Orkuveita Reykjavíkur (OR)
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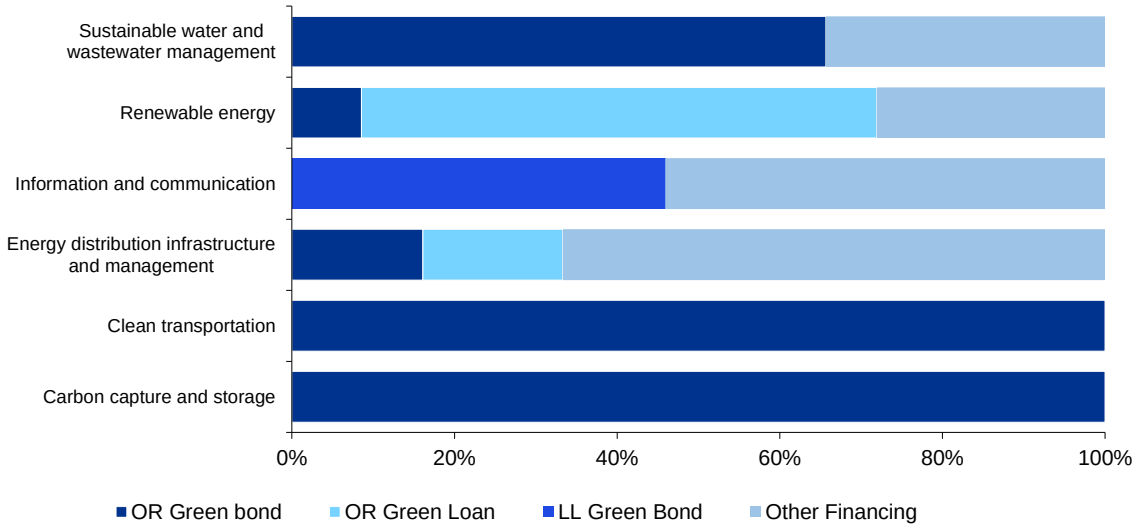
2022 Green Finance Allocation and Impact Report

In 2019, Orkuveita Reykjavíkur (OR; Reykjavík Energy) published a Green Bond Framework, under which the company issued green bonds in 2019 and 2020. In 2021 OR updated its Framework to a Green Financing Framework to allow for the use of additional types of financing such as green loans. Furthermore, its update reflects a 'balance sheet' approach as OR's operation is largely directly or indirectly related to green activities – see further in the updated Framework and the accompanying Second Party Opinion (SPO) from CICERO Shades of Green. In the year 2022, OR issued an Allocation and Impact Report for 2021, where ISK 13.2 billion of green financing was issued.

This report discloses the 2022 allocation and impact of OR's green financing, where approximately ISK 10.7 billion in green financing, of which ISK 7.2 billion was from the issuance of green bonds for OR and one of OR's subsidiaries, Ljósleiðarinn (LL; Reykjavík Fibre Network) and ISK 3.5 billion from green loans. All financing was new financing.

OR's financing has been deployed across its subsidiaries which the defined Project Categories cover, i.e.: carbon capture and storage, clean transportation, energy distribution infrastructure and management, information and communication, renewable energy, and sustainable water and wastewater management. Impacts from the funded assets and projects can be found in the below table. The chart below shows the funding of these project categories through the various finding instruments.

Project category	Indicator	Allocated impact	Impact units
Carbon capture and storage	Estimated sequestered CO2 emissions.	3,920	tCO2eq. sequestered
	Estimated sequestered H2S emissions	2,009	tH2S sequestered
Clean transportation	Electrification of OR car fleet	20	low-emission vehicles purchased
	Installation of public EV charging stations	74	number of EV charging stations installed
Energy distribution infrastructure and management	Electricity distribution infrastructure	30	km
	Heat distribution infrastructure	15	km
Information and communication	Fibre optic installed or upgraded	211	km
	Number of homes passed.	2,377	homes
Renewable energy	Renewable electricity production	376	GWh
	Renewable heat production	144	GWh
	Emissions avoided from renewable electricity production	63,978	tCO2eq. avoided
Sustainable water and wastewater management	Sewage infrastructure	5.33	km
	Cold water infrastructure	8.67	km



Financed project categories and asset and/or project examples

Carbon Capture and Storage

Carbfix is a global leader in the field of carbon capture and storage and sequesters carbon produced at OR's largest geothermal plant, operated by ON Power, Hellisheiði. Total gas sequestered in 2022 was 12,100 tonnes CO2 and 6,200 tonnes H2S, with 3,920 tonnes CO2 and 2,009 tonnes H2S being attributed to new financing (see methodology below).

