained in effect, keeping internal and external employees separated, and visits to stations were restricted. Young adults employed for the duration of the summer were allowed to work at the power stations with various restrictions. A second but more minor wave hit the country on the 25th of July. Immediate restrictions on gatherings were introduced at the end of July, which meant that only one hundred people could meet, maintaining a distance of two metres from each other. These restrictions had some effect but did not completely stop the virus from spreading.

A group infection was confirmed in mid-September, marking the beginning of the third wave of the pandemic. Further restrictions were implemented on the 5th of October. The Department of Civil Protection and Emergency Management declared a state of emergency and restricted gatherings to twenty people. Landsvirkjun tightened regulations by prohibiting visits to power stations. The infection rate rose rapidly, reaching its peak mid-month. Restrictions were tightened even further on the 30th of October, allowing only ten people to gather. The Infection rate subsequently dropped significantly at the end of November, and the authorities were convinced that the third wave was in its final stages. Restrictions were relaxed on the 9th of December, and the first vaccination program began in the UK that same day.

The first batch of vaccine arrived In Iceland on the 28th of December, and the vaccination program began the following day.[4]

4 Read more detailed information about the COVID-19 pandemic in the chapter ISK 12 billion response to the COVID-10 crisis

Búrfell Hydropower Station's 50th year
The Búrfell Hydropower Station was officially opened on the 2nd of May 1970. The station was originally equipped with three turbines and came online twelve months before the station officially opened. Three more turbines were installed at the station in 1971 and 1972. The national newspaper Morgunblaðið announced the following information on the inauguration on Friday the 1st of May:

"The Búrfell Hydropower Station will be inaugurated tomorrow, on Saturday the 2nd of May, in a ceremony held in the powerhouse at 13.30. The President of Iceland, Mr Kristján Eldjárn, will officially open the station. The ceremony will begin with an address by the Chairman of Landsvirkjun's Board of Directors, Dr Jóhannes Nordal. The owners of Landsvirkjun, the State and the City of Reykjavík, will be represented by Mr Jóhann Hafstein, Minister of Industry, and Mayor Geir Hallgrímsson, who will both deliver speeches. We expect around 600 guests, both foreign and Icelandic. Among the guests will be the Icelandic government, members of the Althingi, the Reykjavík City Council and those responsible for the construction of Búrfell."

The Búrfell Hydropower Station inauguration. The President of Iceland, Mr Kristján Eldjárn, officially opened the station.

On completion, Búrfell Hydropower Station was equipped with six turbines and an installed capacity of 210 MW, generating 1,500 GWh per year. The station set a record for annual production in 1988 and 1996 when it produced approx. 1,800 GWh. The station's capacity was increased between 1993 and 1998 when turbine stator windings, runners, guide vanes and other equipment were replaced. The station's installed capacity was increased from 210 MW to over 270 MW, and annual energy production increased from 1,800 GWh to anything up to 2,300 GWh, which is an increase of 500 GWh per year. The expansion is the most cost-effective project ever undertaken by the Company.

The station has been operated at almost full capacity since it came online. The average availability of generating units at the power station is 93%, which is probably a world record. The expansion of the station (Búrfell II) has alleviated the pressure on the original station (Búrfell I), which now produces 2000 GWh per year and availability is 84%. The availability of generating units in most hydropower stations in Europe is approx. 40%.

Natural resources
Sustainable utilisation

Water year 2019–2020
The water year, spanning from October 2019 to September 2020, was below average or the fourth-worst water year in the last seventeen years. All reservoirs were full at the beginning of the water year, and draw-down began mid-October. The winter period was primarily dry and cold, and milder intervals did not reach the highland area. Snowfall was above average towards the end of the winter, and snowmelt contributed to reservoir levels during the spring. July was rather chilly and dry, but reservoirs filled due to favourable conditions in August. Inflow was poor in September but increased slightly towards the end of the month, which meant that all reservoirs were full by the end of the water year.

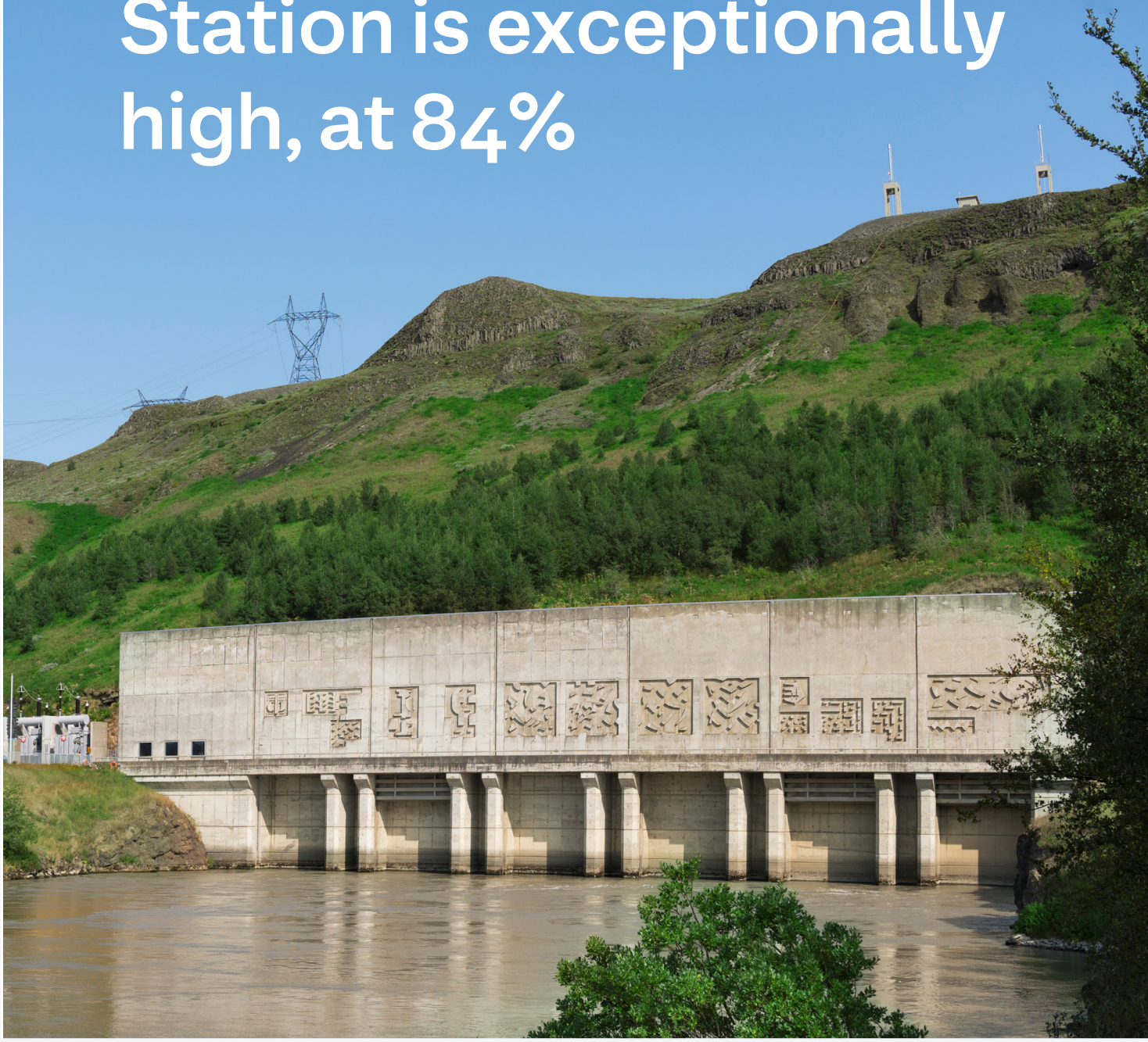
Geothermal resources 2020
One of Landsvirkjun's guiding principles is the responsible and sustainable utilisation of geothermal resources. Landsvirkjun operates three geothermal stations at Krafla, Bjarnarflag and Þeistareykir. Extensive geothermal research is conducted in the area, both in connection with current operations and potential future utilisation in other areas.

Geothermal fluid is composed of steam, water, and gas and is extracted from the geothermal system at a depth of 2,000 metres during the utilisation process. Energy is generated by utilising steam. Most of the water is then re-injected into the geothermal system (deep re-injection) or released into surface water. The gases and some of the steam evaporate from the cooling tower and are released into the atmosphere.

> **In 2020, approx. 7,801 thousand tonnes of geothermal fluid were extracted to produce 972 gwh of electricity In the Mývatn area (Krafla, Bjarnarflag and Þeista-reykir). The process produced 11,783 thousand tonnes of separated and condensed geothermal water, of which 9,513 thousand tonnes was re-injected back into the geothermal reservoir.**

Landsvirkjun is committed to safe and sustainable geothermal production and to minimising its impact on the environment.

