LANDSVIRKJUN GREEN BOND FRAMEWORK

SECOND-PARTY OPINION BY SUSTAINALYTICS

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1. INTRODUCTION

Landsvirkjun (or "the National Power Company of Iceland" or "the company") is Iceland's largest electricity company and one of the largest European renewable energy producers, generating a total electricity output of more than 13 TWh per year. Landsvirkjun operates 17 power stations in Iceland[1] and derives over 99% of its energy from renewable hydroelectric and geothermal power plants, with the rest being covered by wind energy projects. In 2016, the company was responsible for 73% of all electricity generated in Iceland. The company was founded in 1965, it is currently owned by the Icelandic State and is based in Reykjavik.

Landsvirkjun has developed a Green Bond Framework[2] under which it intends to issue green bonds. Proceeds of the green bonds will be used to finance or refinance, in whole or in part, future and existing "Eligible Green Projects", when disbursements have occurred within the 36 months preceding the issuance date, and that promote the sustainable, responsible and efficient use of Icelandic natural resources to produce renewable energy. The framework defines eligibility criteria in three renewable energy project categories:

(i) Geothermal energy projects (with direct emissions of less than 100gCO_2/kWh)
(ii) Hydropower energy projects (with a capacity of no more than 100MW and annual greenhouse gas emissions below 4.0 g/kWh)
(iii) Wind energy projects

Landsvirkjun engaged Sustainalytics to provide a second-party opinion on its Green Bond Framework and on the framework's environmental credentials. As part of this engagement, Sustainalytics held conversations with various members of Landsvirkjun's management team to understand the sustainability impact of their projects and planned use of proceeds, as well as management of proceeds and reporting aspects of Landsvirkjun's Green Bond Framework. Sustainalytics also reviewed relevant public documents and non-public information. Following this engagement between Landsvirkjun and Sustainalytics, some elements of the "Landsvirkjun Green Bond Framework" were clarified to ensure an alignment with the level of disclosure expected by the Green Bond Principles, 2017.[3]

This document contains Sustainalytics' opinion of the Landsvirkjun Green Bond Framework and should be read in conjunction with that framework.

[1] Including the Theistarreykir Geothermal Power Station, currently under development
[2] Landsvirkjun Green Bond Framework document available at: http://www.landsvirkjun.com/greenbond
[3] The Green Bond Principles 2017, dated 2 June 2017, issued by the International Capital Market Association (ICMA)

2 SUSTAINALYTICS' OPINION

Section 1: Sustainalytics' Opinion on the Landsvirkjun Green Bond Framework

Overall, Sustainalytics is confident that the Landsvirkjun Green Bond Framework is transparent and robust, and it aligns with the four pillars of the Green Bond Principles 2017. Some key considerations on the Green Bond Framework include:

- Landsvirkjun's eligibility criteria targets renewable energy investments, specifically, geothermal, hydropower and wind energy projects. Renewable energy is recognized by the Green Bond Principles as a project category with clear environmental benefits;
- While Sustainalytics recognizes that the common threshold for hydropower projects in the green bond market is a capacity of 25MW, Sustainalytics views the 100 MW hydropower projects as having a positive impact given: (i) the company's thorough environmental and social impact assessment due diligence process that mitigates common risks associated with large hydropower projects, (ii) the local social and environmental context, and (iii) the Climate Bond Initiative's opinion that 4g CO_2/kWh is an impactful threshold to ensure low GHG resulting from the large hydropower projects.[4] Similarly, the CO_2 reduction threshold for geothermal projects is also considered impactful by the CBI;[5]
- The Process for Project Evaluation and Selection is overseen by the company's Environmental and Finance Departments. Only projects executed in strict compliance with the Icelandic environmental regulations and the company's internal risk management tools are eligible. Sustainalytics views this process in line with market practice;
- Landsvirkjun's Management of Proceeds is performed by the company's Finance Department. An external auditor will review annually the tracking of proceeds and the allocation of the net proceeds towards the Eligible Green Projects. Sustainalytics assesses the provided disclosure and processes as being aligned with market practice;
- Landsvirkjun commits to allocation and impact reporting on an annual basis, disclosed publicly on the company's website. Allocation reporting will include a list of Eligible Green Projects, proceeds allocated, and the remaining unallocated proceeds. This information will be externally verified. With regards to impact reporting, Landsvirkjun commits to report annually on several metrics such as the newly added renewable electricity generation capacity (in MW) per project. Sustainalytics considers that the company's efforts to disclose information on environmental impact are in line with market best practice.

Alignment with Green Bond Principles 2017

Sustainalytics has determined that the Landsvirkjun Green Bond Framework aligns to the four pillars of the Green Bond Principles 2017. For detailed information please refer to Appendix 5: Green Bond Programme External Review Form.

[4] Even though the Climate Bonds Initiative has no public standard for hydropower projects (this is currently under development) similar thresholds have been publicly endorsed and recognized as impactful by the CBI.

