Climate account 2023

Orkuveitan

Reykjavík Energy

ssn. 551298-3029
Bæjarháls 1, 110 Reykjavík, Iceland

Publishing date: March 7th 2024

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The climate account

The greenhouse gas (GHG) emissions are compiled annually, where the total emissions are calculated based on operations (activity data) from January 1st to December 31st each year. The climate account is conducted according to the methodology of the corporate standard Greenhouse Gas Protocol (GHGP) and in accordance with the international standard ISO 14064-1. The climate account has been independently reviewed and verified with limited assurance by Bureau Veritas Denmark. See verification statement at the end of the report.

Purpose and Objective of Reykjavík Energy's (RE) Climate Account

The purpose of RE's climate account is to transparently communicate RE's impact on climate change and its efforts to reduce those impacts. This includes informing about the company's GHG emissions, specifying the types and amounts of emissions due to its operations, reporting plans and actions taken by the company to reduce emissions, improve energy efficiency, and transition to more sustainable practices.

Overall, the climate account of RE is a means to communicate the commitment to increased sustainability, present its environmental impact, and provide stakeholders with a better understanding of the company's climate-related initiatives and performance.

Responsibility for the Climate Account

The CEO of Reykjavík Energy is responsible for and confirms the results of the climate account and carbon footprint with the signature below. RE's Environmental Division is responsible for producing the report.

Reykjavik Energy's CEO hereby confirms the contents of the climate account for the year 2023.

Össur Freyr Kristinsson

Intended Use and Users of the GHG Inventory

RE's climate account is used by its owners, City of Reykjavík, the Township of Akranes, and the Municipality of Borgarbyggd, along with politicians, government agencies, licensing authorities, scientists, environmental organizations, and the public. Environmental authorities rely on the data to assess the effectiveness of adaptation and mitigation actions in climate issues and to monitor progress towards climate goals. Scientists use the data for climate analysis, and licensing authorities, environmental authorities, the public, and RE's employees use the information to advocate for sustainable practices and clarify responsibility for emissions from RE. Overall, RE's climate account contributes to transparency, accountability, and informed decision-making in addressing the climate crisis.

Frequency and Accessibility of the Climate Account

Annually, RE compiles information about greenhouse gas emissions, mitigation actions for those emissions, carbon sequestration in land reclamation and afforestation, along with the net emissions from RE and publishes it publicly on its website. This includes an overview of the status of climate actions in relation to the company's climate goals.

Monitoring of the Climate Account and Climate Goals

RE's climate group consists of representatives from RE's Environmental Division, Research and Innovation, and all subsidiary companies. RE's role is to update the climate account and climate goals of the company as appropriate and for RE's Annual Report. RE initiates projects that contribute to the company achieving its climate goals and improve the climate account. Representatives of RE's Climate Group meet monthly.

Materiality

The materiality threshold of the ISO 14064-1 verification is 5%.

Reykjavík Energy

Reykjavík Energy (RE) is an energy- and utility company, jointly owned by the City of Reykjavík, the Township of Akranes, and the Municipality of Borgarbyggd. RE produces energy, hot and cold water, and develops utility infrastructure for three quarters of the Icelandic population.

Reykjavík Energy (RE) consists of four subsidiaries: Veitur Utilities, Reykjavík Fibre Network, ON Power, and Carbfix. Veitur Utilities operates electricity distribution, district heating, cold water supply, and wastewater utility for up to 75% of households in Iceland and as such provides the basic infrastructure for most of the Icelandic society. RE has been crucial for the development and urbanization of the capital region, significantly improving the living conditions of its residents. In addition to Veitur Utilities this also applies to ON Power, which operates two geothermal power plants and a small hydropower plant that together produce approximately 17% of the electricity in Iceland. Together, the geothermal power plants produce hot water for over half of the capital region. Furthermore, ON Power has been leading the energy transition and has emphasised the installation of charging stations for electric vehicles (EV) both along the main routes around Iceland and within urban areas. This has been done in response to the rapid growth of EVs in the country, ensuring the rising demand for charging infrastructure is met. Reykjavík Fibre Network (IS. Ljósleidarinn) is at the forefront of developing and managing a nationwide optical fibre network, serving as a fundamental component in facilitating the shift of communities towards a more sustainable future with faster and more efficient telecommunications. RE's newest subsidiary, Carbfix, is a global leader in developing and implementing solutions to tackle global warming through Carbon Capture and Storage (CCS). This aligns well with RE's previous steps towards improving living conditions and quality of life through innovation.

Organizational boundary

The organisational boundary of the climate account is defined by the operational control approach. Reykjavík Energy (RE) has operational control over its subsidiaries, namely ON Power, Veitur Utilities, Reykjavík Fibre Network, and Carbfix. Associated companies in which RE holds a minority stake are not considered within the operational control approach. These are Orkuskólinn REYST, Netorka hf., Íslensk Nýorka, and Aflvaki. Associated companies are those where RE has limited influence over the financial and operational policy but does not have operational control. The company name Reykjavík Energy (RE) is used when referring to all the companies within the organisation and organisational boundary.

Figure 1 shows the organisational boundary of Reykjavík Energy's climate account.