The average availability of generating units at the Búrfell Hydropower Station is exceptionally high, at 84%



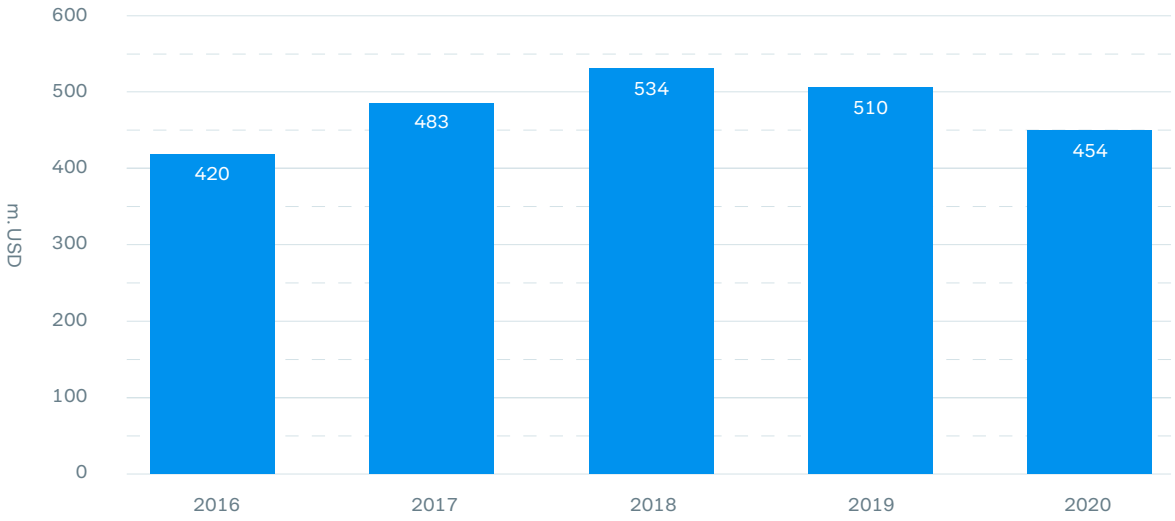
Income statement

Landsvirkjun's operating environment reflects the global pandemic
The world economy has been under pressure because of the COVID-19 pandemic and the subsequent quarantine measures. Many of our customers experienced a reduction in demand, as prices fell on international commodity and energy markets. We have systematically worked on improving our financial position over the past few years, which allowed us to be more proactive at the beginning of the year. We decided to offer our industrial customers temporary discounts on energy prices, while also taking part in the economic recovery by launching various construction, maintenance and research and development projects nationwide.

Income statement 2020

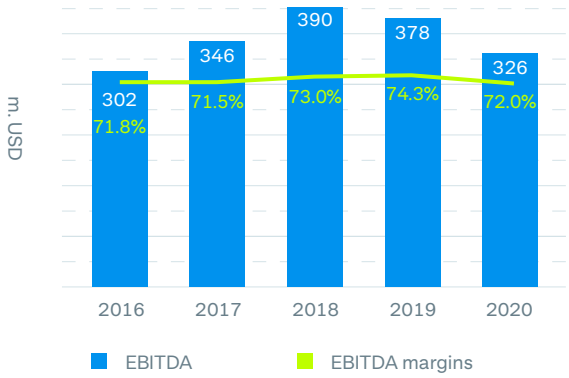
The group's operating revenues fell, which is largely due to decreases on international commodity and energy markets. Demand for metals fell dramatically as a result of the first wave of the pandemic during the start of the year. Nordic electricity prices were also historically low during the year, which negatively affected the company's revenues. In addition to this, there was a small reduction in demand from the company's customers, as their operating environment deteriorated with lower demand and product prices.

↓ Development of operating revenues

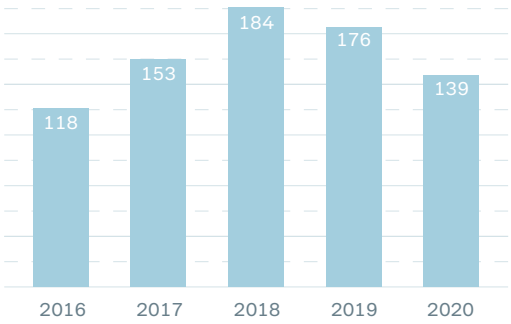


The Group's operating profit before depreciation and amortisation, EBITDA, amounted to USD 326 million in 2020. The decrease in EBITDA between years reflects the revenue development during the period, with ISK operating expenses forming a natural hedge against revenues from the wholesale market. Operating expenses also decrease between years.

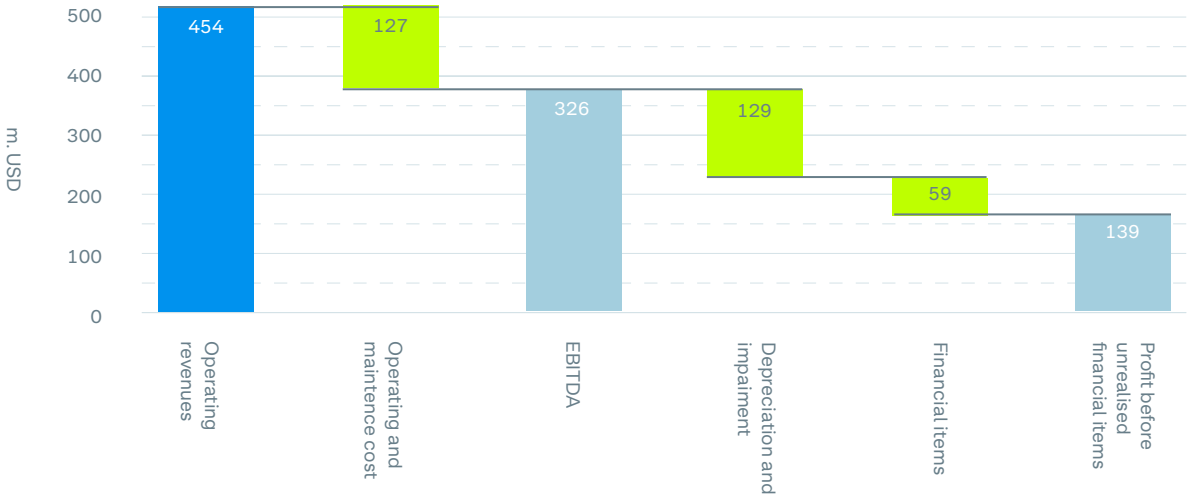
↓ EBITDA and EBITDA margin



↓ Profit before unrealised financial items



Tubulent external conditions affected core operations, with profit before unrealised financial items decreasing by USD 37 million between years. This is in line with a decrease in demand and the aforementioned participation in economic recovery projects. Landsvirkjun's financial position continues to be strong despite this decrease and the company is well placed to face the uncertainty that now hangs over the world economy.



Operational outlook

Like most other companies, we face challenges in the difficult economic environment resulting from the COVID-19 pandemic. Many of Landsvirkjun's customers are experiencing a reduction in demand for their products. However, we are in a strong position to face these challenges, as can be seen in the many economic initiatives we have announced and undertaken. In addition to this, Landsvirkjun has had the capacity to offer temporary discounts to industrial customers. We will continue to place emphasis on reliable energy generation and delivery to our customers, while also ensuring the health and safety of our employees.

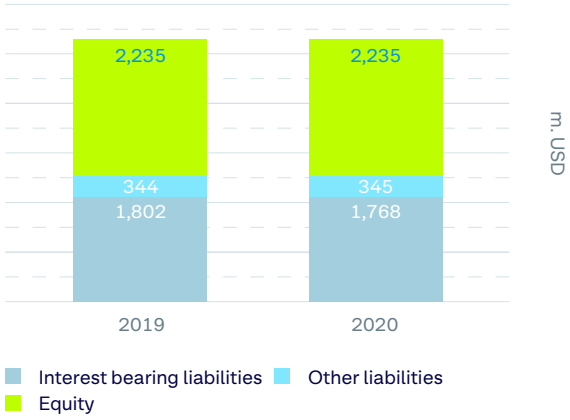
Despite the current economic difficulties, there are various future opportunities for Landsvirkjun, for example in green hydrogen production, eco-friendly industrial parks and other green innovation like the Orkídea project in southern Iceland, Blámi in the Westfjords and Eimur in northern Iceland.

Balance sheet and key figures

Balance sheet
Landsvirkjun's total assets amounted to USD 4,348 million at year end 2020 and cash and cash equivalents amounted to USD 92 million.