[5] Sustainalytics highlights that Landsvirkjun's geothermal projects comply with the Climate Bonds Initiative's Geothermal Standard https://www.climatebonds.net/standard/geothermal. CBI recognizes the 100gCO_2/kWh carbon intensity threshold as impactful for geothermal projects.

Section 2: Assessment of Landsvirkjun's sustainability strategy and performance

Sustainalytics is of the opinion that Landsvirkjun has a strong commitment to the generation of sustainable, responsible and efficient renewable energy, and demonstrates a strategy and governance structure aligned with sustainable development, given the following evidence:

(i) Landsvirkjun has an explicit commitment to become a leader in the sustainable use of energy sources;[6]

(ii) To achieve its sustainability vision, Landsvirkjun outlined a strategy to become a carbon-neutral company by 2030.[7] The implementation of this strategy includes several targets: (i) to offset all GHG emissions from reservoirs by land reclamation and forestry projects by 2020, (ii) to offset all GHG emissions from geothermal power stations by land reclamation, forestry projects, carbon capture and storage and other methods by 2030, (iii) to invest in additional 350MW projects by 2025 and (iv) to ensure that 25% of the company's vehicles transition to electric power by 2020;[8]

(iii) Landsvirkjun demonstrates operational leadership with the achievement of the Icelandic Quality Award in 2007[9] and the Green Electricity Production certification issued by German Certification Body (TÜV SÜD Management System);

(iv) The company demonstrates leadership on climate issues as part of its public pledge to the UN's Caring for Climate initiative signed by Landsvirkjun following the 2015 Paris Climate Agreement;[10]

(v) The company discloses yearly "Green Accounts" that provide detailed numerical data on the environmental impact of Landsvirkjun's operations, including the GHG emissions from geothermal and hydropower operations. These reports are externally verified.

Well positioned to address common environmental and social risks associated with the projects

Common environmental and social risks associated with hydropower and geothermal projects are loss of biodiversity, changes in land use, displacement of inhabitants, etc. Sustainalytics also recognizes that due to these environmental and social risks, the common threshold for hydropower projects in the green bond market is 25MW. However, Sustainalytics has assessed Landsvirkjun's risk mitigation processes, and notes that in addition to complying with Icelandic regulations, Landsvirkjun ensures that the social and environmental impacts associated with hydropower and geothermal energy production projects are properly assessed and mitigated during all development and operational stages. Sustainalytics considers that Landsvirkjun's Eligible Green Projects will have a net positive impact, and that the company is well positioned to address relevant risks, based on the following considerations:

- Landsvirkjun's Environmental Policy[11] includes relevant commitments that address risks associated with operations such as: (i) The Life Cycle Assessment (LCA) technique should be used to improve efficiency in the utilisation of natural resources and to reduce any impact on the

[6] Landsvirkjun, corporate website, information available at: https://www.landsvirkjun.com/Company/

[7] Landsvirkjun, corporate website, information available at: https://environmentalreport2015.landsvirkjun.com/carbon-footprint/climate-objectives

[8] http://climateaction.unfccc.int/company/landsvirkjun

[9] The Icelandic Quality Award is issued annually by the Icelandic Quality Management Association, the Office of the Prime Minister, the University of Iceland, and the Reykjavik Commercial Workers Union for excellence in systematic work practices based on quality management.

[10] Landsvirkjun, corporate website, information available at: https://environmentalreport2015.landsvirkjun.com/carbon-footprint/climate-objectives

[11] https://www.landsvirkjun.com/societyenvironment/environment

environment; and (ii) The company shall work in accordance with sustainable development protocols including active stakeholder engagement;

- All Landsvirkjun's operations comply with internationally recognized environmental and social certification standards[12] such as (i) ISO 9001 quality management standard, (ii) ISO 14001 environmental management standard, (iii) OHSAS 18001 safety management standard;
- Landsvirkjun developed a formalized environmental and social risk assessment document on the Requirements Towards Constructors and Service Providers with Regard to Environmental Matters and Safety[13] specifically targeting the company's contractors. Sustainalytics views this as a solid risk assessment tool. Additional details of these requirements are disclosed in Appendix 1;
- According to Icelandic legislation, all hydropower and geothermal projects must follow the country's Master Plan for Nature Protection and Energy Utilization.[14] For detailed information, please consult Appendix 2. Furthermore, all large-scale power plants must undergo an Environmental Impact Assessment.[15,16,17] Sustainalytics considers that the Icelandic Environmental Impact Assessment Process ensures a strong and comprehensive framework supporting Landsvirkjun in identifying and mitigating environmental risks commonly associated with hydropower and geothermal energy projects. For additional information please consult Appendix 3;
- Landsvirkjun also implements the new Geothermal Sustainability Assessment Protocol (GSAP) and the Hydropower Sustainability Assessment Protocol (HSAP) as internal risk management tools. Sustainalytics assessed the 23 environmental and social themes (also including technical and economic aspects) covered by the protocols and is of the opinion that they provide a credible and strong framework ensuring the company's preparedness to properly identify and mitigate social and environmental risks associated with hydropower and geothermal projects. Please consult Appendix 4 for detailed information.
- Landsvirkjun's hydropower and geothermal energy production projects are located in uninhabited areas, thus significantly scaling down social risks such as population displacement, access to water and land.

