



HS Orka

Green Finance Second Opinion

23 August 2022

Executive Summary

HS Orka is an Icelandic renewable energy producer. It owns and operates two geothermal plants and a run-of-river hydropower plant, all in Iceland, with installed capacity totalling approximately 177 MW (167 MW of geothermal, 9.9 MW of hydropower). HS Orka also produces and sells hot and cold water and trades renewable energy within Iceland.

Most proceeds are expected to be allocated to expansion projects at HS Orka's existing geothermal plants. Geothermal energy is an important renewable resource, and the lifecycle emissions of these facilities is expected to be far below the framework's 100g CO₂eq/kWh threshold, with lifecycle assessments of the plants currently underway. HS Orka may also allocate proceeds to other renewable energy sources (wind, solar, hydropower). The remaining project categories relate to carbon capture storage/utilization from the geothermal process, HS Orka's company vehicles, and its water management segment.

We rate the framework **CICERO Dark Green** and give it a governance score of **Good**. This reflects that most proceeds will be allocated to renewable energy, primarily investments at current geothermal facilities. In respect of governance, HS Orka has a thorough selection process, shows good consideration for physical risk, and is increasing its focus on construction and embedded emissions.

Strengths

The potential for carbon capture storage/utilization investments constitutes a strength. Carbon capture is a critical component of a sustainable low carbon future, and the geothermal sector is seen as mature and comparatively viable for its deployment. Indeed, some projects have already been implemented in the geothermal sector in Iceland, though such projects entail their own risks. In respect of carbon utilization, it is key that HS Orka has committed to screening for and avoiding high emitting customers.

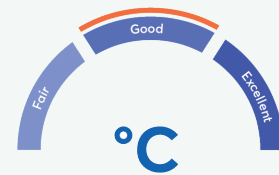
HS Orka has a thorough selection process. Among other things, screening for geothermal projects will include assessment against the Icelandic Geothermal Sustainability Assessment Protocol, which we understand includes a review of 16 factors for each new project, including for biodiversity impacts. This is complemented by HS Orka's track record and policies in respect of active monitoring and mitigation of local environmental risk.

SHADES OF GREEN



°CICERO
Dark Green

GOVERNANCE ASSESSMENT



GREEN BOND AND LOAN PRINCIPLES

Based on this review, this framework is found to be aligned with the principles.



Pitfalls

The balance sheet approach to management of proceeds and allocation reporting can provide less certainty for investors. Under the balance sheet approach, HS Orka will indicate that the value of eligible assets exceeds the value of outstanding green finance instruments, rather than indicate precisely what assets have been financed. While we consider this approach to be aligned with the Green Bond Principles, it provides less certainty for investors as to what projects proceeds are allocated to, though HS Orka commits to report impacts on a project basis.

Several project categories may entail associated emissions, for example from the construction process or supporting infrastructure. Construction materials like cement, and equipment for construction and geothermal exploitation, are likely to be fossil fuel intensive, while access roads can also be financed. HS Orka can point to demonstrable efforts to reduce embedded emissions in construction and materials.

The basis for the sustainability of HS Orka's water management investments is somewhat uncertain. HS Orka's facilities likely have low emissions, given they operate without fossil fuels and are powered by its geothermal electricity. Nonetheless, it has not provided figures for energy consumption, new projects may not have the same conditions, and the framework does not contain quantitative eligibility criteria for investments under the project category. This risk is however mitigated by HS Orka's confirmation it would only invest in a project aligned with the EU Taxonomy's substantial contribution to climate change mitigation criteria for the construction, extension and operation of water collection, treatment, and supply systems.