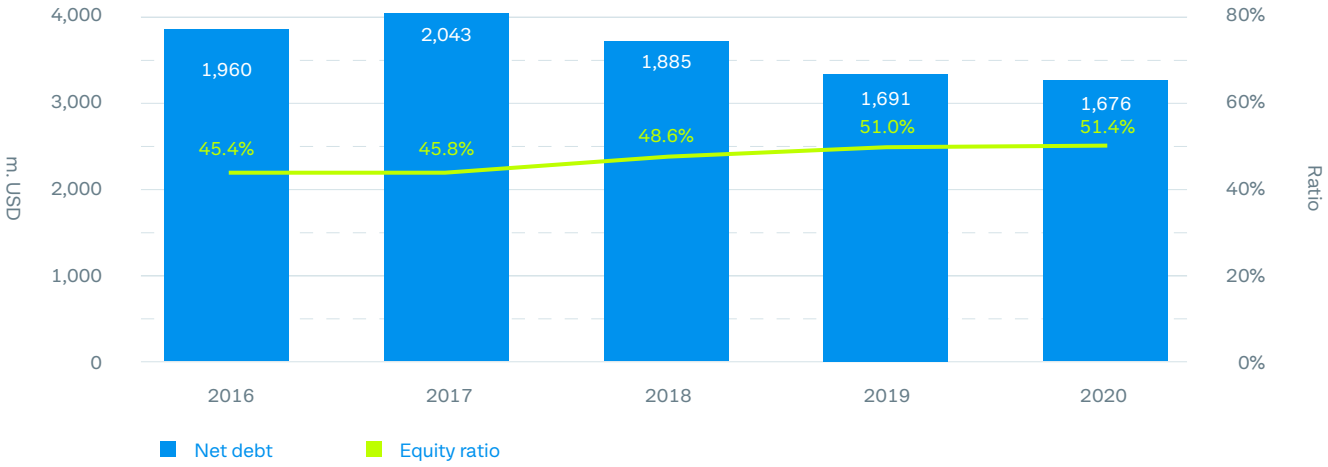
↓ Assets

↓ Liabilities and equity



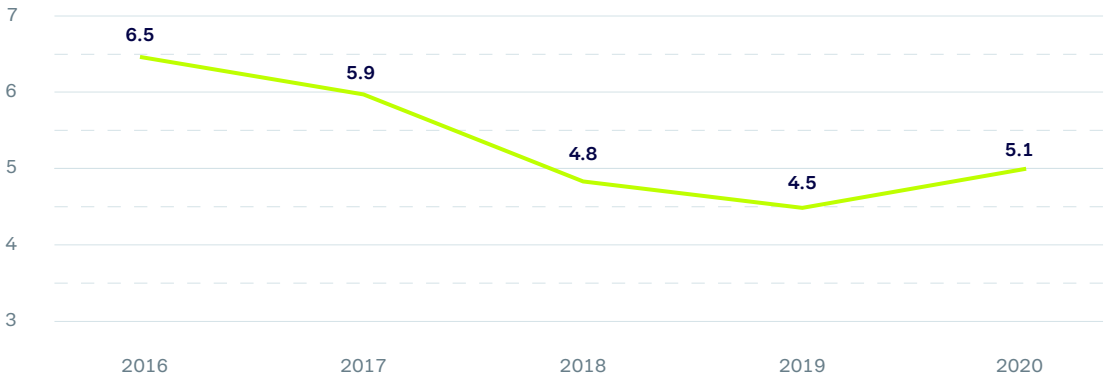
Interest-bearing liabilities amounted to USD 1,768 million at year end 2020 and have decreased by USD 34 million from year end 2019. Equity decreased by USD 0.3 million during this period and the equity ratio is now 51.4% up from 51.0% at year-end 2019 and has never been higher in Landsvirkjun's history.

↓ Net debt and equity ratio



We have placed strong emphasis on debt reduction over the past decade and are therefore in a strong position to meet the challenges faced by Icelandic society and its economy during these turbulent times. Net debt decreased by USD 15.7 million from year end 2019 (net debt is interest bearing debt less cash and cash equivalent). The improved debt position is one of the key criteria for higher dividend payments to the company's owners, the Icelandic nation.

↓ Net debt/EBITDA



The Company's debt, measured against the operating profit before depreciation and amortisation (net debt/EBITDA), shows the interest-bearing debt the company needs to repay in relation to the operating profit before depreciation and amortisation. This ratio increased from 4,5x at year end 2019 to 5,1x at year end 2020. The ratio was at a historical low in 2019 but was about 9x a decade ago.

This improvement in Landsvirkjun's financial position, which is reflected in the development of the equity ratio and debt position, has resulted in an improved credit rating. The company's credit rating in 2013 was Ba2 from Moody's and BB from S&P Global Ratings, which are equivalent ratings, classified as speculative grade. Today, Landsvirkjun's rating is Baa1 from Moody's (an improvement of four notches) and BBB with a positive outlook from S&P Global Ratings (an improvement of three notches). This means that Landsvirkjun's rating is investment grade and is similar to other Nordic energy companies. This positive development provides easier access to funding, at better terms.

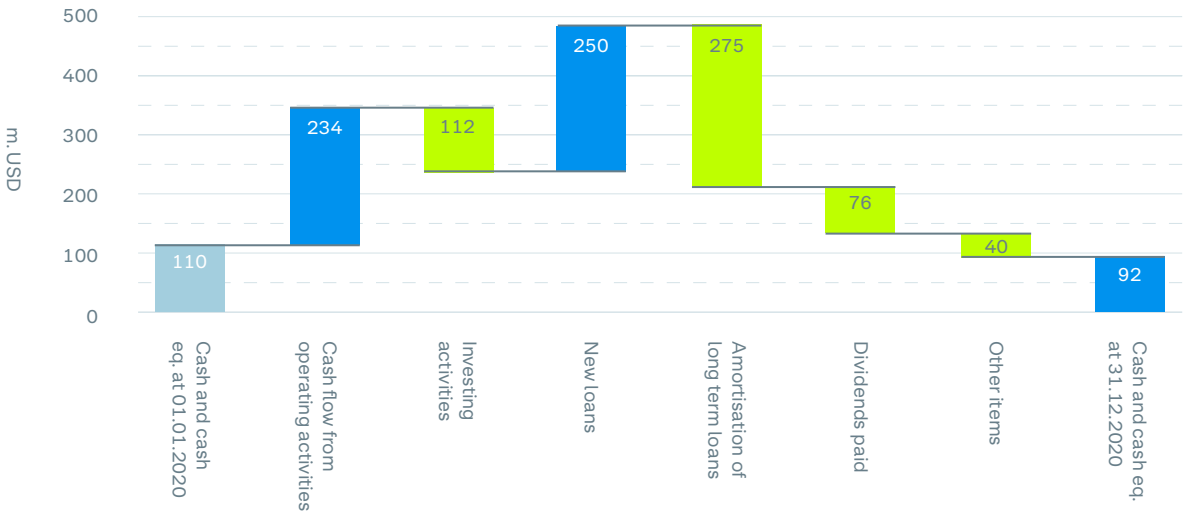
S&P Global Ratings BBB

Moody's BAA 1

Statement of cash flows

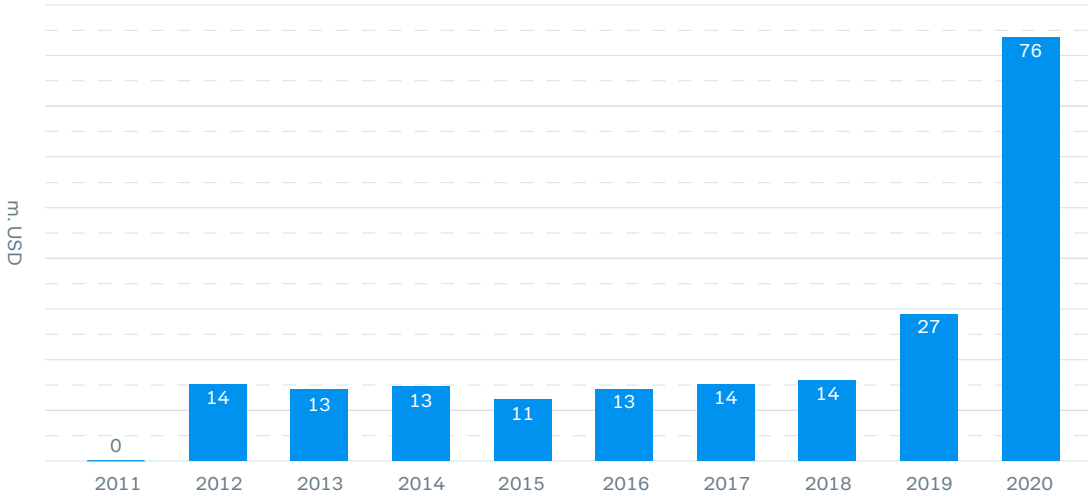
Degrading conditions in Landsvirkjun's operating environment during the COVID-19 pandemic have put pressure on cash flow generation, with cash and cash equivalents decreasing by USD 62 million during the year. However, core operations were strong despite this external turbulence and the company paid a historically high dividend of USD 76 million during the year.

↓ Cash flow



Improvements in the company's debt position and funding terms, along with lower investments, enable Landsvirkjun to increase dividend payments to the company's owner, the Icelandic nation. Although there is continued emphasis on long term investments and decreasing leverage (net debt / EBITDA) to about 3×, the time has arrived that we can start to increase the dividend payments.

↓ Dividends



Risk Management
Informed decision making and social responsibility

Risk Management supports continuous and safe operations
Effective risk management is fundamental to informed decision making within the Company and has been integrated into every work procedure, across all our operations. Our Risk Management Policy supports continuous and safe operations as well as the Company's corporate social responsibility objectives.

Landsvirkjun's risk management objectives:
- Support policy development and implementation
- Support successful, stable and responsible operations
- Support the systematic execution of tasks and projects
- Ensure an acceptable risk level in accordance with set guidelines

Landsvirkjun's Board approves the Risk Management Policy.