Overall, Sustainalytics is confident that Landsvirkjun is well positioned to issue green bonds and that the issuance of green bonds will help Landsvirkjun to meet its 2030 carbon neutral targets and its 2025 renewable energy investment targets, in line with and positively contributing to the company's mission to become a leader in the sustainable use of natural resources. Furthermore, given the level of social and environmental due diligence performed and the regulatory framework of Iceland, in alignment with EU legislation, Sustainalytics is of the opinion that Landsvirkjun is well positioned to identify and mitigate environmental and social risks related to the projects financed by the green bonds.

[12] Landsvirkjun, corporate website, information available at: https://www.landsvirkjun.com/productsservices/certifications
[13] https://www.landsvirkjun.com/Media/v5552landsvirkjuns-requirements-towards-contractors-and-service-providers-with-regard-to-environmental-matters-and-safety.pdf
[14] Regulated and enforced by the Icelandic Act No. 48 from 2011
[15] http://www.ramma.is/english/general-information/laws-and-regulations/the-master-plan-act/
[16] http://www.althingi.is/lagas/nuna/2000106.html
[17] Based on the Icelandic Act No. 106/2000, which is aligned with the European Directive 85/337/EEC

Section 3: Impact of Use of Proceeds

Proceeds of the bonds will be used for projects supporting the production of renewable energy in Iceland. Considering Landsvirkjun's environmental and social risk due diligence process (internal risk management system aligned with the Hydropower Sustainability Assessment Protocol and the Geothermal Sustainability Assessment Protocol, and the strong Icelandic regulatory environment requiring comprehensive environmental impact assessments), Sustainalytics believes that the proceeds will have clear environmental benefits. Additionally, Sustainalytics is of the opinion that Landsvirkjun's strict compliance with CBI's carbon intensity thresholds of 100gCO_2/kWh for geothermal projects and 4.0 g/kWh for geothermal projects provide additional assurance that the company's eligible projects will deliver meaningful positive impact. Below, Sustainalytics provides an opinion on the impact of Landsvirkjun's green bond eligibility criteria, considering the local context and focusing on the impact of some of the projects financed over the past years.

Contributing to Iceland's 100% renewable energy production and lower carbon emissions

Considering that Landsvirkjun is a state-owned company and the main power supplier in Iceland, Sustainalytics is of the opinion that the use of the proceeds will allow the country to continue to supply its citizens and industry with 100% renewable energy (i.e. for electricity and heating).[18] This is also one of the company's commitments. The company produces renewable energy mainly from geothermal and hydropower sources, which emit significant less carbon emissions than the fossil fuel-based generating stations.[19] Sustainalytics highlights that Landsvirkjun's hydropower projects are located in boreal regions, a climate where hydro dam reservoirs emit limited GHG emissions – similar to those of natural lakes (4 ± 2 g CO_2e kWh^{-1})[20] ten years after their construction,[21] and a fraction of the GHG emissions typically released by tropical dam reservoirs.[22]

Assessment of the environmental impact studies of eligible projects

As mentioned in Section 2, Sustainalytics considers that the environmental impacts of eligible projects have been adequately identified and addressed. As an example, the Burfell hydropower Station, will be expanded with an additional 100MW while emitting limited GHG emissions. According to the impact studies provided,[23] the conclusion is that the expansion activities will have a negligible negative impact on the environment and biodiversity as all proposed work camp areas and plant areas for the expansion are those that were already used during the initial construction of a power station in 1972. The area affected by the expansion is within the confines of nationally owned land and Landsvirkjun has been responsible for extensive re-forestation and re-vegetation around Búrfell. Finishing work and mitigation measures will be carried out with the aim of harmonising the man-made structures with the environment.

[18] Energy Statistics in Iceland 2016: http://os.is/gogn/os-onnur-rit/Orkutolur-2016-enska-A4.pdf
[19] Benefits of Renewable Energy Use, Union of Concerned Scientists, https://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power#.WlNrNt-WaUk, accessed on 8 January 2018;
[20] https://dl.sciencesocieties.org/story/2015/aug/mon/assessing-the-carbon-footprint-of-a-hydroelectric-reservoir
[21] http://www.un.org/esa/sustdev/sdissues/energy/op/hydro_tremblaypaper.pdf
[22] https://www.internationalrivers.org/campaigns/reservoir-emissions
[23] Document provided to Sustainalytics: Burfell Hydropower Station - Final Phase of Expansion – Announcement of construction

Regarding the Theistareykir Power Project, results of the impact assessment, using the Geothermal Sustainability Assessment Protocol, conclude that Theistareykir has "low adverse environmental and social impacts, and positive socio-economic effects for the project region, primarily by enabling industrial development and economic diversification in the sparsely populated north-east".[24] Specific negative impacts have been however identified, and include for instance: permanent impact on geological features that are protected such as lava fields, and temporary impacts on fauna (birds) during construction phase. Even though Landsvirkjun has no definitive data regarding carbon emissions given that the power station is still under construction and a lifecycle assessment is under progress, the company confirmed to Sustainalytics that the carbon footprint for Theistareykir is estimated to be well below 100gCO_2/kWh.