Figure 1: Organisational boundary of included companies in Reykjavík Energy's (RE's) climate account according to the operational control consolidation approach. The company name is Orkuveitan (IS) and in English Reykjavík Energy (RE). RE is used when referring to all the companies within the organisation and organisational boundary.

Reporting boundaries

The reporting year for the climate account is 2023, with 2016 as base year.

Emissions sources are defined according to the GHG Protocol, with scope 1 (direct emissions), scope 2 (indirect emissions from energy use), and scope 3 (other indirect emissions) along with a scope for carbon insetting and a specific scope for carbon dioxide (CO_2) emissions of biological origin. Figure 2 shows the main emissions sources that fall within scope 1, 2 and 3 of RE's climate account. All emissions sources from scope 1 and 2 are included, while emissions sources in scope 3 are selected based on the significance criteria shown in table 6, page 22. Some examples of excluded emission sources and operations are nature-based activities. These are Andakílsárvirkjun hydroelectric powerplant, low temperature geothermal fields, wholesale electricity trading and taxi-trips. Exclusions are listed and explained on page 24.

The reporting boundaries for RE's climate account are illustrated in figure 2. The coloured lines, in the middle of the figure, represent the value streams operated by Veitur Utilities, ON Power, Ljósleidarinn and Carbfix. Namely district heating and hot water production (orange), cold water supply (light blue), wastewater discharge (blue), electricity distribution and production (green), optical fibre network (pink), and carbon capture and storage (dark blue). RE is directly responsible for emissions from its geothermal powerplants, vehicle fleet and wastewater discharge, see discussion in Reykjavík Energy, page 3. These are reported under scope 1.

Given the scope of RE's operations, that is basic infrastructure for most of the Icelandic society, the company is responsible for expanding and maintaining its utility systems. Much of the activities associated with this expansion and maintenance are outsourced to contractors, resulting in emissions that RE is indirectly responsible for. Further up the supply chain, this also results in emissions from the production and transportation of the goods procured in association with RE's operations. These indirect emissions are included in the reporting boundary along with the rest of the value chain, see figure 2.