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1 HS Orka's environmental management and green finance framework

Company description

HS Orka is an Icelandic power generator which has been involved in renewable energy production in Iceland since 1974. It owns and operates two geothermal plants and a run-of-river power plant, all in Iceland, with installed capacity totalling approximately 177 MW (167 MW of geothermal, 9.9 MW of hydropower). As well as renewable energy, HS Orka produces and sells hot and cold water to municipalities and local communities in the Reykjanes area of Iceland. HS Orka also trades renewable energy, which accounts for about 25% of the total revenues.¹

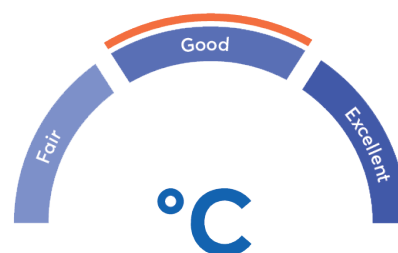
HS Orka is jointly owned by Jarðvarmi slhf (a dedicated investment vehicle owned by several Icelandic pension funds) and funds managed by Ancala Partners LLP, a UK infrastructure investment fund. Each owner holds a 50% share.

Governance assessment

HS Orka has defined targets for emissions reductions and investments under the framework are material to achieving these. Focus is turning to lifecycle emissions, with lifecycle assessments underway for its current geothermal plants and demonstrable efforts to reduce embedded emissions in construction and materials. A focus on material emissions is noteworthy given the harsh weather conditions in which HS Orka operates, which can limit options (e.g. seismic activity limiting the type of steel or concrete available).

HS Orka's selection process is thorough. In the Icelandic context, all energy projects are screened by the government in the context Master Plan for Nature Protection and Energy Utilization which embeds ideas of sustainable development into the permitting process. HS Orka will also use the Icelandic Geothermal Sustainability Assessment Protocol (GSAP) to evaluate geothermal projects, which requires consideration of biodiversity, invasive species, induced seismicity and subsidence, and social issues (among other things).

HS Orka will manage proceeds, and report allocation of proceeds, on a balance sheet approach. As such, it will indicate that the value of eligible assets exceeds the value of outstanding green finance instruments, rather than indicate precisely what assets have been financed. On the other hand, it intends to report impacts on a project-by-project basis. This approach can provide less certainty for investors as to allocation, and it is crucial that HS Orka is consistent on a year-by-year basis on the projects for which it reports impacts. HS Orka stated it will look at disclosing methodologies used to calculate impacts on a case-by-case basis, as it may not be possible to do so in each case (for example because of confidentiality concerns). In any event, it will have the methodologies externally audited. HS Orka does not set out a potential metric for the sustainable water management project category.



The overall assessment of HS Orka's governance structure and processes gives it a rating of **Good**.

¹ All purchased energy is from small hydro power plants (less than 10 MW) or other "pure-players" (geothermal and hydropower) in Iceland.



Sector risk exposure

Physical climate risks. Iceland is at risk from a variety of hazards due to its particular location. These hazards include extreme snowstorms and cold, storm surges, earthquakes, increased volcanic activity and glacial outburst floods, snow avalanches and more frequent landslides, mostly where there is permafrost in the mountains, floods, hazards from geothermal activity and drift ice (Source: [National-risk-assessment-for-iceland.pdf \(almannavarnir.is\)](#)). According to HS Orka, given there are no glaciers or ice sheets on Reykjanes where it operates, volcanic activity there is due to natural cycles rather than related to climate change. It is also expected that various physical climate risks will increase supply chain disruptions.

Transition risks. Iceland aims to achieve carbon neutrality before 2040 and to cut greenhouse gas emissions by 40% by 2030 under the Paris Agreement (Source: [Government of Iceland | Climate Change](#)). While Iceland currently has close to 100 % of its electricity coming from renewable energy, and 90 % of residential heating comes from geothermal sources, the transition to a low carbon future, including the electrification of the transport sector, will require more electricity. Multiple sources of renewable energy are key to a low carbon transition and HS Orka can significantly contribute to this transition.