Contributing to advancing the Sustainable Development Goals

The UN Sustainable Development Goals (SDGs) were set in September 2015 and form an agenda for achieving sustainable development by the year 2030. In Sustainalytics' view, the Landsvirkjun Green Bond Framework advances the following SDG goals and targets:

Use of Proceeds	SDG	SDG target
Renewable Energy	7. Affordable and Clean Energy	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
	13. Climate Action	While Sustainalytics recognizes that SDG13 is mostly suited to governmental institutions, given that Landsvirkjun is a state-owned company and the main supplier of energy in Iceland, Sustainalytics considers that Landsvirkjun directly contributes to SDG13.

Conclusion

Landsvirkjun, Iceland's largest electricity company intends to issue green bonds to finance or refinance, future and existing "Eligible Green Projects", when disbursements have occurred within the 36 months preceding the issuance date, and that promote the sustainable, responsible and efficient use of Icelandic natural resources to generate renewable energy. Proceeds of the bonds may be directed towards the following Eligible Green Projects: (i) Geothermal energy projects (with direct emissions of less than 100gCO_2/kWh), (ii) Hydropower energy projects (with a capacity of no more than 100MW and annual greenhouse gas emissions below 4.0 g/kWh), and (iii) Wind energy projects.

While Sustainalytics recognizes that hydropower projects larger than 25MW are often associated with environmental and social risk, Landsvirkjun is well positioned to mitigate these risks due to their robust risk management processes. Specifically, all projects need to receive a positive impact assessment following national legislation. Additionally, Landsvirkjun implements the Hydropower Sustainability Assessment Protocol and the new Geothermal Sustainability Assessment Protocol. Sustainalytics views this as a strong indication that the company is well positioned to identify and mitigate common risks associated with Eligible Green Projects. Furthermore, Sustainalytics assesses positively the carbon emissions thresholds included in the Green Bond Framework for hydro and geothermal projects.

[24] https://www.landsvirkjun.is/Media/gsap-theistareykir-assessment-reportfinal-3-may-2017-4.pdf

Finally, the Green Bond Framework displays best practices regarding allocation reporting, which is externally verified, and with regards to impact reporting. Sustainalytics is of the opinion that projects funded by the proceeds of the green bond will positively contribute to the company's mission to become a leader in the sustainable use of natural resources, and to advance SDGs 7 and 13.

Based on the above, Sustainalytics is confident that Landsvirkjun is well positioned to issue green bonds, and that the Landsvirkjun Green Bond Framework is transparent and robust and in alignment with the four pillars of the Green Bond Principles 2017.

APPENDICES

Appendix 1: Overview and assessment of Landsvirkjun's Requirements Towards Contractors and Service Providers

Background	**Landsvirkjun's Requirements Towards Contractors and Service Providers with Regard to Environmental Matters and Safety**[25] is a document based on the company's environmental and safety policies. The document represents an environmental and social risk assessment, and its purpose is to define and highlight the requirements and recommendations that all its contractors and service providers will comply with.
Areas of assessment	In the first part of the document (Landsvirkjun's Requirements and Recommendations Towards Contractors and Service Providers in Regard to Environmental Matters), the company discloses 19 areas of assessment, together with requirements and recommendations: • Operations in harmony with nature and the ecosystem • Courses on environmental matters • Environmental mishaps – notification • Utilization of groundwater - cold water • Water and soil pollution • Fossil fuels and the greenhouse effect • SF6 emissions from electrical equipment • General waste • Procurement • Toxic substances and hazardous substances • Hazard labels and hazard pictograms • Handling toxic substances and hazardous substances • Storing toxic and hazardous substances • Packaging for toxic substances and hazardous substances • Material safety data sheets (MSDS) for toxic substances and hazardous substances • Hazardous substances • Design of structures and landscape design • Noise The second part of the document (Landsvirkjun's Requirements and Recommendations Towards Contractors and Service Providers in Regard to Occupational Safety, Health and Environment) provides 18 areas of assessment and respective requirements for each of them: • Safety, health and working environment plan • Work permits • Nomination and responsibility of security officer • Safety training of employees • Requirements regarding first aid

[25] https://www.landsvirkjun.com/Media/v5552landsvirkjuns-requirements-towards-contractors-and-service-providers-with-regard-to-environmental-matters-and-safety.pdf

	• Requirements regarding clean-up and finishing touches at worksites • Tobacco and controlled substances • Notification of accidents, damage or potential danger • Violation sanctions • Requirements regarding personal protective equipment • Requirements regarding vehicles • Requirements regarding fire protection and orderliness on site • Requirements regarding electrical work • Requirements regarding work at fall heights • Requirements in regard to lifting • Requirements regarding work in high-temperature fields • Requirements regarding work in closed spaces • Requirements with regard to the handling and use of hazardous substances
Sustainalytics' view	Considering the relevant environmental and social issues covered, among which water and soil pollution, handling toxic substances and hazardous substances, and safety training of employees, Sustainalytics views this document as a solid environmental and social risk assessment and management tool limiting risks associated with contractors and service providers.