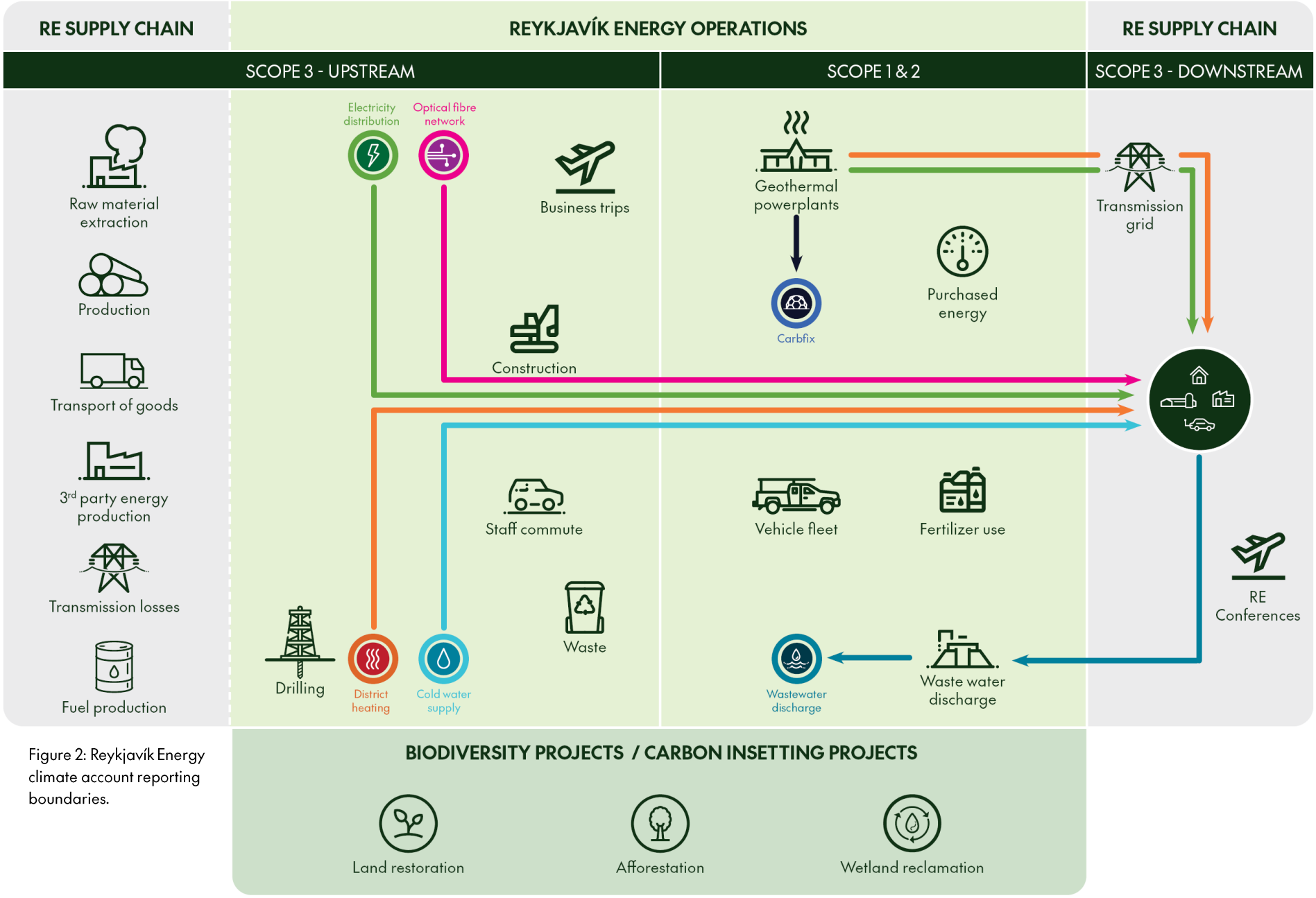


Figure 2: Reykjavík Energy climate account reporting boundaries.

Sustainability strategy and climate goals of Reykjavík Energy

Reykjavík Energy (RE) has committed to showing respect for the environment, resources, and the community in accordance with the company's ownership strategy. RE's sustainability strategy forms the basis for successful decision-making and good collaboration, built on information transparency. RE seeks feedback from stakeholders on the sustainability of its activities and responds to suggestions responsibly. The sustainability strategy is based on RE's values – initiative, foresight, efficiency, and integrity - and is presented in alignment with the guiding principles of the company's ownership.

Within RE's operations, the most evident tasks involve combating and adapting to the climate crisis, with final steps towards net-zero and an increased emphasis on actions supporting the circular economy. By serving up to two third of households in Iceland and being crucial for the development and urbanization of the capital region, the leadership of RE is undisputed and will play a significant role in determining how the Icelandic nation succeeds in these tasks.

In RE's climate account, 2016 was selected as the base year due to its representation of RE's typical GHG profile. Since then, RE has tracked its progress in reducing emissions and aligning with the climate goals set for 2030. These goals are in accordance with and have been validated by the Science Based Target initiative (SBTi), see table 1. Thus, RE has joined the "Business Ambition for 1.5°C" campaign, a growing group of companies aiming to meet the goal of keeping the temperature rise under 1.5°C. Consequently, RE has become part of the "Race to Zero" campaign supported by the United Nations.

To achieve its climate targets, RE has outlined significant steps in its emissions reduction strategy. These include the complete implementation of the Carbfix injection method at the Hellisheidi geothermal power plant by 2025, and achieving full-scale injection at the Nesjavellir geothermal power plant by 2030. Additionally, RE plans to lower emissions from its vehicle fleet. The strategy also encompasses encouraging the use of sustainable materials in procurement and fostering an energy transition in construction processes, see table 1. Additionally, RE has plans to achieve net-zero emissions by 2040 where the focus will be put on scope 3 with sustainable procurement of goods and services.

Table 1: RE's 2030 climate targets approved by SBTi.

Orkuveitan

SBTi approved climate targets

Scope	2030 target from 2016 baseline	Related initiatives
Scope 1+2	90% reduction	• Emission free geothermal powerplants in 2025 and 2030 (page 10) • Emission free vehicle fleet (page 11)
Scope 3	40% reduction	• Low-emission materials in procurement (page 12) • Energy transition in construction (page 13)

Simultaneously actions: Strengthening the community's resilience by adapting RE's power plants, utility systems, etc. to climate change. Care is taken to ensure that the climate adaptation does not cause significant harm to other environmental objectives. The goal is that no climate-related risk is classified as being unacceptable in RE's s risk assessment base.

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Key numbers in 2023

Scope 1: **51,820** tonnes CO_2-eq

Scope 2: **525** tonnes CO_2-eq

Scope 3: **19,940** tonnes CO_2-eq

Emission Intensity

Electricity: **7.3** gCO_2-eq/kWh

Heating: **205.2** gCO_2-eq/m^3

21% CO_2 injected

in RE's geothermal power plants using the Carbfix method

Greenhouse gas emissions overveiw

In 2023 the Reykjavík Energy's (RE) total direct and indirect greenhouse gas (GHG) emissions amounted to 72.285 tonnes CO_2 equivalent, and net emissions amounted to 64,055 tonnes CO_2 equivalent. The primary sources of these emissions were, direct emissions from RE's geothermal power plants, nitrous oxide (N_2O) emissions from wastewater discharge and indirect emissions from procurement. RE's emissions are categorized into three scopes: Scope 1 (directed emissions) which accounted for approximately 72% of total emissions, scope 2 (indirect emissions from purchased energy) which accounted for less than 1%, and scope 3 (all other indirect emissions) comprised 28%. Breakdown of emissions is presented in table 2. An overview of the applied emissions factors is presented in tables 8-10.

Table 2: GHG emissions in tonne CO_2 equivalents by scope 1, 2 and 3, biogenic carbon emissions, carbon insetting and offsetting projects. The uncertainty is presented in each emissions source.