Risk management process
Landsvirkjun follows a formal risk management process to identify and manage financial and non-financial risk. The process consists of four sequential steps:

Risk management process

Risk identification
Landsvirkjun's risk is identified and mapped, based on the Company's main processes and construction projects. Risk identification is performed on a regular basis, according to a planned process, in accordance with risk management rules.

Risk analysis
Risk analysis includes an assessment of 'risk severity', based on likelihood, potential impact and the relationship between the two. The potential impact of risk on financial status, image, health and safety or the environment is assessed, as appropriate.

Risk treatment
Risk management may include accepting, avoiding, reducing, increasing or transferring risk. Measures are only implemented when the risk is considered unacceptable or if opportunities for improvement are identified.

Risk management

Risk management, which involves risk monitoring and disclosure, supports operations by using approved risk management policies and procedures, and is designed to ensure that risk is within authorised risk acceptance levels.

Principles of risk management

Each operating unit is responsible for managing its own risk. However, centralised risk management is sometimes necessary. The Treasury Division is responsible for managing the Company's market and liquidity risk. The Information Security Manager and the IT & Digital Development Division are responsible for the security of the major network and information systems. The Human Resources Division manages employee risk and the Legal Division oversees external requirements and compliance.

Risk division

There are many risks associated with Landsvirkjun's operations and value chain. The Company's risk is divided into business risk, financial risk and operational risk.

Business risk

Landsvirkjun operates in an ever-changing business environment. External factors, out of the Company's control, can create various types of risk for the Company. Landsvirkjun closely monitors any shifts within the business environment to assess the potential impact on its operations, customers or on the Icelandic energy market. Managing business risk involves data collection and analyses (in both a wide and narrow context), the development of flexible business plans and decision making based on risk and opportunity.

Financial risk

The Company's financial risk is divided into market risk, liquidity risk and counterparty risk.

Market risk

The Company is exposed to market risk due to power agreements linked to contract prices, foreign exchange and interest rate risk due to the Company's liabilities. Landsvirkjun uses derivative contracts to protect the Company from market risk, in accordance with authorised risk acceptance levels.

Liquidity risk

Landsvirkjun's liquidity risk is managed with a long-term cash flow planning, stress tests and easy access to credit. These measures enable Landsvirkjun to fulfil its obligations in a timely and cost-effective manner.

Counterparty risk

Landsvirkjun's counterparty risk arises first and foremost due to the Company's power agreements, derivative contracts and cash and cash equivalents. Power contracts include a guaranteed minimum purchase for energy as well as guarantees. In relation to derivative contracts and cash and cash equivalents, counterparties are required to have an investment grade credit rating.

Operational risk

Landsvirkjun's operational risk includes risk associated with operations, the maintenance of power stations and other structures, as well as construction. Operational risk is the risk of loss or damage resulting from failures or damage to property and equipment, inadequate internal procedures, system failures, human error or external events.

Operational risks can cause:

- Incidents involving employees, contractors or third parties
- Damage to the environment
- Financial losses
- Production losses or property damage incurred by the customer.
- Image damage
- Information leaks or loss.

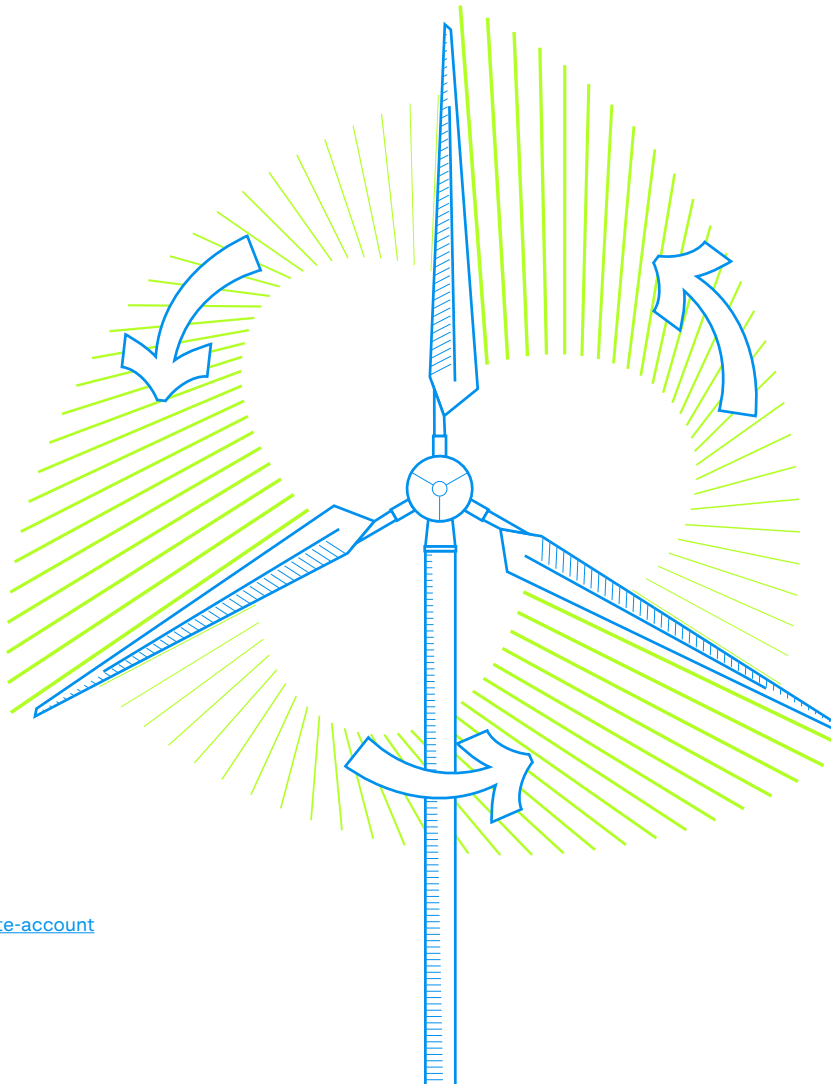
> **Risk management is an intrinsic part of our operations. This includes the preparation of contingency plans, design of technical solutions, process automation, improved work procedure registration, knowledge dissemination and training. The company operates in accordance with international standards and requirements. Mitigation and effective monitoring are used to prevent potential loss or damage.**

Sustainability
Climate action

A leader in climate action
The international non-profit organisation, the Carbon Disclosure Project (CDP), confirmed Landsvirkjun's leadership in environmental transparency and action on climate-related changes by giving the Company an A- grade on their Climate list. The CDP runs the global disclosure system, gathering and distributing information and advising on continuous improvement on environmental issues.

Over 10,000 organisations submit information to the CDP every year. Extensive disclosure contributes to the effective management of carbon and climate change risk, promoting environmental transparency and accountability. The average grade for *Company Category* in 2020 was C. The average score for renewable energy companies was B, but Landsvirkjun was one of 50 energy companies given an A– or A rating.

Climate accounting and GRI Sustainability reports
More detailed information on environmental and societal issues can be found in our Climate Accounting[5], and GRI reports for 2020[6], which are part of the Annual Report.



5 www.landsvirkjun.com/annualreports/climate-account
6 www.landsvirkjun.com/annualreports/gri

Landsvirkjun's leadership in climate action has been confirmed by the international organisation CDP

Customers

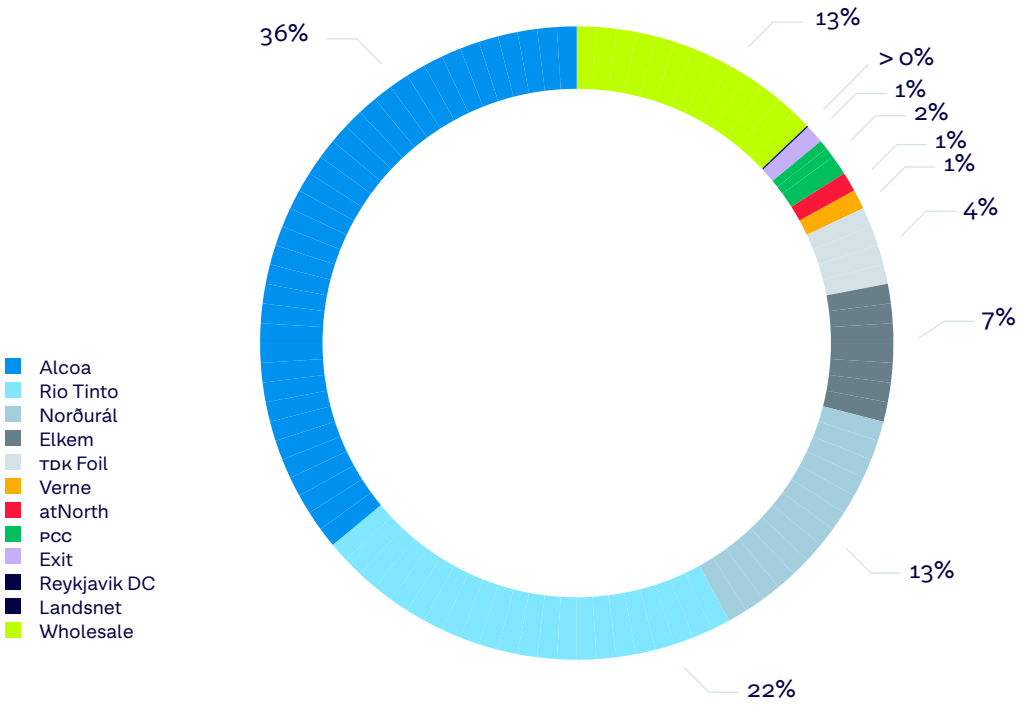
Landsvirkjun assists its customers in challenging times

Demanding circumstances in global markets throughout the year
The COVID-19 pandemic created volatile conditions for global markets in 2020. Most of our customers felt the impact when the worldwide response to the pandemic led to a downturn in the world economy and decreased demand for energy and raw materials. The demand for metals fell to its lowest point during the first wave of the epidemic, and product prices fell sharply in the first half of the year. Markets recovered in the second half of the year, despite a second wave of the virus, which can partly be attributed to the rapid recovery of China's markets, supporting global demand for various commodities. Global markets hailed the rollout of coronavirus vaccines, injecting more optimism into global markets, resulting in higher prices, e.g., in the aluminium market.