Appendix 2: Overview and assessment of the Master Plan for Nature Protection and Energy Utilization

<table>
<tr><td></td><td>The Icelandic Master Plan for Nature Protection and Energy Utilization[26; 27]</td></tr>
<tr><td>Background</td><td>The Icelandic Master Plan for Nature Protection and Energy Utilization is a tool used by the Icelandic regulators to reconcile the competing interests of nature conservation and energy utilization on a national scale and at the earliest planning stages. The current master plan is regulated by the Icelandic Act No. 48 from 2001 on the Plan for nature protection and energy utilization.</td></tr>
<tr><td>Areas of assessment</td><td>• The evaluation matrix includes the environmental and cultural values incorporated in the Master Plan for Nature Protection and Energy Utilization:
<table>
<tr><td></td><td></td><td colspan="6">Attributes[28]</td></tr>
<tr><td>Classes</td><td>Sub-classes</td><td>Richness and diversity</td><td>Rarity</td><td>Size</td><td>International responsibility</td><td>Information value</td><td>Visual and scenic value</td></tr>
<tr><td>Geology and Hydrology</td><td>Bedrock
Sediments
Hydrology
Rivers and lakes</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Species</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ecosystems and soils</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Landscape and wilderness</td><td>Landscape

Wilderness</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Cultural heritage</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Sustainalytics' view</td><td>Sustainalytics considers that the Icelandic Master Plan for Nature Protection and Energy Utilization offers a strong and balanced framework for a sustainability-oriented decision-making process due to the assessment of the nature's conservation value and of the cultural historical relics.</td></tr>
</table>

[26] http://www.ramma.is/english
[27] http://www.ramma.is/english/general-information/laws-and-regulations/the-master-plan-act/
[28] http://www.os.is/gogn/flytja/JHS-Skjol/El%20Salvador%202006/15_SteingrimssonMasterPlan.pdf

Appendix 3: Overview and assessment of the Icelandic Environmental Assessment Process

	Environmental Impact Assessment Process[29]
Background	The Icelandic National Planning Agency (Skipulagsstofnun) performs environmental impact assessments (EIAs) with the intention to: • Ensure that the environmental impact of individual projects in assessed before any final decision on the granting of licenses • Promoting cooperation between all stakeholders • Respond to predictable negative consequences through mitigating actions
Areas of assessment	Skipulagsstofnun performs environmental impact assessments based on eight main environmental categories: • Atmosphere and water • Water and sea • Land / sea floor • Ecosystem • Health and safety • Economic and social factors • Nature and cultural heritage • Landscape Each environmental category is divided into subtopics of assessment: <u>Atmosphere and weather</u>: • Climate ozone layer (global warming & the dilution of the ozone layer) • Air quality (chemical composition – ratio of pollutants, mist sulphur, humidity) <u>Water and sea</u>: • Surface water (water quality – chemical composition and ratio of pollutants) • Surface water (water quality – temperature, glaciers) • Surface water (water flow / water supply – legs of river / lake, water levels, seasonal fluctuations, current / flow, water catchment area) • Groundwater (water quality - chemical composition and ratio of pollutants, temperature) • Groundwater (water flow / water supply – the flow of groundwater, amount of groundwater, groundwater level) • Sea / coastal (water quality - chemical composition and ratio of pollutants, temperature, sifting pharmacy) • Sea / coastal (water flow / water supply – marine currents, sea height, flood / beach) <u>Land / sea floor</u>: • Formations (mountain scenery, set-up, loose soil layers, beach line) • Soils (soil attack, chemical composition and ratio of pollutants) • Geothermal (surfactants – steam outflow, camps etc.) • Geothermal (geothermal reservoir – pressure, water supply, heat deposit, temperature duty)

[29] http://www.skipulag.is/umhverfismat-framkvaemda/um-umhverfismat-framkvaemda/matsferlid/