Environmental risks. Environmental impact resulting from geothermal development varies during the different phases of development and between sites. For example, during flow testing of wells, there are environmental risks associated with steam and spray which can have temporarily adverse effect on the local vegetation with moss and grass being scalded. Noise from flow testing of wells can also have negative effect on wildlife and local people. Geothermal power generation usually also causes air pollution due to the emission of geothermal gas, particularly carbon dioxide (CO₂) and hydrogen sulfide (H₂S). During operation, seismicity can occur due to the change in geothermal surface activity. Discharge of hot water and/or geothermal fluid from geothermal power generation may also cause problems where the fluid can contain high concentration of various chemicals (Source: [Environmental Impact Assessment of Geothermal Projects in Iceland \(geothermal-energy.org\)](#)).

Environmental strategies and policies

HS Orka has a target to reduce its Scope 1 emissions to 26 gCO₂-eq/kWh combined heat and power by 2030. This equates to a 40% reduction from the 2021 figure of 43 gCO₂-eq/kWh. HS Orka indicated that two ways this may be achieved are via increased capacity at its power plants and a reduction in waste heat. HS Orka also targets carbon neutrality by 2040, which will require carbon capture and storage and/or carbon capture and utilization technologies.

HS Orka measures emissions from its power plants and operations (Scope 1) and reports them publicly. In 2021, these amounted to 86,722 tCO₂-eq and 189 tonnes of methane equivalent. Over 99% of these are direct geothermal emissions (CO₂ and methane). Fossil fuel use in back-up generators and company vehicles give rise to other Scope 1 emissions - fossil fuel use has been reduced by 2% since 2018. Scope 3 emissions are from activities such as business flights and waste production. HS Orka is in the process of conducting life cycle assessments for its geothermal plants (expected to be completed by the end of 2022).

HS Orka is increasing its focus on environmental and climate considerations when selecting suppliers and developers – for example discussions with contractors on emissions and requirements for environmental certification – though we understand that such requirements are not yet formally factored into the procurement process. It is also considering embedded emissions in materials: notably, for an expansion project at one its geothermal power plants, it engaged an external party to analyse the environmental impacts of different construction materials, and this exercise fed into the design phase of the project.



HS Orka undertakes environmental impact assessments (EIA) if required to do so. It also carried out an EIA for its hydro-power plant when this was not required by law. HS Orka monitors the impacts of its projects and in accordance with the requirements of the local Public Health Authority and other stakeholders. For example, at its hydropower plant, it planted 25,000 birch trees and restored 10 hectares of wetland. Monitoring of projects involves third parties, for example the Marine and Freshwater Research Institute and The Southwest Iceland Nature Research Centre.

HS Orka has analysed and is aware of physical risks to its business, for example extreme weather events impacting its water magazines and saline intrusion. Its last risk analysis was conducted in 2022, where it was concluded that its exposure to physical risk was minor, and that its water production would more likely be impacted than its electricity generation. Noting that its power generation assets are already exposed to (and built to withstand) extreme weather due to their location, HS Orka informed us it is nonetheless preparing to build 'better and stronger' assets. Its awareness of physical risk extends to its supply chain: critical spare parts are being analysed and the warehouse storage facility will be expanded in the coming years.

HS Orka issued its first sustainability report in 2021, prepared in accordance with GRI standards. It intends to publish a TCFD analysis in its 2022 sustainability report.

Green finance framework

Based on this review, this framework is found to be aligned with the Green Bond and Loan Principles. For details on the issuer's framework, please refer to the green finance framework dated July 2022.

Use of proceeds

For a description of the framework's use of proceeds criteria, and an assessment of the categories' environmental risk and impacts, please refer to section 2.

Selection

The selection of projects will be performed by the HS Orka green financing committee, which has representatives from its legal, finance, and environmental divisions.

HS Orka will assess each potential project for alignment with the framework criteria. It will also use the Icelandic Geothermal Sustainability Assessment Protocol (GSAP), as well as the statutory requirements under Icelandic and EU legislation (including the EU Taxonomy the Renewable Energy Directive). We understand that the GSAP provides a review of 16 factors for each geothermal project, such as environmental and social issues management, geothermal resource management, biodiversity and invasive species, induced seismicity and subsidence, and air and water quality. According to HS Orka, lifecycle assessments will be undertaken if the EU Taxonomy requires a lifecycle threshold for a specific activity.