Notable assets financed in 2022 by ON Power, as the operator of the plant and adjacent land, include the construction of Mammoth, the world's largest direct air capture (of CO_2) plant connected to Carbfix's sequestration system, and operational costs for the capture plant at Hellisheiði.

	Year	Total financing m ISK	Green financing m ISK	Green financing percentage	Indicator	Total impact	Allocated impact	Unit
Carbon Capture and Storage	2021	168.3	158.1	94%	Estimated sequestered CO2 emissions (in tonnes) per year.	3,809	3,578[1]	$tCO_2eq.$ sequestered
					Estimated sequestered H2S emissions (in tonnes) per year.	2,148	2,017	tH_2S sequestered
	2022	405.9	405.9	100%	Estimated sequestered CO2 emissions (in tonnes) per year.	3,920	3,920	$tCO_2eq.$ sequestered
					Estimated sequestered H2S emissions (in tonnes) per year.	2,009	2,009	tH_2S sequestered

Clean Transportation

OR interacts with the Clean Transportation project categories in two ways. First, OR is working to replace its current vehicle fleet with zero emissions vehicles with the goal of the car fleet to be fully non-emitting of GHG by 2030. Second, through its subsidiary, ON Power, OR plays an important role in Iceland's energy transition to a low-carbon society by, for example, providing the installation of public charging

[1] Note that this number represents an updated methodology in terms of reporting as compared to OR's 2021 Allocation and Impact Report, and is considered to be more accurate and thus supersedes the 2021 numbers.

stations. In 2022, 6 low-emission vehicles were purchased, making OR's car fleet composed of now 42% of green vehicles and 74 EV charging connections were installed across Iceland.

	Year	Total financing m ISK	Green financing m ISK	Green financing percentage	Indicator	Total impact	Allocated impact	Unit
Clean Transportation	2021	241.2	56.8	24%	Electrification of OR car fleet	3	0.7	low-emisison vehicles purchased
					Installation of public EV charging points	159	37.5	number of EV charging points installed
	2022	271.0	271.0	100%	Electrification of OR car fleet	20	20	low-emisison vehicles purchased
					Installation of public EV charging points	74	74	number of EV charging points installed

Energy distribution infrastructure and management

OR's subsidiary, Veitur Utilities, manages the electricity and heat distribution infrastructure in the Reykjavik capital area and in parts of West and South Iceland. In 2022, it installed 91 km of electricity distribution infrastructure (where the total network length is 5,200 km) and 45 km of heat distribution infrastructure (where the total network length is 3,300 km). Example of cost associated with this infrastructure is cables, pipes, and distribution stations.

Case Study: *Renewal of heating pipes in Hafnarbraut*

Project description: *Heating pipes renewed to strengthen the distribution system of heating in Kársnes, a municipal area in Iceland's capital area.*
Project location: *Hafnarbraut, Kópavogur.*
Estimated benefits: *340 meters of piping.*
Percent Green finance: *100%*
Project status: *Operational*

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	Year	Total financing m ISK	Green financing m ISK	Green financing percentage	Indicator	Total impact	Allocated impact	Unit
Energy distribution infrastructure and management	2021	6,637.0	3,795.0	57%	Electricity distribution infrastructure	164	94	km
					Heat distribution infrastructure	40	23	km
	2022	7,161.2	2,386.7	33%	Electricity distribution infrastructure	91	30	km
					Heat distribution infrastructure	45	15	km

Information and communication

OR's subsidiary, Reykjavík Fibre Network (Ljósleiðarinn; LL), manages fibre optic infrastructure in Iceland, and in 2022 installed 460 kilometres of efficient fibre optic cables, reaching 5,177 homes, respectively.

	Year	Total financing m ISK	Green financing m ISK	Green financing percentage	Indicator	Total impact	Allocated impact	Unit
Information and communication	2021	2,568.4	1,443.4	56%	Fibre optic installed or upgraded	310	174	km
					Number of homes passed.	4,090	2,299	homes
	2022	4,726.2	2,170.1	46%	Fibre optic installed or upgraded	460	211	km
					Number of homes passed.	5,177	2,377	homes

Renewable Energy

OR's subsidiary, ON Power, manages its geothermal power plants and a small hydropower plant which supply a large portion of Reykjavik's electricity and district heating. In 2022 the total amount of energy produced 3.5 TWh of electricity and 2.9 TWh_{th} of heating. It was estimated that in 2022, the amount of renewable electricity and heat that could be attributed to the new investments was 532.1 GWh of electricity and 200.1 GWh_{th} of thermal energy production. This represents a significant rise from 2021 because of the greater new investments in the year 2022. Example assets and projects in this category include engine renovations, gas management system improvements, and efficiency improvements at the power plants. The case study to the right discusses the new borehole at Hellisheiði invested in to ensure continued energy security in the Capital Area.