Electricity prices in the Nordic countries reached a historical low, caused by several factors, including the COVID-19 pandemic. The winter was mild in Scandinavia, reducing electricity demand and inflow into reservoirs was unusually high, leading to a considerable oversupply of hydropower. The large-scale development of wind energy has continued in the region in recent years, although electricity demand and new connections have not increased, respectively. These factors created very unusual conditions in the Nord Pool electricity market resulting in the lowest electricity prices in its history. These circumstances reduced Landsvirkjun's revenue, as the power contract with Norðurál is linked to the market price of Nord Pool.

Customer support during demanding external circumstances
Landsvirkjun had ten energy-intensive customers in 2020, with a new customer, Reykjavík DC Data Center, beginning operations at the beginning of the year. Landsvirkjun now has four customers in the data center industry, including Verne Global, Etix Everywhere Iceland, and atNorth (formerly Advania Data Centers). Landsvirkjun's customers in the aluminium industry include Alcoa Fjarðaál, Rio Tinto in Straumsvík, Norðurál in Grundartangi and TDK Foil in Akureyri. Customers in the silicon industry include Elkem in Grundartangi and the PCC BakkiSilicon plant in Bakki. PCC BakkiSilicon's operations were suspended temporarily in mid-2020 due to poor market conditions worldwide. The shutdown is being used to carry out improvements and maintenance. The factory is scheduled to start up again in the first half of 2021.

Energy sales decreased somewhat in 2020, compared with the previous year, due to demanding challenges faced by our customers. Energy sales in 2020 were just over 13.3 TWh, whereof 11.6 TWh or 87% were sold to energy-intensive users. Most of the energy was sold to customers in the aluminium industry.



↗ Division of electricity sales

Landsvirkjun temporarily decreased its prices for energy-intensive users during the year to show its support for customers during this unprecedented period of uncertainty. This provision assisted our customers in facing operational challenges and, in some instances, increasing their production.

Competitiveness of total electricity costs to energy-intensive users an important factor
The Fraunhofer Institute for Systems and Innovation Research ISI published a new report on electricity prices and their impact on the competitiveness of the energy-intensive industry. The report concludes that electricity prices in Iceland are competitive. However, transmission costs of electricity and the lack of a compensation scheme due to indirect costs from carbon prices could reduce competitiveness.

Landsvirkjun supports measures that increase the competitiveness of its customers. Landsvirkjun has therefore requested that the Icelandic government secure Iceland's interests in any decision on a compensation scheme for energy-intensive users in accordance with the EU Emissions Trading System (EU ETS), a vital tool for reducing greenhouse gas emissions and the world's first major carbon market.

The government has initiated an analysis of regulations and arrangements in connection with the transmission and distribution of electricity, and Landsvirkjun has shown its support. Landsvirkjun took the initiative to hire an independent third party to assess Landsnet's profitability, to identify measures that could increase Iceland's competitiveness pertaining to electricity transmission costs.

Stable electricity sales to the data center industry, despite challenging external conditions

Landsvirkjun has four data center customers to date. Electricity sales to these customers have increased steadily, quadrupling in five years, amounting to approx. 400–500 GWh per year. These developments show that the industry is thriving in Iceland. Although there is room for further growth as the industry only represents 3% of Landsvirkjun's total electricity sales to energy-intensive users. Electricity sales to data centers in 2020 were comparable to the previous year and relatively stable despite challenging external conditions.

Time-limits on wholesale revoked and digital solutions increased

Landsvirkjun has seven wholesale customers to date: Íslensk orkumiðlun, Orka heimilanna, ON Power, HS Orka, Fallorka, Westfjord Power Company and Orkusalan (Rafveita Reyðarfjarðar merged with Orkusalan in 2020). These wholesale customers subsequently sell the electricity to homes and businesses. Landsvirkjun's market share in the wholesale market decreased considerably in 2020, representing about 13% of the Company's electricity sales, or 1.7 TWh.

Landsvirkjun's changing business environment calls for increased flexibility in services. Time-limits on the purchase of electricity via the wholesale market have been revoked. Our customers can now use digital solutions to enter contracts at any time, whereas they were previously mostly bound to the calendar year. Our digital solutions will continue to grow, and wholesale customers can now enter into contracts for up to 18-months ahead of time. These measures support efficiency and transparency.

The wholesale electricity market has undergone significant changes over the past three years as new companies have entered the market, significantly increasing competition. Electricity auctions have increased in the corporate market, both the number of auctions and the amount of electricity. These developments are beneficial to electricity users but make it difficult for sales companies to make any long-term decisions under such uncertain conditions.

Increased competition in ancillary services auctions

Transmission losses are the energy lost between power stations and consumers during transmission. The Transmission System Operator (TSO), Landsnet, is responsible for purchasing transmission losses from energy companies. The cost of these purchases is part of the transmission fee. Auctions for transmission losses are held every quarter, and participation is open to those who meet Landsnet's requirements. Landsvirkjun has participated in these auctions since they began. The auctions' results reflect the increased competition in the electricity market as prices have decreased between years. The number of participants has increased, which has resulted in Landsvirkjun's market share falling from 72% in 2017 to 25% in 2020.

Participation in the review of the electricity market in Iceland

Landsnet began a review of its transmission fees in 2018. Further progress was made on the issue at the beginning of 2020 when Landsnet published an initial design report for the electricity market, based on variable prices between substations that reflect transmission restrictions in Iceland. Existing proposals would lead to fundamental changes in electricity trading in Iceland, affecting both sellers and buyers of electricity. Landsvirkjun, alongside other market participants, has taken an active part in this review process of the Icelandic electricity market, where an emphasis has been placed on ensuring that the views of all relevant parties are considered.

Green certificates for Icelandic homes and businesses
Landsvirkjun actively participates in the Green Certificates market, allowing buyers in the European market to support renewable energy production. Increasing renewable energy is a fundamental part of the fight against climate change. Revenue from the sale of green certificates is used to provide finance for projects connected with the further development of renewable energy production.

Green certificates are provided with all the electricity Landsvirkjun sells on the Icelandic wholesale market. The Company's wholesale customers provide consumers with green certificates, which confirm that the electricity was produced using renewable energy resources.

Environmental awareness is becoming an integral part of business. Green certificates could give Icelandic companies a competitive advantage in the sale and marketing of their products.

The sale of green certificates creates revenue for Icelandic businesses while also allowing them to participate in the green transition of business, providing end-users with access to valuable green energy. The sale of green certificates provided Landsvirkjun with over ISK 800 million in 2020.

ISK 12 billion response to the COVID-19 crisis
Landsvirkjun announced its ISK 12 billion response to the COVID-19 crisis on the 28th of April 2020. The response package shows that Landsvirkjun can make an important contribution to Iceland's economic recovery during the pandemic.

Landsvirkjun introduced the following measures

- Expediting various employment opportunities and maintenance projects, launched in the next three years, in the amount of ISK 12 billion. See more detailed information in the chapter Refurbishment projects and the new bridge in Þjórsá.

- Offering energy-intensive customers a temporary discount on electricity prices in the amount of ISK 1.5 billion. See more in the chapter Landsvirkjun assists its customers in challenging times.

- Research and development projects in the South and North of Iceland in cooperation with stakeholders in the local community. See more in the chapter on Collaborative projects with stakeholders in rural areas

- Digital development projects designed to support Landsvirkjun's energy production, digital systems, and services.

  Landsvirkjun had recently announced a 10 billion ISK dividend payment to owners, or just over double the amount paid in the previous year.