In Iceland, the national government also screens all energy projects in the context of the Master Plan for Nature Protection and Energy Utilization. According to HS Orka, this enshrines the idea of sustainable development, including differing stakeholder opinions on utilization of natural areas for energy projects, into the permitting process.

Management of proceeds

The proceeds from green finance instruments will be managed by HS Orka's treasury department under the balance sheet approach. HS Orka will hold and/or invest unallocated green finance proceeds in cash, short term and liquid instruments, or pay back the net balance of unallocated proceeds.



Reporting

HS Orka will report on both allocation and impact. Allocation reporting will include i) outstanding funding under the green financing framework, allocations, and amount of unallocated proceeds and ii) a list of eligible projects and assets with a brief project description. Impact reporting will include expected impact on a project basis (e.g. installed capacity of renewable energy, estimated saved/avoided CO₂ emissions, energy performance), and accumulated environmental impact of the funded projects.

HS Orka stated it will look at disclosing methodologies used to calculate impacts on a case-by-case basis, as it may not be possible to do so in each case (for example because of confidentiality concerns). In any event, it will have the methodologies externally audited. HS Orka will have its reporting externally reviewed.




2 Assessment of HS Orka’s green finance framework

The eligible projects under HS Orka’s green finance framework are shaded based on their environmental benefits and risks, based on the “Shades of Green” methodology.

Shading of eligible projects under HS Orka’s green finance framework

- Proceeds can be used for financing and/or refinancing. HS Orka may use proceeds under its framework to refinance some of its debts/loans that are due in 2025.
- Most investments are expected to relate to the expansion of current geothermal power plants. Other investments are expected to be minimal.
- HS Orka will not use any of the proceeds to finance renewable energy projects with emissions exceeding 100 g CO₂eq/kWh nor will proceeds be used to finance investments or projects or infrastructure which facilitate use of fossil fuel.

Category	Eligible project types	Green Shading and considerations
Renewable Energy 	<ul style="list-style-type: none"> • Geothermal, Hydro, Solar and Wind power station with emissions less than 100 g CO₂eq/kWh, • Capitalized research, modelling and development cost of new and existing Geothermal-, Hydro-, wind- or Solar power stations (hereafter called “green power stations”), • Drilling of new boreholes for new and existing powerplants and/or permanent carbon storage, including research and development cost, • Intangible assets, geothermal- and water rights and acquisition or lease of land for solar and wind turbine parks, • Acquisition of small green power stations, 	Dark Green <ul style="list-style-type: none"> ✓ Renewable energy – including geothermal, hydropower, solar and wind – is key to a low carbon transition. ✓ Most proceeds are expected be allocated to the expansion and upgrading of current geothermal plants, though other projects may emerge in the future. HS Orka is in the process of undertaking lifecycle assessments of these plants and estimates lifecycle emissions to be closer to 50g CO₂eq/kWh. ✓ For all projects, HS Orka intends to undertake lifecycle assessments if the EU Taxonomy includes a lifecycle threshold. Because it is not a requirement of the EU Taxonomy, it will therefore not undertake such assessments for potential wind and solar projects, though such projects are expected to have significantly lower emissions than geothermal projects. ✓ Construction and embedded emissions can be sizeable and should be considered and mitigated. HS Orka is increasing its focus on these: at one of its geothermal power plants, it has engaged an external party to analyse the environmental impacts of different construction materials, and this exercise is feeding into the design phase of the project.