Case Study: *Borehole HE-65b*

Project description: *HE-65b, became operational in 2022 which will help ON Power to ensure consistent energy delivery.*
Project location: *Hellisheiði*
Percent Green finance: *100%*
Project status: *Operational*

	Year	Total financing m ISK	Green financing m ISK	Green financing percentage	Indicator	Total impact	Allocated impact	Unit
Renewable energy	2021	1,488.8	1,443.8	97%	Renewable electricity production	127.3	123.5	GWh
					Renewable heat production	200.1	194.1	GWh
					Emissions avoided from renewable electricity production	20,800	20,172	tCO2eq. Avoided
	2022	3,525.9	2,536.9	72%	Renewable electricity production	532.1	376	GWh
					Renewable heat production	200.1	144	GWh
					Emissions avoided from renewable electricity production	88,918	63,978	tCO2eq. Avoided

Sustainable water and wastewater management

OR's subsidiary, Veitur Utilities, manages the cold water and sewage infrastructure in the Reykjavik capital area and in West Iceland. In 2022, Veitur installed 13 km of water infrastructure and 8 km of sewage infrastructure. Example assets and projects include the purchase of smart meters, water collection equipment and sewer pumping and treatment plants.

	Year	Total financing m ISK	Green financing m ISK	Green financing percentage	Indicator	Total impact	Allocated impact	Unit
Sustainable water and wastewater management	2021	3,028.9	1,643.9	54%	Sewage infrastructure	6	3.26	km
					Cold water infrastructure	12	6.51	km
	2022	4,281.7	2,854.6	67%	Sewage infrastructure	8	5.33	km
					Cold water infrastructure	13	8.67	km

Methodology

The impacts which are detailed in this report, are impacts representing the positive impacts enabled by OR's green financing. Methodologies used for avoided emissions and other impact calculations are based on relevant international guidelines and standards.

For the **carbon capture and storage** project category, the total CO_2 and H_2S sequestered is measured according to monitoring systems both during the capture and storage phase. During the capture phase, the CO_2 and H_2S is a percent of capture of the non-condensable gasses emitted at the Hellisheiði power station. Capture data is collected from monitors in this stage. The rate of sequestration is then measured and sequestration rates at this site been academically published.[2] To allocate the additionality impacts from investment in the year 2022, the amount invested in 2022 was constructed as a ratio of the end of year balance sheet value of the Carbfix subsidiary (where new investments represented 32% of the total balance sheet).

For the **clean transportation** project category, the number of eco-friendly vehicles purchased and charging stations installed are sourced from internal asset system data.

For the **energy distribution infrastructure and management** project category, the length of infrastructure installed is sourced from Veitur Utilities' GIS based infrastructure management system, where all infrastructure laid during the year is updated into this system.

For the **information and communication** project category, the length of infrastructure installed is sourced from the Fibre Network's GIS based infrastructure management system, where all infrastructure laid during the year is updated into this system.

For the **renewable energy** project category, the amount of renewable electricity and heat produced is measured per production facility, where meters measure this production.

OR supplies renewable electricity to users in Iceland. For the avoided emissions calculations, this is relevant because the electricity users in Iceland have been divided into two types as shown below. Both will contribute to the EU's 2030 emission reduction targets defined in the Paris Agreement but will have

[2] Matter, J. M., Stute, M., Snæbjörnsdottir, S. Ó., Oelkers, E. H., Gislason, S. R., Aradottir, E. S., ... & Broecker, W. S. (2016). Rapid carbon mineralization for permanent disposal of anthropogenic carbon dioxide emissions. Science, 352(6291), 1312-1314.

a different role in the EU's 2030 climate & energy framework. Methodologies used for avoided emission calculations are based on relevant international guidelines and standards.

Type 1: Industry operating within the European Union (EU) Guarantee of Origin (GO) market, representing ~60-65% of OR's sold electricity.

- The benchmark emission factor for this group was calculated using a methodology from the International Financial Institutions (IFI)[3] using the combined margin method and the Harmonized IFI Default Grid Factors 2021 v3.1.