	Emissions tonne CO_2-eq								Uncertainty
	2016	2017	2018	2019	2020	2021	2022	2023	2023
Scope 1									
Geothermal power plants	54,200	42,380	48,820	50,820	49,700	46,420	48,100	48,780	12.5%
Ratio of injected CO_2	*15%*	*23%*	*21%*	*18%*	*20%*	*24%*	*22%*	*21%*	
Steam utility in Hveragerdi Town	55	55	70	70	70	85	120	125	100%
Wastewater discharge	1,940	2,000	2,310	2,130	2,030	1,900	2,180	2,340	2,495%
Fuel use (TTW)	515	440	455	440	440	360	410	545	10%
HFCs and SF_6	10	2	2	2	1	50	15	25	10%
Fertilizer for land reclamation and afforestation	2	<1	<1	<1	<1	<1	1	<1	233%
Total Scope 1	**56,720**	**44,880**	**51,650**	**55,460**	**52,240**	**48,810**	**50,830**	**51,820**	
Scope 2									
Location based									
Electricity	0	40	0	0	265	430	490	525	1%
Heating	0	0	0	0	0	0	0	0	-
Market based									
Electricity	0	0	0	0	0	0	0	67,800	1%
Heating	0	0	0	0	0	0	0	0	-
Total Scope 2 (Location based)[1]	**0**	**40**	**0**	**0**	**265**	**430**	**490**	**525**	**1%**
Scope 3									
Purchased capital goods	9,020	10,250	11,300	14,880	7,750	11,810	12,140	9,460	60%
Purchased goods	3,720	5,970	5,130	5,840	4,510	4,940	3,770	4,310	60%
Purchased services	2,765	4,185	4,415	4,770	3,965	4,410	5,520	4,605	20%
Trench digging by contractors	*2,690*	*3,210*	*4,380*	*3,950*	*4,410*	*4,420*	*5,260*	*3,520*	50%
Drilling by contractors	*75*	*975*	*35*	*320*	*15*	*0*	*260*	*1,085*	
Transportation of goods	115	140	185	155	60	75	70	65	70%

[1] Reykjavík Energy calculates its carbon footprint with the location-based approach, as most its energy use is internal and included in scope 1.

Table 2: GHG emissions in tonne CO_2 equivalents by scope 1, 2 and 3, biogenic carbon emissions, carbon insetting projects and offsetting projects. The uncertainty is presented in each emissions source. Continued.

	Emissions tonne CO_2-eq								Uncertainty
	2016	2017	2018	2019	2020	2021	2022	2023	2023
Fuel & energy related activities not incl. in scope 1 & 2	130	120	110	110	150	130	140	170	
Upstream emissions of purchased electricity	*0*	*0*	*0*	*0*	*30*	*30*	*30*	*30*	0%
Transmission losses	*0*	*<1*	*0*	*0*	*5*	*10*	*10*	*10*	1%
Fuel use (WTT)	*125*	*110*	*110*	*110*	*105*	*90*	*100*	*135*	10%
Transmission grid, SF_6	415	400	545	360	590	485	345	270	5%
Sewage waste	315	405	365	325	445	310	400	240	35%
Screening waste	130	95	135	90	180	60	85	75	-
Fat and grease	*185*	*310*	*235*	*230*	*265*	*210*	*205*	*165*	-
Sludge from biological treatment	*0*	*0*	*0*	*0*	*0*	*40*	*100*	*0*	-
Sand	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	-
Waste	95	115	100	110	110	95	115	45	35%
Landfill	*95*	*110*	*95*	*105*	*110*	*85*	*90*	*40*	-
Compost	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*<1*	-
Combustion	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	-
Reused/Recycled	*<1*	*1*	*1*	*1*	*2*	*3*	*2*	*1*	-
Hazardous	*<1*	*4*	*<1*	*1*	*1*	*5*	*20*	*2*	-
Employee commuting	110	110	120	110	40	70	90	80	5%
Employee business travel	220	235	255	340	65	20	240	425	
Air travel	*195*	*210*	*225*	*300*	*60*	*15*	*210*	*375*	45%
Hotel stays	*25*	*25*	*30*	*40*	*5*	*5*	*30*	*55*	5%
Downstream event related travel	0	0	0	0	0	0	0	260	45%
Total Scope 3	**16,900**	**21,920**	**22,525**	**27,000**	**17,675**	**22,345**	**22,830**	**19,940**	
Biogenic carbon emissions									
$CO_2$from biological origin	40	40	40	55	60	50	50	45	
Total biogenic carbon emissions	**40**	**40**	**40**	**55**	**60**	**50**	**50**	**45**	
Biodiversity and carbon insetting projects									
Afforestation	-5,740	-5,740	-5,740	-5,740	-5,740	-5,740	-5,740	-5,740	
Land reclamation	-1,205	-1,210	-1,215	-1,220	-1,225	-1,235	-1,250	-1,250	
Rewetting of peatland	0	-40	-40	-40	-40	-40	-40	-40	
Total biodiversity and carbon insetting projects	**-6,945**	**-6,990**	**-6,995**	**-7,000**	**-7,005**	**-7,015**	**-7,040**	**-7,040**	
Carbon offsetting projects									
Carbon credits from UNU CDM Malawi project	0	0	0	0	-645	-625	-2,610	-1,200	
Votlendissjódur	0	0	-500	-1,250	-605	-625			
Total carbon offsetting projects	**0**	**0**	**-500**	**-1,250**	**-1,250**	**-1,250**	**-2,610**	**-1,200**	
Total GHG emissions	**73,620**	**66,840**	**74,175**	**80,460**	**70,180**	**71,585**	**74,150**	**72,285**	104%
Total Greenhouse gas sequestration and offsetting	**-6,945**	**-6,990**	**-7,495**	**-8,250**	**-8,255**	**-8.265**	**-9.640**	**-8.230**	38%
Net emissions	**66,675**	**59,850**	**66,680**	**72,210**	**61,925**	**63,320**	**64,510**	**64,055**	**57%**