- Upgrading of existing green power stations to better utilize resources.
- ✓ Risks arise in all energy projects due to local environmental impacts and potential opposition to projects. In Iceland, all energy projects are evaluated in the context of the Master Plan for Nature Protection and Energy Utilization, which brings such considerations into the permitting process. For geothermal projects, these are also considered in the Icelandic Geothermal Sustainability Assessment Protocol which HS Orka will use. HS Orka also has a demonstrable track record around local environmental monitoring and mitigation. Both expansion projects are being built on areas defined as 'industrial' by the Icelandic government.
- ✓ HS Orka has confirmed that any acquired power stations would be run as HS Orka operations and therefore subject to its policies and targets (i.e. not arm's length).
- ✓ All power projects will be connected to the grid (no direct clients).
- ✓ Access roads can be financed, and fossil fuel machinery will be used during project construction.

Clean Transportation



- Investment in Electrical Vehicles (EV) or equipment and vehicles using derivatives like hydrogen, biogas, methanol, and Renewable Fuels of Non-Biological Origin (RFNBO),
- EV infrastructure including EV charging stations.

Dark Green

- ✓ This project category relates to HS Orka's vehicle fleet.
- ✓ HS Orka favours electric vehicles which are important in decarbonising the transportation sector in a 2050 future.
- ✓ According to HS Orka, biogas would derive from landfills and RFNBO would be produced using CO₂ captured from its activities. Fossil fuel-dual fuel or hybrid vehicles will not be financed.

Pollution Prevention and Control



- Investment in Carbon Capture facilities for direct air capture and for carbon capturing and/or upgrading of carbon from HS Orka geothermal power plants for further downstream utilization in RFNBO, food- or industrial processes,

Medium to Dark Green

- ✓ Carbon capture and storage is a critical component of a sustainable low carbon future, and the geothermal sector is seen as mature and comparatively viable for its deployment. Some projects have already been implemented in the geothermal sector in Iceland, though carbon capture and storage in general continues to entail technology risks.



- Investment in Carbon Capture and Storage facilities, including research and development.

- ✓ HS Orka would favour carbon capture and utilization, where possible, and the carbon would replace fossil fuel or fossil fuel derivatives. It confirms it would screen industrial clients for potential fossil fuel linkages or lock in risk, with sectors such as agriculture and food seen as the most likely clients. The Medium to Dark Green shading reflects that in the carbon capture and utilization process the captured carbon may ultimately be released, as well the uncertainty of potential end uses and their possible associated emissions.

Sustainable Water and
wastewater Management



- Investing in water collection and distribution facilities, including treatment and supply, of drinking water to general public and municipalities,
- Research and modelling of water resources and prevention of resource contamination.

Light to Medium Green

- ✓ Note that HS Orka is only active in freshwater facilities (no wastewater).
- ✓ HS Orka's water collecting facilities operate without fossil fuels and are powered by its geothermal electricity. Such facilities therefore likely have low emissions. The Light to Medium Green shading reflects, however, that HS Orka does not have figures for energy consumption, new projects may not have the same conditions, and the framework does not contain quantitative eligibility criteria for investments under this project category (including for embedded emissions).
- ✓ In any event, HS Orka stated it would only invest in this project category if it had evidence that a project aligned with the EU Taxonomy's substantial contribution to climate change mitigation criteria for activity 5.1 (construction, extension and operation of water collection, treatment and supply systems).

Table 1. Eligible project categories









3 Terms and methodology

This note provides CICERO Shades of Green’s (CICERO Green) second opinion of the client’s framework dated **July 2022**. This second opinion remains relevant to all green bonds and/or loans issued under this framework for the duration of three years from publication of this second opinion, as long as the framework remains unchanged. Any amendments or updates to the framework require a revised second opinion. CICERO Green encourages the client to make this second opinion publicly available. If any part of the second opinion is quoted, the full report must be made available.