	Ecosystem: • Life in water (ecosystems and / or habitats – types of habitat, unusual fish types) • Life in water (flora and animals - type combination, whale species, protected species) • Life in the sea (ecosystems and / or habitats - types of habitat, unusual fish types • Life in the sea (flora and animals - type combination, whale species, protected species) • Life on land (ecosystems and or habitat – types of habitat, unusual animals) • Life on land (flora and animals - type combination, whale species, protected species) Health and safety: • Health (healthy residents – pollution such as noise, air or water pollution, diseases, radiation) • Health (discomfort – noise, odour, light, vibration) • Security (natural disasters – avalanche, landslides, floods, volcanic eruption, earthquakes, weather) • Security (social security – crimes, traffic safety, accident risk) Economic and social factors: • Economic and business life (number of jobs, type of jobs, unemployment, long-term unemployment, employment participation, number and size of companies, number of start-ups, tax revenues, national production, inflation, foreign exchange earnings) • Population (projections, immigration, distribution of residences by region) • Population (composition – age, gender, ethnicity, family types and household sizes, education level, minority groups • Social environment (trade and service – supply demand and access to commerce and services) • Social environment (community services – supply, demand and access to community services such as schools, kindergartens, healthcare and services for the elderly) • Social environment (supply, demand and access to areas for leisure and outdoor activities such as playgrounds, sports grounds) • Social environment (transport, travel time, proximity to the airport, public transport, road network, hiking, cycling and tourist trails) • Built and substantive valuables (residential, type, size and age of housing, ownership, supply and demand for residential housing, number of empty apartments and new constructions • Built and substantive valuables (type, size and age of housing, ownership, supply and demand for commercial, m^3 not currently in use, new constructions) • Built and substantive valuables (other physical value – transport infrastructure, fuel, water supply, sewage, electricity supply, district heating, telecommunications) • Built and substantive valuables (density and arrangement of buildings, complexion etc.) Nature and cultural heritage: • Cultural (protected archaeological sites – registered protected archaeological sites

	• Cultural (other archaeological sites – burial sites, National Monuments etc.) • Cultural (free house – houses built before 1850 or churches built before 1918) • Cultural (environmental protection) • Cultural (other cultural values – other monuments or buildings that are considered valuable because oh historical or cultural value, World Heritage sites) • Natural (protected areas – national parks, national reserves etc., ponds larger than or equal to 1000 m^2, lakes larger than or equal to 3ha, waterfalls, hot springs, marine fences etc.) <u>Landscape</u>: • Natural landscape (wilderness, untouched / natural complexion, landscape diversity, contrast in terrain etc.) • Cultural landscape (historical value)
Sustainalytics' view	Sustainalytics considers that the Icelandic Environmental Impact Assessment Process ensures a strong and comprehensive framework supporting Landsvirkjun in identifying environmental risks commonly associated with hydropower and geothermal energy projects (land use, wildlife impacts, changes in the physical properties of a reservoir, sediment deprivation etc.) Sustainalytics is of the opinion that the Icelandic Environmental Impact Assessment incorporates all the relevant environmental (and social) aspects helping Landsvirkjun in safeguarding against commonly encountered environmental risks.

Appendix 4: Overview and assessment of the Sustainability Assessment Protocols used by Landsvirkjun

	Hydropower Sustainability Assessment Protocol (HSAP)[30]	Geothermal Sustainability Assessment Protocol (GSAP)[31]
Background	The Hydropower Sustainability Assessment Protocol is a sustainability assessment framework for hydropower development and operation, offering a way of measuring the impact of a hydropower project across 23 sustainability topics. The Protocol has been developed through cross-sector engagement, receiving input from various international actors, such as the World Bank, International Hydropower Association, World Commission on Dams, social and environmental NGOs, development banks, hydropower sector and national governments. The final version of the HSAP has been produced in 2010.	The Geothermal Sustainability Assessment Protocol was started in 2010 by Ruth Shortall, a master student at the University of Iceland, in partnership with Landsvirkjun, Reykjavik Energy, HS Orka and the Icelandic Environment Agency. The GSAP is an assessment protocol inspired by the HSAP and is designed to consider all aspects of geothermal development, including society, economy and the environment. The pilot version has been tested in Iceland, on the Krafla geothermal project in a partnership with Landsvirkjun. In 2017, the Theistareykir Power Project has been assessed using an updated version of the GSAP, which is still under further development.
Areas of assessment	The HSAP is composed out of four sections, which can be utilized as standalone tools: Early Stage, Preparation, Implementation and Operation. The Early Stage document is a screening mechanism for potential hydropower projects. the Preparation tool covers the management plans, commitments and design. The Implementation document is being utilized through the construction phase and the Operation one is used on working projects. The Hydropower Sustainability Assessment Protocol provides scores for 23 areas of assessments which rely on objective evidence. These areas of assessments are the following: • Communications and Consultation • Governance • Demonstrated Need and Strategic Fit • Siting and Design • Environmental and Social Management • Integrated Project Management • Hydrological Resource • Infrastructure Safety • Financial Viability	The Geothermal Sustainability Assessment Protocol aims to promoting best practices for a sustainable utilization of geothermal resources, aiding policy and decision-making in regard to the development of geothermal energy. The GSAP, like the HSAP, is comprised out of four sections: Early Stage, Preparation, Implementation and Operation, and provides an assessment for large number of topics: • Communications and Consultation • Demonstrated Need and Strategic Fit • Siting and Design • Environmental and Social Impact Assessment and Management • Geothermal Resource • Financial Viability • Project Benefits • Procurement • Labour and Working Conditions • Cultural Heritage • Governance • Integrated Project Management