Scope 1 emissions and initiatives

Geothermal Powerplants and Carbfix CCS Method:

Geothermal steam is utilized for power- and heat production. It consists partially of two greenhouse gasses (GHG), namely carbon dioxide (CO_2) and methane (CH_4). Typically, these GHGs are released from the geothermal steam and emitted into the atmosphere. However, Reykjavík Energy (RE) has developed the Carbfix method, a Carbon Capture and Storage (CCS) technology which permanently mineralizes CO_2. A cornerstone of RE's emission reduction strategy is the implementation of the Carbfix method at the geothermal facilities. Carbfix started out in 2006, and was formalized by four founding partners in 2007; Reykjavík Energy, the University of Iceland, CNRS in Toulouse, and the Earth Institute at Columbia University. Since 2007, several universities and research institutes have participated under the scope of EU funded sub-projects.

RE's geothermal power plants emitted 48,780 tonnes CO_2-eq, which was approximately 10% decrease from 2016. This decrease is mainly due to increased use of Carbfix CCS at the geothermal powerplants in 2023 compared to 2016 and less overall CO_2 concentration in the geothermal steam.

Since 2016, the geothermal powerplants have accounted for 65-75% of RE's total GHG emissions. The implementation of Carbfix CCS on an industrial scale began at Hellisheidi geothermal power plant in 2014, capturing 15-24% of CO_2 emissions the past 10 years. RE plans to fully implement Carbfix CCS, capturing and injecting 95% of CO_2 emissions from the power plant, by 2025. Pilot injections started at the Nesjavellir powerplant in early 2023 and RE aims for full scale injection at the powerplant by 2030.

In the base year, 2016, the geothermal power plants' CCS rate was around 15%. In 2017, these rates increased and since then the injection rates are ranging from 18% to 24% of CO_2 emissions, with the highest rates recorded in 2021. This variability is mainly due to three factors:

Figure 3: Carbfix reinjection well, used for carbon capture and storage. Photo: Gunnar Freyr.

1) Variability in the uptime of the CO_2 capture unit at the Hellisheidi geothermal powerplant, due to temporary shutdowns related to either construction or unexpected failures.

2) Variability in energy production at geothermal powerplants.

3) Variability of CO_2 concentration in new boreholes connected to the Hellisheidi geothermal powerplant.

Steam-Utility in Hveragerdi Town:

In Hveragerdi Town, a municipality east of Hellisheidi powerplant, RE operates a "steam utility", and a district heating system which draws its energy from geothermal steam. This steam consists partially of GHG, including CO_2 and CH_4, which are emitted once the steam has been used

↓ 9% decrease in scope 1 emissions from base year, 2016.

for heating. The GHG emission have been roughly estimated as 55 to 125 tonnes CO_2-eq since 2016. However, the emissions lack precise measurements. RE is currently working on developing more concise measurement methods for this emission category.

Wastewater discharge:

RE manages the infrastructure and operation of wastewater systems in the Reykjavík Capital Area, as well as in the Township of Akranes and the Municipality of Borgarbyggd in West Iceland. Wastewater from the Capital Area, that is the City of Reykjavik, Kópavogsbaer, Mosfellsbaer and Seltjarnarnesbaer, in addition to parts of Gardabaer, is treated in wastewater treatment plants at Ánanaust and Klettagardar in Reykjavík. The wastewater infrastructure serves approximately 60% of the population in Iceland. From the treatment plants, the treated wastewater is discharged to the ocean.

Figure 4: Wastewater treatment at Eidisgrandi in Reykjavík City. Photo: Einar Örn Jónsson.

This treated wastewater consists of organic nitrogen, methane, and carbon. RE accounts for N_2O and CH_4 emissions in scope 1 from the resulting decomposition, CO_2 is however not reported, as it comes from a biogenic origin. Methane forms where organic material from the wastewater discharge is buried into sediment where it decomposes in an anaerobic environment. This is the case at two locations in West Iceland, Hvanneyri and Reykholt, where the wastewater is discharged to lakes. At other locations where the wastewater is discharged to marine environments, or where there is active flow, the erosion rate of sediment is too great to assume that the discharged material is buried in sediment. The amount of GHG released in 2023 amounted to 2,340 tonnes CO_2-eq, which is a 21% increase form 2016.

Fuel use (TTW):

RE purchases and uses fuel for its vehicle fleet and other machinery. Tank-To-Wheel (TTW) denotes the tailpipe emissions which occur when fuel is burned. RE is also evaluating Well-To-Tank (WTT) emissions which are discussed under the scope 3 section below. TTW emissions in 2023 amounted to 545 tonnes CO_2-eq, which is an increase of 6% from 2016. Although the total number of vehicles in RE's vehicle fleet has increased from 177 in 2016 to 216 in 2023, the relative amount of clean energy vehicles rose from 24% to 46%. RE is actively phasing out fossil fuel vehicles and machinery for more sustainable alternatives.