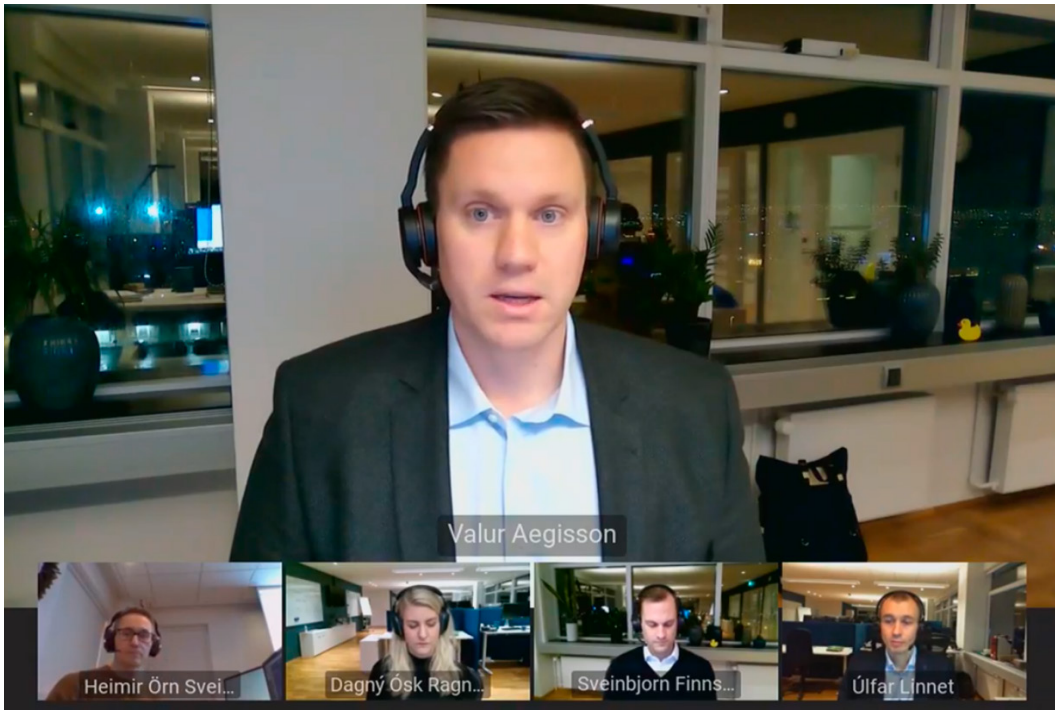
Secure energy production and supply during COVID-19
Various measures were taken to ensure secure energy production at Landsvirkjun's power stations during the pandemic. Landsvirkjun's Emergency Response Team was activated on the 28th of January. Please see the chapter on the Effects of the COVID-19 pandemic on operations and maintenance.

Ensuring the health and safety of employees is a priority. There were no disruptions to energy production because of COVID-19, and none of our power station employees became infected. We collaborated with Auðnast, a wellbeing and support service, to ensure that employees could seek help for anxiety and any other problems associated with the situation. All trips abroad were postponed, and visits to power stations were limited. We also postponed our Annual Meeting and other planned gatherings.

Meetings and events
Energy markets in formation

Open electricity market meetings
Landsvirkjun held two meetings of a series of open meetings on *Energy Markets in Formation,* where domestic and international electricity markets were discussed. Landsvirkjun closely monitors both Icelandic and international market conditions to fulfil its role effectively and to ensure exceptional customer service.

The first meeting's title was Icelandic Energy in International Markets, which discussed the impact of China and climate change on aluminium and electricity markets, developments in Nordic electricity markets and the competitiveness of electricity prices in Iceland. Martin Jackson, an aluminium expert at the research company CRU, who spoke at the meeting, stated that the aluminium industry in Iceland certainly has access to competitive electricity prices. Still, this advantage decreases when overall costs are compared with aluminium smelters worldwide. However, the operation of Icelandic smelters was more efficient than two-thirds of the smelters worldwide.



The second meeting, Our Nordic Cousins and Fraunhofer, was held online and streamed via our Facebook page. The status and prospects of the Nordic electricity market were discussed, as well as the results of the report published by the Fraunhofer Institute for Systems and Innovation Research ISI on the electricity costs of energy-intensive industries in Iceland. The main conclusions of the report found that electricity prices do not negatively impact energy-intensive industries' competitiveness in general when compared with Norway, Canada (Quebec) and Germany. The assessment was carried out at the request of the Ministry of Industries and Innovation in Iceland. The purpose was to shed light on the impact of electricity costs on the competitiveness of the energy-intensive industry in Iceland.

Published articles
Transparency and informed discussion

Landsvirkjun published several articles in 2020 to support transparency and promote informed discussion on energy Issues:

Emission Allowances and Guarantees of Origin Completely Unrelated
Fréttablaðið. 24th of June. Ragnhildur Sverrisdóttir, Corporate Communications.

> **"The so-called Emissions Trading System is about emission allowances [...] The Guarantees of Origin system is entirely different. There is no emission allowance trading of any kind."**

The Future is about Green Energy and Innovation
Vísir.is. 13th of July. Stefanía Guðrún Halldórsdóttir,
Executive Director of Marketing and Business Development.

> **"Responsible resource utilisation is the foundation of prosperity in Iceland, and we are fortunate to be able to use our resources and knowledge for continued value creation, especially as the demand for green energy-producing products increases in the world."**

Willingness to Negotiate and Support
Vísir.is. 23rd of July. Stefanía Guðrún Halldórsdóttir,
Executive Director of Marketing and Business Development.

> **"Landsvirkjun is ready to meet its customers at the negotiating table, with an acute awareness of their difficult position in unprecedented market conditions."**

We Need to do Much Better
An article written for Landsvirkjun.is. 28th of September. Hörður Arnarson CEO.

> **"The goal of introducing 100,000 electric cars is a great step towards eliminating fossil fuels, and we certainly hope that this can be achieved by 2030. However, this only represents a small part of the fossil fuels that we must replace, both to achieve the goals of the Paris Agreement and complete the energy transition in Iceland."**

Does Iceland Want to Give its Natural Resources Away?
Vísir.is. 12th of November. Ragnhildur Sverrisdóttir, Corporate Communications.

> **"The 40 permanent jobs that the union leader is interested in creating in his district would cost the Icelandic nation up to ISK 100 million, per year, each and every one of them! Can't we find a more efficient solution to creating jobs at the expense of the nation?"**

The Nordic Energy Market
An article written for landsvirkjun.is. Valur Ægisson, Director of Business Analysis.

> **"We often hear that the Nord Pool market offers better opportunities to negotiate long term contracts at more favourable prices than we offer in Iceland. The Fraunhofer Institute's report on the impact of electricity prices on the competitiveness of the energy-intensive industry shows that this is simply not the case."**

Greencast
Podcast on green solutions

Landsvirkjun's green solutions podcast was launched this year. Anyone can listen or subscribe to the main broadcasts, which are also accessible on Landsvirkjun's website. The 'Greencast' (Icel. 'Grænvarpið') discusses sustainable development and improved efficiency in utilising resources through the production of renewable energy and any other aspects of the circular economy. Various experts, interested parties, and entrepreneurs are interviewed about green innovation and opportunities within the field.

Græn-
varpið

You can listen to the podcast on Landsvirkjun's website and other streaming platforms. Ívar Páll Jónsson, the host of Greencast, can be seen below with Einar Bárðarson from the Icelandic Wetland Fund during the recording of our sixth episode.

Innovation
Collaboration and progress

Collaborative projects with stakeholders in rural areas
Landsvirkjun has recently focused on increased cooperation and dialogue with various municipalities, institutions, and organisations in rural areas to support the development of green economic activities, promoting sustainable development, innovation, and value creation in rural areas.

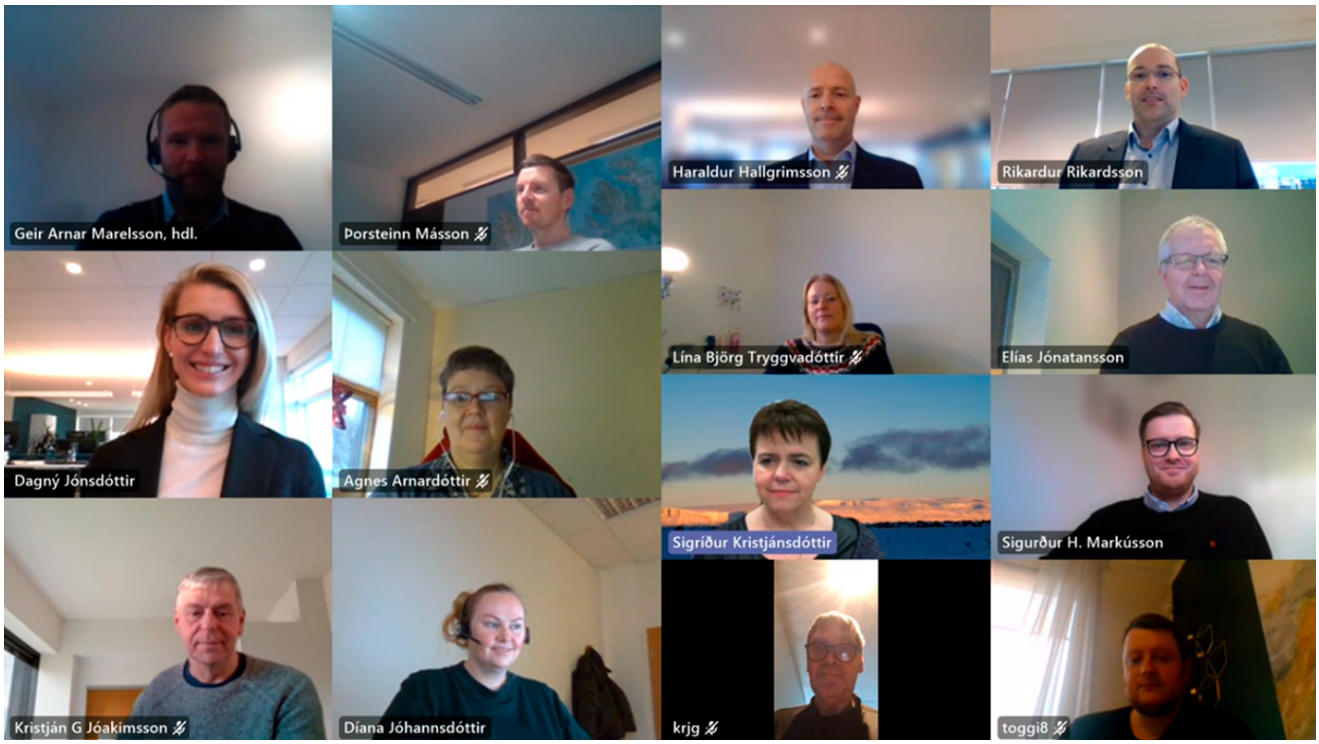
Eimur
We decided to renew our contract with the Eimur project in the Northeast until 2023 at least. Our partners in the Eimur project are Nordurorka, Husavik Energy and Invest in Northeast. The positions of Managing Director and Research Development Director have been filled, and we conducted a review of the project's priorities.