The second opinion is based on a review of the framework and documentation of the client’s policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

‘Shades of Green’ methodology

CICERO Green second opinions are graded dark green, medium green or light green, reflecting a broad, qualitative review of the climate and environmental risks and ambitions. The shading methodology aims to provide transparency to investors that seek to understand and act upon potential exposure to climate risks and impacts. Investments in all shades of green projects are necessary in order to successfully implement the ambition of the Paris agreement. The shades are intended to communicate the following:

Shading	Examples
 Dark Green is allocated to projects and solutions that correspond to the long-term vision of a low-carbon and climate resilient future.	 Solar power plants
 Medium Green is allocated to projects and solutions that represent significant steps towards the long-term vision but are not quite there yet.	 Energy efficient buildings
 Light Green is allocated to transition activities that do not lock in emissions. These projects reduce emissions or have other environmental benefits in the near term rather than representing low carbon and climate resilient long-term solutions.	 Hybrid road vehicles

The “Shades of Green” methodology considers the strengths, weaknesses and pitfalls of the project categories and their criteria. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised, including potential macro-level impacts of investment projects.

Sound governance and transparency processes facilitate delivery of the client’s climate and environmental ambitions laid out in the framework. Hence, key governance aspects that can influence the implementation of the green finance framework are carefully considered and reflected in the overall shading. CICERO Green considers four factors in its review of the client’s governance processes: 1) the policies and goals of relevance to the green finance framework; 2) the selection process used to identify and approve eligible projects under the framework, 3) the management of proceeds and 4) the reporting on the projects to investors. Based on these factors, we assign an overall governance grade: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.



Assessment of alignment with Green Bond and Green Loan Principles

CICERO Green assesses alignment with the International Capital Markets' Association's (ICMA) Green Bond Principles, as well as with the Green Loan Principles. We review whether the framework is in line with the four core components of the GBP and the GLP (use of proceeds, selection, management of proceeds and reporting). We assess whether project categories have clear environmental benefits with defined eligibility criteria. The Green Bonds Principles (GBP) state that the "overall environmental profile" of a project should be assessed. The selection process is a key governance factor to consider in CICERO Green's assessment. CICERO Green typically looks at how climate and environmental considerations are considered when evaluating whether projects can qualify for green finance funding. The broader the project categories, the more importance CICERO Green places on the selection process. CICERO Green assesses whether net proceeds or an equivalent amount are tracked by the issuer in an appropriate manner and provides transparency on the intended types of temporary placement for unallocated proceeds. Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs.



Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	HS Orka's Green Finance Framework	Dated July 2022
2	HS Orka's Financial Statements 2021	
3	HS Orka's Sustainability Report 2021	HS Orka Sustainability Report 2021 - HS Orka



Appendix 2: About CICERO Shades of Green

CICERO Green is a subsidiary of the climate research institute CICERO. CICERO is Norway's foremost institute for interdisciplinary climate research. We deliver new insight that helps solve the climate challenge and strengthen international cooperation. CICERO has garnered attention for its work on the effects of manmade emissions on the climate and has played an active role in the UN's IPCC since 1995. CICERO staff provide quality control and methodological development for CICERO Green.

CICERO Green provides second opinions on institutions' frameworks and guidance for assessing and selecting eligible projects for green bond investments. CICERO Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Green is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. CICERO Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

We work with both international and domestic issuers, drawing on the global expertise of the Expert Network on Second Opinions (ENSO). Led by CICERO Green, ENSO contributes expertise to the second opinions, and is comprised of a network of trusted, independent research institutions and reputable experts on climate change and other environmental issues, including the Basque Center for Climate Change (BC3), the Stockholm Environment Institute, the Institute of Energy, Environment and Economy at Tsinghua University, the International Institute for Sustainable Development (IISD) and the School for Environment and Sustainability (SEAS) at the University of Michigan.



- ★ **2021 Largest External Reviewer**, Climate Bonds Initiative Awards
- ★ **2020 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
- ★ **2020 Largest External Review Provider In Number Of Deals**, Climate Bonds Initiative Awards
- ★ **2019 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
- ★ **2019 Largest Green Bond SPO Provider**, Climate Bonds Initiative Awards
- ★ **2018 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
- ★ **2018 Largest External Reviewer**, Climate Bonds Initiative Awards
- ★ **2017 Best External Assessment Provider**, Environmental Finance Green Bond Awards
- ★ **2016 Most Second Opinions**, Climate Bonds Initiative Awards