HFCs and SF_6:

RE uses two GHGs in its operations that fall under either HFCs or SF_6.

Sulfur hexafluoride (SF_6), which has a GWP of 23,500, is used as insulation material in various electricity equipment in both the electric distribution system as well as in power plants. Additionally, SF_6 is used in tracers during tracer flow tests (TFT) to measure steam uptake from high temperature geothermal boreholes. SF_6 emissions occur mainly due to leakages in electricity equipment in Hellisheidi and Nesjavellir geothermal power

plants. RE is actively replacing equipment which uses SF_6 such as switches, for more sustainable alternatives.

In RE's freshwater utility, Hydrofluorocarbons (HFCs) are utilized in air conditioning systems to maintain dry air conditions in pumping stations. RE previously used HFC-134a, a GHG with a GWP of 1,300, in its cooling equipment. However, since 2021, RE has purchased equipment that uses R454c, which is a mixture between HFC-32 and HFC-1234yf, and has a GWP of 148.

Emissions of HFCs and SF_6 in 2023 were 25 tonnes CO_2-eq, which is an increase of 15 tonnes CO_2-eq from 2016. RE's goal is to phase out HFC and SF_6 use.

Fertilizer Usage:

Fertilizer is used on RE's land in afforestation and land reclamation projects. The fertilizer consists partially of nitrogen which is converted to N_2O after application. Total emissions resulting from fertilizer application amounts to less than 1 tonne CO_2-eq in 2023. This presents a 60% decrease from 2016 due to less fertilizer usage in the reporting year. RE is evaluating potential solutions to minimize fertilizer emissions, such as buying fertilizer with less nitrogen content.

Scope 2 emissions and initiatives

Scope 2 emissions refer to indirect greenhouse gas (GHG) emissions associated with the Reykjavík Energy's (RE) purchase of electricity and heating.

Location Based Approach:

Using the location-based approach, these emissions amounted to 525 tonnes CO_2-eq in 2023, which is relatively low in comparison to RE's energy consumption. This marks a considerable increase from 2016, when no electricity was procured from external sources, and all location-based

40% increase in CO_2 injection at geothermal power plants from base year, 2016.

emissions were zero, as the emissions were already included in scope 1. Similarly, emissions from heating are zero as RE generates all the geothermal water used for heating, with these emissions also included in scope 1.

The location-based approach is applied in RE's total carbon footprint. This is primarily since RE predominantly purchases energy produced internally, with a large share of these emissions already accounted for under scope 1. All emissions from heating are already included in scope 1.

Market Based Approach:

Under the market-based method, the emissions amount to 67,800 tonnes CO_2-eq in 2023. This is up from 0 tonnes CO_2-eq in the previous years where the Guarantees of Origin (GO) were retained for RE's operations. In this approach, electricity accompanied by a GO is assigned an emission factor of zero. Conversely, purchased electricity without GOs is assigned an emission factor based on the residual mix, as published annually by the National Energy Authority (NEA, Orkustofnun). This aligns with the recommendations of the Association of Issuing Bodies (AIB), which developed and oversees the European Energy Certificate System (EECS).

Market-based heating is the same as location-based heating as no GOs are sold in this market.

Scope 3 emissions and initiatives

Purchased Goods and Capital Goods:

Procured goods have a carbon footprint due to direct and indirect emissions by suppliers which produce those goods. Reykjavík Energy (RE)

evaluates indirect emissions from procurement by using data based on Life Cycle Assessments (LCA) for products purchased by RE. In cases where such data does not exist, spend based emission factors published by the United Kingdom's Department for Environment, Food & Rural Affairs (DEFRA) are used. These factors describe emissions per currency spent on product categories such as "Basic iron and steel" etc. LCA data are used to evaluate the emissions from 13% of the total value of RE's procurement in 2023. Included are all the goods and capital goods paid for in the reporting year. In many cases delivery of the good is included in the contract, in which case the emissions of transportation are included in the purchased goods and capital goods category.

Total emissions related to procurement of capital goods amounted to 9,460 tonnes CO_2-eq in 2023, which presents an increase of 5% from 2016. The product category contributing to most of the impacts from total procurement was "Basic iron and steel" with "50% of the impacts". RE is actively evaluating ways to procure more sustainable goods, focusing on sustainably produced steel, as steel pipes are a substantial part of RE's purchases. Emissions from procurement of goods other than capital goods were 4,310 tonnes CO_2-eq in 2023, an increase of 16% from 2016. RE is proactively communicating with its main suppliers to find ways to reduce and outline procurement related emissions.

Purchased services:

RE focuses on services related to construction (mainly trench work) and drilling. Construction emissions are based on the length and volume of trenches, the emissions factor per meter of trench was sampled from a project in which a contractor supplied RE with information on emissions. Drilling emissions are based on estimations from drilling contractors.