Orkídea
Landsvirkjun, the Association of Local Authorities in South Iceland, the Agricultural University of Iceland and the Minister of Fisheries and Agriculture signed a collaborative agreement in July 2020 to support the development of sustainable high-tech food production and biotechnology in South Iceland. The positions of Managing Director and Research and Development Director have been filled. Startup Orkídea was set in motion as a business accelerator and platform for developing business ideas and innovative projects that focus on sustainable solutions in the field of high-tech food production and biotechnology to promote sustainable value creation in the South and increase the number of well-paid jobs. Startup Orkídea will be launched in early 2021.

↓ Eva Björk Harðardóttir, Chairman of the Association of Local Authorities in South Iceland; Kristján Þór Júlíusson, Minister of Fisheries and Agriculture; Kristín Linda Árnadóttir, Deputy CEO of Landsvirkjun and Ragnheiður I. Þórarinsdóttir, Rector at the Agricultural University of Iceland.

Blámi

Landsvirkjun, the Westfjords Regional Development Office and the Westfjord Power Company signed a cooperative agreement to launch Blámi, an energy transition and innovation project. The main goal of the Blámi Project is to inspire the development of innovative energy transition projects on land and at sea, in fisheries, aquaculture, and other industries. New opportunities in the area could support innovation and the increased use of underused raw materials to create value for existing and future businesses and ventures. The position of Managing Director has been filled for the project, and the role of Research and Development Director for the project has been advertised and should be filled by the spring.



↑ One of the purposes of the Blámi Project is to attract partnerships and international funding for experimentation, research, and development on energy- and eco-friendly solutions. New opportunities and increased co-operation between the public and private sector could help the region to move towards a more circular economy, where the increased use of underused raw materials will be used to create value for existing and future businesses and ventures.

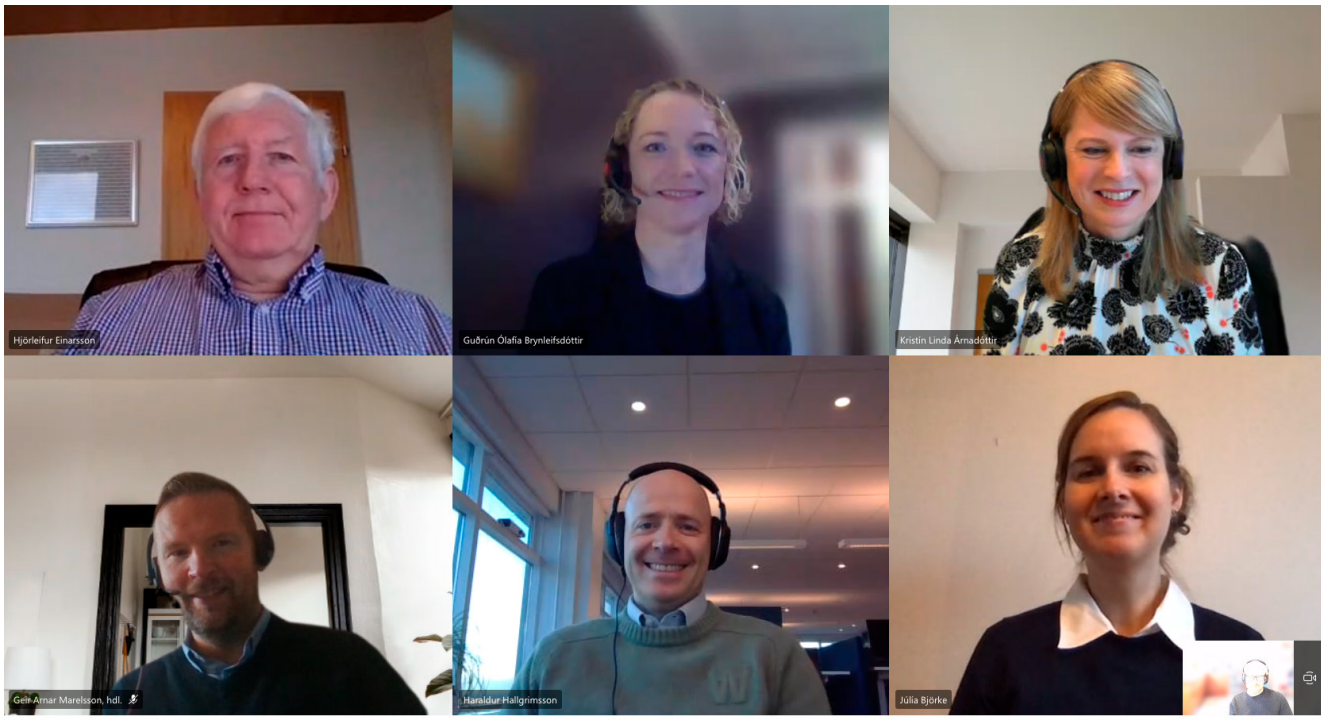
Innovation in the Northeast
The innovation company MýSilica was the first business to use Landsvirkjun's facility to support innovative and multi-use geothermal source projects in the Mývatn area. Landsvirkjun and MýSilica signed a contract to research, develop and produce silica-rich skin and cosmetic products sourced from geothermal water produced by Landsvirkjun's geothermal stations in the North of Iceland.

The project will explore the extraction of mineral-rich and particularly, silica-rich raw materials from geothermal water produced by energy production. The material will subsequently be used to make natural skin care products.

> **We also signed a contract with MýSköpun ehf. on research and the cultivation, development, and production of algae in Landsvirkjun's geothermal operation areas in the North of Iceland. Their offices will initially be located in offices previously used by Kísiliðjan by Mývatn.**

The project focuses on assessing the feasibility of MýSköpun's research and cultivation of algae found in Mývatn and the subsequent development, production, and marketing of valuable consumer products. e.g., from spirulina. The multi-use of geothermal energy will be considered, as geothermal streams from geothermal stations, e.g., electricity, hot water, cold water and natural gases, are used in cultivation. Both agreements aim to increase value creation from unused resource streams from geothermal electricity production. The project will improve the utilisation of resources and create opportunities for development and innovation in the local community.

↓ The contract between Landsvirkjun and MýSköpun signed during an online meeting due to the covid-19 crisis. Top left is Hjörleifur Einarsson, Chairman of the Board of MýSköpun; Guðrún Ólafía Brynleifsdóttir, Business Development Manager at Landsvirkjun and Kristín Linda Árnadóttir, Deputy CEO at Landsvirkjun. Bottom row: Geir Arnar Marelsson, a lawyer; Haraldur Hallgrímsson, Director of Sales and Business Development at Landsvirkjun and Júlía K. Björke, Managing Director of MýSköpun.



Energy transition
Demand is growing to produce hydrogen and electricity to facilitate energy transition in domestic transport. The feasibility of exporting this type of fuel to mainland Europe is also under assessment.

Landsvirkjun and the Port of Rotterdam signed a Memorandum of Understanding (MOU) in 2020 to conduct a pre-feasibility study on the export of green hydrogen from Iceland to mainland Europe. The two parties intend to share their knowledge and experience to find a platform for cooperation, seeking out new export opportunities and assess whether green hydrogen from Iceland could meet the energy needs of European consumers.

Energy supply for the Borgarlína project

We continued our cooperation with Strætó, the Association of municipalities in the Capital Area and the Icelandic Road and Coastal Administration (IRCA) to identify the best source of energy for the Borgarlína (City Line) project.