[30] Hydropower Sustainability Assessment Protocol website, http://www.hydrosustainability.org/
[31] https://www.landsvirkjun.com/company/mediacentre/news/news-read/theistareykir-first-geothermal-power-plant-to-undergo-gsap-sustainability-assessment

	• Project Benefits • Economic Viability • Procurement • Project-Affected Communities • Resettlement • Indigenous Peoples • Labour and Working Conditions • Cultural Heritage • Public Health • Biodiversity and Invasive Species • Erosion and Sedimentation • Water Quality • Reservoir Planning • Downstream Flow Regimes	• Project-Affected Communities and Livelihoods • Biodiversity • Induced Seismicity and Subsidence • Air and Water Quality • Infrastructure Safety • Economic Viability • Public Health • Resettlement • Indigenous Peoples
Sustainalytics' view	Considering the variety of environmental and social topics covered, among which protecting biodiversity and invasive species, assuring water quality, and maintaining labour and working conditions, Sustainalytics considers the HSAP and GSAP credible and thorough sustainability assessment tools, and is of the opinion that they provide a credible and strong framework ensuring the company's preparedness to properly identify and mitigate social and environmental risks associated with hydropower and geothermal projects.	

Appendix 5: Green Bond Programme External Review Form

Green Bond Programme
External Review Form

Section 1. Basic Information

Issuer name: Landsvirkjun

Green Bond ISIN or Issuer Green Bond Framework Name*:* Landsvirkjun Green Bond Framework

Review provider's name: Sustainalytics

Completion date of this form: 17 January 2018

Publication date of review publication: 17 January 2018

Section 2. Review overview

SCOPE OF REVIEW

The review assessed the following elements and confirmed their alignment with the GBPs:

- ☒ Use of Proceeds
- ☒ Process for Project Evaluation and Selection
- ☒ Management of Proceeds
- ☒ Reporting

ROLE(S) OF REVIEW PROVIDER

- ☒ Consultancy (incl. 2nd opinion)
- ☐ Certification
- ☐ Verification
- ☐ Rating
- ☐ Other *(please specify)*: http://www.landsvirkjun.com/greenbond

EXECUTIVE SUMMARY OF REVIEW and/or LINK TO FULL REVIEW *(if applicable)*

Please refer to Landsvirkjun Green Bond Framework, January 2018, available at htttp://www.landsvirkjun.com/greenbond and the Second Opinion Document above.

Section 3. Detailed review

1. USE OF PROCEEDS

Overall comment on section *(if applicable)*:
Proceeds of the green bond will be used to finance or refinance, in whole or in part, future and existing "Eligible Green Projects", when disbursements have occurred within the 36 months preceding the issuance date, and that promote the sustainable, responsible and efficient use of Icelandic natural resources to produce renewable energy in three renewable energy project categories: (i) geothermal energy projects (with direct emissions of less than 100gCO_2/kWh), (ii) hydropower energy projects (with a capacity of no more than 100MW and annual greenhouse gas emissions below 4.0g/kWh) and (iii) wind energy projects.

While Sustainalytics recognizes that hydropower projects larger than 25MW are often associated with environmental and social risk, Landsvirkjun is well positioned to mitigate these risks due to their robust risk management processes and local context. Overall, Sustainalytics is confident that Landsvirkjun is well positioned to issue green bonds and that the issuance of green bonds will help Landsvirkjun to meet its 2030 renewable energy investment targets, in line with and positively contributing to the company's mission to become a leader in the sustainable use of natural resources, and to advance SDGs 7 and 13.

Use of proceeds categories as per GBP:

☒	Renewable energy	☐	Energy efficiency
☐	Pollution prevention and control	☐	Sustainable management of living natural resources
☐	Terrestrial and aquatic biodiversity conservation	☐	Clean transportation
☐	Sustainable water management	☐	Climate change adaptation
☐	Eco-efficient products, production technologies and processes	☐	Other *(please specify)*:
☐	Unknown at issuance but currently expected to conform with GBP categories, or other eligible areas not yet stated in GBPs		

If applicable please specify the environmental taxonomy, if other than GBPs:

2. PROCESS FOR PROJECT EVALUATION AND SELECTION

Overall comment on section *(if applicable)***:**
The Process for Project Evaluation and Selection is overseen by the company's Environmental and Finance departments. Only projects executed in strict compliance with the Icelandic environmental regulations and the company's internal risk management tools are eligible. Sustainalytics views this process in line with market practice.