Construction emissions were 3,520 tonnes CO_2-eq in 2023, an increase of 30% from 2016 due to increased expansion of utility systems in the Reykjavík Capital area.

Figure 5: Retractable pipe laid in Ljósleidari trench in Stokkseyri. Photo: Arna Rut Hjartardóttir.

Emissions from drilling amounted to 1,085 tonnes CO_2-eq in 2023 which presents a considerable increase from 75 tonnes CO_2-eq in 2016. Although high-temperature geothermal drilling, now almost exclusively relies on electricity, the avoided emissions are not enough to outweigh the increase in the number of drilling projects, such as for Carbfix. RE is working with its suppliers to evaluate the potential of using electricity for smaller drilling projects as well, namely for cold and hot water drilling.

RE is proactively encouraging its contractors to shift towards energy transition. This initiative is part of RE's broader strategy to promote sustainable practices and reduce carbon footprint across its operations and supply chain.

Transportation of Goods:

Goods are transported to and from Iceland by air through commercial airlines and cargo planes. Furthermore, Iceland relies on sea

transportation via cargo ships. Goods are transported by land using trucks and other vehicles which is crucial for the last-mile delivery of goods to their final destinations, serving both RE's urban and rural service areas. Emissions from transportation of goods were 60 tonnes CO_2-eq in 2023, a decrease of around 45% from 2016. This is due to a decrease in the amount of goods transported. Please note that this category only includes transportation of goods directly paid by RE, transportation of goods in the supply chain is included in the category purchased goods and capital goods.

Fuel use (WTT):

Upstream emissions from fuel use, also referred to as well to tank (WTT), are associated with emissions that occur during production of RE's purchased fuels. WTT emissions were 135 tonnes CO_2-eq in 2023 which was

Figure 6: Street charging at Sundlaugarvegur in Reykjavík City. Photo: Atli Már Hafsteinsson

↓ 27% decrease in employee commute emissions from base year, 2016.

around 8% increase from 2016. The emissions in this category are related to TTW emissions and will be reduced in line with RE's journey to complete energy transition.

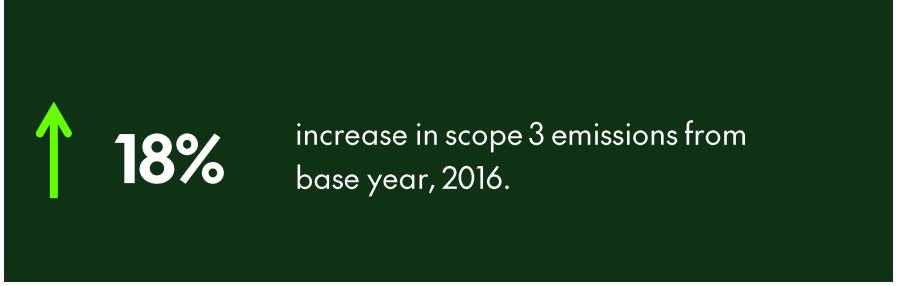
Transmission Losses:

This emission category falls under Scope 3 and pertains to the indirect emissions resulting from transmission losses in Iceland's national grid operated by Landsnet, the national electricity grid operator. Specifically, it concerns the electricity RE purchases from external sources. It is important to note that emissions stemming from transmission losses of electricity produced internally by RE are already accounted for in scope 1.

In 2023, the total scope 3 emissions attributed to transmission losses amounted to 10 tonnes of CO_2-eq. This accounting helps in providing a more comprehensive understanding of RE's indirect emissions footprint, particularly those emissions that are not directly produced by its operations but are a consequence of the energy it procures from outside sources.

Transmission Grid:

RE calculates its indirect emissions attributable to SF_6 leakages from the electricity equipment of Landsnet, the national electricity grid operator. SF_6 is a potent greenhouse gas used as an insulating material in electrical equipment. RE's approach to estimating these emissions involves assessing its proportion of electricity production relative to Iceland's total production. This method allows RE to determine its share of the environmental impact caused by Landsnet's SF_6 leakages.



Between 2016 and 2022, Landsnet reported SF_6 leakages varying from 85 to 142 tonnes of SF_6. In 2023, the SF_6 leakages from Landsnet that were incorporated into RE's climate account amounted to 11.4 tonnes of SF_6, which translates to 270 tonnes of CO_2-equivalents.

Sewage Waste:

In RE's wastewater treatment operations, filtered sewage waste is systematically gathered and then transferred to designated waste collectors. In 2023, the indirect emissions resulting from the handling and processing of this sewage waste were calculated to be approximately 240 tonnes of CO_2-equivalent. Notably, this figure represents approximately 25% reduction in emissions compared to the levels recorded in 2016.

RE's initiatives include working on innovative projects to prepare for the reuse of sewage waste such as sand, sludge and fat which is of value in the circular economy.

Waste:

In 2023, the emissions resulting from waste generated in RE's operations totalled 45 tonnes of CO_2-eq, marking a decrease of about 50% compared to 2016. This decline in waste emissions is primarily attributed to changes in waste treatment practices in Iceland. The most significant change contributing to this reduction is the shift from landfilling to combustion for disposing of general waste. This transition has a considerable impact on emissions due to the differing emission factors associated with these disposal methods.