The Borgarlína project has been under development for years, but systematic steps should now be taken to decide Borgarlína's energy source. The energy source must be environmentally friendly and from a domestic source. The project is carried out in connection with the first construction phase of Borgarlína, due to begin in 2021, and route changes to the Strætó bus system, currently being worked on in collaboration with Borgarlína's project office. These changes are expected to be implemented once the first two Borgarlína routes open in 2023.

Strætó has been a leader in energy transition in Iceland by deciding to stop purchasing diesel buses in the capital area. The New Route Network (Nýtt leiðanet) was developed to run some of Strætó's routes through the Borgarlína system.

Hydrogen, batteries, and methane – each energy source has different strengths

The objective is to provide Borgarlína with an environmentally friendly and domestic energy source. Hydrogen, batteries, and methane have varying characteristics and are being considered for the project.

Assessing energy and investment costs is essential when choosing an energy source. Other factors that need consideration include the location of filling stations, operational security, greenhouse gas emissions, planning issues, local air pollution, noise pollution and various other factors during the lifetime of the project.

Further information is provided in the first draft of the 1st round of the Borgarlína project, published this year.

Ongoing cooperation with the Icelandic Fishmeal Producers Association

We agreed with the Icelandic Fishmeal Producers Association (FÍF) to continue and further promote the use of renewable energy in the fishmeal industry. The initiative increased the proportion of electricity used by fishmeal factories from 75% of their total energy demand to 83% between 2017 and 2019, and plans are in place to increase this even further. The increased use of electricity has prevented the consumption of 56.5 million litres of oil, decreasing carbon emissions from fishmeal factories by 168 thousand tonnes or equivalent to driving 36,295 passenger cars in one year.

Fishmeal producers have relied on both oil and electricity in their production and have purchased so-called curtailable electricity. However, this type of electricity is limited, and fishmeal producers must rely on oil when electricity is unavailable, creating pollution. In 2017, Landsvirkjun and FÍF announced that the energy company would increase the supply of curtailable electricity as much as possible. However, oil would still be used as a backup power source for fishmeal producers. We also offered retailers in the electricity market the chance to negotiate longer terms due to the resale of electricity to fishmeal producers. The change provided fishmeal producers with the incentive to make any investments needed to shift to electricity.

↑ Jón Már Jónsson, Chairman of the Icelandic Fishmeal Producers Association and Hörður Arnarson, CEO at Landsvirkjun, sign a contract to support the further electrification of the fishmeal industry using renewable energy sources.

Landsvirkjun and FÍF have agreed to continue their cooperation for the next three years with the objective of more environmentally friendly fishmeal production, reducing CO_2 emissions and thereby fulfilling Landsvirkjun's obligations to the Paris Agreement.

Green hydrogen
Landsvirkjun has started the process of developing a hydrogen production facility at the Ljósifoss Hydropower Station, which has been presented to the District Board of Grímsnes- and Grafnings District. So-called green hydrogen would be produced at Ljósifoss through the electrolysis of water with renewable energy sources. This carbon-free method of producing hydrogen is still relatively uncommon, with most of the world's hydrogen supply currently produced from natural gas with its corresponding carbon footprint.

The unit would be housed in a 700m2 building where capacity could be increased as demand increases with a full capacity of 10 MW. At full capacity, the station would produce enough hydrogen to power the Reykjavík area's entire public transportation fleet.

4% of the vehicle fleet responsible for 15% of emissions

Hydrogen production offers businesses an incentive to switch to eco-friendly operations. About 4% of Iceland's automotive fleet consists of commercial freight vehicles, which are the source of 15% of Iceland's transport emissions on land.

Several countries, including the European Union and Japan, have developed hydrogen road maps, with plans for the widespread use of hydrogen in their energy systems. Hydrogen can be used as energy storage, for industrial processes and district heating and as an energy source in transport. Hydrogen produced using renewable energy is almost carbon-free.

Eco-Industrial park
Landsvirkjun and Norðurþing joined forces to develop an eco-industrial park at the Bakki industrial site. A framework will be created for the area, focusing on sustainability. The project will involve widespread cooperation between companies and various stakeholders who share infrastructure, resources, and raw material streams, to reduce the environmental impact of production and supporting innovation. Access to extensive infrastructure and renewable resources could create a variety of opportunities for commercial activities in Bakki and was the basis for the choice of location.

↓ A robust infrastructure has been developed in Bakki Industrial Park in recent years, and energy production has significantly increased at the Þeistareykir Geothermal Power Station. The transmission system has also been strengthened.

Construction
Foresight and development

Þeistareykir Road (South) – first phase complete
Landsvirkjun carried out construction work, over the past two summers, on the Þeistareykir Road (South), which runs 17 km from Þeistareykir (South) to Hólasandur. The first phase of the project is now complete. The road connects Mývatnssveit to Húsavík via Þeistareykir and will, when finished, be used for the joint operation of Landsvirkjun's geothermal power stations in Northeast Iceland. It will also play an essential role as a new year-round route in a busy tourist area. The road should be completed once the paved surface has been laid over the next two summers.

Easier public access to the area by the Búrfellsskógur Forest
Tenders for the construction of a pedestrian and riding bridge over Þjórsá, above the Þjófafoss Waterfall were released in July. The bridge is about 100 m in length and crosses the river just above the Þjófafoss Waterfall, South of Búrfell. The bridge will connect the Skeiða- & Gnúpverjahreppur and Rangarþing ytra municipalities, who were both consulted on the location and the appearance of the bridge.

The project is part of an agreement between Landsvirkjun and Skeiða & Gnúpverjahreppur, on mitigation measures for the construction of Búrfell II, which began operations in the summer of 2018. The goal of the project is to make the area more accessible to the public and tourists visiting the area.

Three bids were received, all of which were well over budget and therefore rejected. The project was subsequently split in two, and an agreement was reached with the lowest bidder (Ístak) for the first phase of construction. The first phase included contractor's on-site mobilisation and construction of the bridge foundation. Work began on-site on the 19th of October with the intention of completing the first phase before the end of the year 2020.

Everything went according to plan, and the contractors removed the last of their on-site equipment on the 22nd of December. The second phase of the project, which includes the construction of the bridge and finishing work, is expected to begin in early spring 2021 and should be completed by mid-summer. The steel bridge is constructed on concrete foundations, and the bridge floor and crossbeams will be made of domestic timber, as well as part of the handrails.

Domestic timber used for the new bridge
The decision to use as much domestic timber as possible for the project was made early on. An agreement was reached with the Icelandic Forest Service who subsequently felled 500 Sitka spruce trees in the Haukadalsskógur Forest last February. The trees were then sent to Ásólfsstaðir in Þjórsárdalur for further processing. The appropriate material was selected and sawed in Þjórsárdalur and then sent to Límtrés Vírnet in Flúðir for drying. Límtré Vírnet will produce glulam crossbeams for the bridge floor. They will also be responsible for further processing the material and performing the necessary tests required to achieve CE marking status. Larch and spruce will be used for fencing and the bridge handrail.

A Framed View
The art piece, Framed View, by the architect Jón Grétar Ólafsson, has been erected outside the Þeistareykir Geothermal Power Station after winning Landsvirkjun's artwork competition. The work will be unveiled in an official ceremony once COVID-19 controls and the weather allow.

Landsvirkjun has previously commissioned artworks for Its power stations and launched the Þeistareykir artwork competition in cooperation with Icelandic Design and Architecture.

A Framed View invites people to enjoy a very personal experience of the environment through and between four steel frames that point North, East, South, and West. The individual can sense the power and beauty of Þeistareykir. Within the four frames is a model of Iceland, made of natural rock columns. The columns vary in height and reflect the height of Iceland's mountains and mountain ranges. Iron columns rise from Iceland as symbols of the geothermal energy that lies beneath.

Steel structures of the new bridge heaved onto the foundations, 19th Oct 2019.

Renovation of the Sultartangi tailrace canal

A special assessment of the condition of the tailrace canal at Sultartangi Hydropower Station was carried out in 2015. Significant damage was discovered on the banks of the canal along a 250 m section above, under and below the overlying bridge. A collapse occurred in the canal in 2016, which was located approx. 150 to 180 m below the bridge and required an immediate clean-up.

Permanent repairs were subsequently made to the banks of the canal in 2018 to ensure the operational safety of the station. The project was extensive due to the size and depth of the canal (up to 33 m) and numerous structures in the area. Part of the project involved the construction of a new bridge over the canal located approx. 100 m above the older bridge, as significant damage to the banks of the canal, had occurred and could only be repaired after removal of the bridge.

Damage at the east bank of the canal below the older bridge- the new bridge can be seen in the background.

The work involved significant safety and technical challenges, as the canal banks were high and unstable. Sultartangi Hydropower Station was subsequently offline for 6 weeks in the summer of 2020 due to a significant collapse in the canal during the construction period, which caused the immediate closure of the old bridge and opening of the new bridge, which had been completed. The removal of the older bridge under such difficult conditions also proved demanding.

The concerted efforts of Landsvirkjun's employees and contractors meant that repairs to the canal could be completed in the autumn of 2020. The adjacent roads will be completed in the spring of 2021.

Excavation of collapsed material in the canal beneath the older bridge in July 2020

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