- The IFI benchmark emission factor for the year 2022 for firm energy production (which is the relevant description for geothermal energy) is estimated to be 204.3 gCO_2e/kWh.

Type 2: Other Industries and households in Iceland, representing ~35-40% of OR's sold electricity.

- The benchmark emission factor for Type 2 users was calculated using the same methodology as used for Type 1 users.

- The Icelandic benchmark emission factor for the year 2022 is estimated to be 0 gCO_2e/kWh.

Using the above methodology, the comparative weighted average benchmark according to approximate GO sales was estimated to be 127.7 $gCO_2eq./kWh$, which is the average displaced electricity emission factor. Using OR's reported carbon footprint of 7.6 $gCO_2eq.$ per kWh[4], comparing this value to the benchmark to calculate, the avoided impact was estimated to be 120.1 $gCO_2eq.$ per kWh produced.

Since it is difficult to measure the additionality of impacts associated with the investments made in 2022, to allocate the impacts from investment in that year, the amount invested was constructed as a ratio of the end of year balance sheet value of the ON Power subsidiary (where new investments represented 8.2% of the total balance sheet).

For the **Sustainable water and wastewater management** project category, the length of infrastructure installed is sourced from Veitur Utilities' GIS based infrastructure management system, where all infrastructure laid during the year is updated into this system.

KPMG ehf. was appointed as an external advisor to help prepare this report. It provided advise on setup, methodology, and calculations of environmental/climate change impact. ***All new financing and re-financing assessed was aligned with the Eligible Project Categorization in the Framework with exclusion criteria considered. All data was provided by OR.*** *KPMG's engagement was not bound by any assurance standards, nor did it provide an opinion. The ultimate responsibility for this report and the accuracy of the information lies with OR.*

[3] International Finance Institution (2022). *Methodological Approach for the Common Default Grid Emission Factor Dataset*. IFI TWG - AHG-001.
[4] Reykjavik Energy. *Annual Report 2022*. Reykjavik Energy. Reykjavik.

Independent Auditor's Assurance Report

To the Board of Directors of Orkuveita Reykjavíkur and Green Bond holders

Assurance scope

The scope of our work was limited to verifying that the proceeds of the Green Financing obtained were used for funding selected eligible projects as reported in the 2021 Green Finance Allocation and Impact Report.

Responsibilities of The City of Reykjavik

The net proceeds from Green Financing is managed by the Financial Department of Orkuveita Reykjavíkur. It is the responsibility of Orkuveita Reykjavíkur to allocate the proceed to the eligible projects selected by a Selection Committee and approved by the Board of Directors of Orkuveita Reykjavíkur. The Financial Department of Orkuveita Reykjavíkur is also responsible for preparation of a Green Finance Allocation and Impact Report which is free from material misstatements, whether due to fraud or error, in accordance with the Green Financing Framework from 2022.

Responsibility of the auditor

Our responsibility is to express an assurance conclusion for the subject matter at hand and which is included in the Green Finance Allocation and Impact Report, based on the procedures we have performed and the evidence we have obtained.

We conducted our assurance engagement in accordance with *ISAE 3000 Assurance Engagements Other than Audits or Reviews of Historical Financial information* issued by the IASB.

Our independence and quality control

We have complied with independence and other ethical requirements of the Code of Ethics for professional Accountants issued by the International Ethics Standards Boards for Accountants which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

We apply *ISQC 1 International Standard on Quality Control* and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Work performed

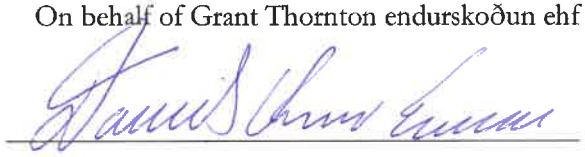
During our assurance engagement we reconciled the list of funded projects to the selected eligible projects. We performed assurance procedures on accounting transactions and capital movements in the Green Account. We have also reviewed the 2022 Green Finance Allocation and Impact Report and performed assurance procedures on the completeness and accuracy of reported information as described in the Green Financing Framework.

Conclusion

Based on the assurance procedures we have performed and the evidence we have obtained, we conclude, in all material aspects, that the proceeds of Green Financing obtained has been used to fund the selected eligible projects as reported in the 2022 Green Finance Allocation and Impact Report.

Reykjavík, 7 March 2023

On behalf of Grant Thornton endurskoðun ehf



Davíð Arnar Einarsson

State Authorized Public Accountant