Evaluation and selection

- ☒ Defined and transparent criteria for projects eligible for Green Bond proceeds
- ☒ Documented process to determine that projects fit within defined categories
- ☒ Summary criteria for project evaluation and selection publicly available
- ☐ Other *(please specify):*

Information on Responsibilities and Accountability

- ☐ Evaluation / Selection criteria subject to external advice or verification
- ☒ In-house assessment
- ☐ Other *(please specify)*:

3. MANAGEMENT OF PROCEEDS

Overall comment on section *(if applicable)***:**
Landsvirkjun's Management of Proceeds is performed by the company's Finance department. An external auditor will review annually the tracking of proceeds and the allocation of the net proceeds towards the Eligible Green Projects. Sustainalytics assesses the provided disclosure and processes as being aligned with market practice.

Tracking of proceeds:

- ☒ Green Bond proceeds segregated or tracked by the issuer in a systematic manner
- ☒ Disclosure of intended types of temporary investment instruments for unallocated proceeds
- ☐ Other *(please specify)*:

Additional disclosure:

- ☐ Allocations to future investments only
- ☒ Allocations to both existing and future investments
- ☐ Allocation to individual disbursements
- ☐ Allocation to a portfolio of disbursements
- ☒ Disclosure of portfolio balance of unallocated proceeds
- ☐ Other *(please specify)*:

4. REPORTING

Overall comment on section *(if applicable)*:
Landsvirkjun commits to an annual allocation and impact reporting disclosed publicly on the company's website. The allocation reporting will include a list of Eligible Green Projects, the amount of proceeds allocated, and the remaining unallocated proceeds. This information will be externally verified on an annual basis. With regards to impact reporting, Landsvirkjun commits to report annually on several metrics including the newly added renewable electricity generation capacity (in MW) per project, the expected electricity output (in GWh) per project and expected avoided CO_2 emissions (in tonnes of CO_2 equivalent). Sustainalytics considers that the company's efforts to disclose information on environmental impact are in line with market best practice.

Use of proceeds reporting:

☐ Project-by-project
☒ On a project portfolio basis
☐ Linkage to individual bond(s)
☐ Other *(please specify):*

Information reported:

☒Allocated amounts
☐ GB financed share of total investment
☐ Other *(please specify):*

Frequency:

☒Annual
☐ Semi-annual
☐ Other *(please specify):*

Impact reporting:

☐ Project-by-project
☒ On a project portfolio basis
☐ Linkage to individual bond(s)
☐ Other *(please specify):*

Frequency:

☒Annual
☐ Semi-annual
☐ Other *(please specify):*

Information reported (expected or ex-post):

☒GHG Emissions / Savings
☐ Energy Savings

☒Other ESG indicators *(please specify):*
newly added renewable electricity generation capacity (in MW) per project, the expected electricity output (in GWh) per project

Means of Disclosure

☐ Information published in financial report
☒ Information published in sustainability report
☐ Information published in ad hoc documents
☐ Other *(please specify): information available on the company's website*
☒ Reporting reviewed *(if yes, please specify which parts of the reporting are subject to external review): allocation reporting, and compliance of the Eligible Green Projects with the eligibility criteria*

Where appropriate, please specify name and date of publication in the useful links section.

USEFUL LINKS *(e.g. to review provider methodology or credentials, to issuer's documentation, etc.)*

https://www.landsvirkjun.com/
https://www.landsvirkjun.com/societyenvironment/environment

SPECIFY OTHER EXTERNAL REVIEWS AVAILABLE, IF APPROPRIATE
Type(s) of Review provided:

☐ Consultancy (incl. 2nd opinion)
☐ Certification
☐ Verification / Audit
☐ Rating
☐ Other *(please specify):*

Review provider(s): **Date of publication:**

ABOUT ROLE(S) OF REVIEW PROVIDERS AS DEFINED BY THE GBP

(i) Consultant Review: An issuer can seek advice from consultants and/or institutions with recognized expertise in environmental sustainability or other aspects of the issuance of a Green Bond, such as the establishment/review of an issuer's Green Bond framework. "Second opinions" may fall into this category.

(ii) Verification: An issuer can have its Green Bond, associated Green Bond framework, or underlying assets independently verified by qualified parties, such as auditors. In contrast to certification, verification may focus on alignment with internal standards or claims made by the issuer. Evaluation of the environmentally sustainable features of underlying assets may be termed verification and may reference external criteria.

(iii) Certification: An issuer can have its Green Bond or associated Green Bond framework or Use of

Proceeds certified against an external green assessment standard. An assessment standard defines criteria, and alignment with such criteria is tested by qualified third parties / certifiers.

(iv) Rating: An issuer can have its Green Bond or associated Green Bond framework rated by qualified third parties, such as specialised research providers or rating agencies. Green Bond ratings are separate from an issuer's ESG rating as they typically apply to individual securities or Green Bond frameworks / programmes.

Disclaimer

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The client is fully responsible for certifying and ensuring its commitments` compliance, implementation and monitoring.

SUSTAINALYTICS

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