The emission factors used for calculating waste emissions are sourced from the United Kingdom's Department for Environment, Food & Rural Affairs (DEFRA). According to these factors, emissions from combustion are substantially lower than from landfilling. This difference arises because the decomposition process in combustion is utilized for energy generation, and a portion of the emissions is allocated to the energy produced.

Considering these changes in waste treatment and disposal practices, the emission factors applied to each waste category have been updated for 2023. This update ensures that the emission calculations more accurately reflect the actual pathways and impacts of RE's waste management, thereby providing a more precise measure of the organization's environmental footprint in terms of waste-related emissions.

Employee Commuting:

RE accounts for emissions associated with employees' commuting to and from work. Every year RE conducts a survey among its employees to gather information about their commuting habits. This survey inquiries about the modes of transportation used by the employees, frequency, and the distance between their homes and the workplace.

In 2023, the emissions resulting from employees' commutes to work amounted to 80 tonnes of CO_2-equivalent. This represents approximately 30% decrease compared to 2016. This significant reduction can be attributed to RE's proactive measures to promote sustainable commuting practices among its workforces.

RE offers a comprehensive travel plan package to its employees To encourage eco-friendly commuting. This package includes initiatives such as a green travel grant, which is a monetary incentive granted to employees that opt for climate friendly modes of transport. RE also provides free charging for electric vehicles at the workplace and access to electric bicycles. Additionally, following the experience during covid pandemic, RE supports flexible working arrangements, with the option to work from home, which can notably reduce the need for daily commuting.

Employee Business Travel:

RE employees regularly travel to attend conferences or business meetings. In 2023 emissions from work related flights were 375 tonne CO_2-eq. This is a 90% increase from 2016. Likewise, emissions from hotel stays that accompany travel have increased by 120% since 2016, totalling 55 tonne CO_2-eq in 2023. Low emissions especially in 2020 and 2021 are explained by limited travel due to the covid pandemic.

RE Conferences:

RE accounts for all air travel and hotel stays by foreign guests for conferences hosted by RE. In 2023, for the first time, Carbfix hosted a Mineralization Summit, inviting participants from all over the world. Total emissions from participants traveling to the Mineralization Summit was 260 tonnes CO_2-eq.

The summit was held both on-site in Reykjavík and via streaming. This hybrid approach not only promoted message but also had a positive impact on the environment. RE will continue to provide the chance for remote participation in its events.

Biogenic carbon emissions

Reykjavík Energy (RE) reports its biogenic CO_2 emissions separately, adhering to the guidelines of the ISO 14064-1 standard. These emissions originate from the biofuel blend included in the fossil fuels RE purchases, as well as from methane fuel. In 2023, RE's total biogenic CO_2 emissions amounted to 45 tonnes of CO_2-equivalent.

Wastewater discharge releases biogenic CO_2 emissions, these have not been quantified and are not included in RE's total biogenic CO_2 emissions.

GHG breakdown in scope 1

The greenhouse gases (GHGs) that are released directly into the atmosphere because of Reykjavík Energy's (RE) operations are carbon dioxide (CO_2), methane (CH_4), sulfur hexafluoride (SF_6), nitrous oxide (N_2O), tetrafluoroethane (HFC-134a) and R454c, a mixture between HFC-32 and HFC-1234yf. Table 3 describes RE's GHG emissions in scope 1.

Carbon dioxide (CO_2) is released from the operation of geothermal powerplants and due to research and maintenance drilling in the high-temperature geothermal fields. Furthermore, CO_2 is in the steam utility and due to the operation of fixed and mobile back-up power stations in the supply and distribution system. CO_2 is also released due to the burning of fuel in RE's s car fleet.

Methane (CH_4) is released from the operation of geothermal powerplants and due to research and maintenance drilling in the high-temperature geothermal fields. Furthermore, CH_4 is released due to the decomposition of organic substances in wastewater discharge in lakes, landfilling of waste and the burning of fossil fuels in RE's car fleet.

Nitrous oxide (N_2O) is released due to the decomposition of organic substances as wastewater is discharged in the ocean, due to the burning of fossil fuels in RE's car fleet and as fertilizers are used in land reclamation and afforestation projects.

Hydrofluorocarbons (HFCs) such as tetrafluoroethane (HFC-134a) and R454c are used in the water utility system for cooling air and to prevent moisture forming on pipes, e.g. in airtight pumping stations.

Sulfur hexafluoride (SF_6) is used in electrical equipment in geothermal power plants, in supply and distribution systems, and it can be released when it leaks from the equipment. SF_6 can also be released during tracer flow tests (TFT) in high temperature boreholes.

Table 3: Reykjavík Energy's greenhouse gas (GHG) emissions (tonne) in Scope 1, by various source in 2023

	Scope 1, tonnes GHG						
Source:	**Geothermal power plants**	**Steam utility**	**Wastewater discharge**	**Fuel use (TTW)**	**HFCs and SF_6**	**Fertilizer**	**Total 2023**
CO_2	45,324	125	0	538	0	0	**45,987**
CH_4	123	0	0.17	0.01	0	0	**123.17**
N_2O	0	0	8.81	0.03	0	0.002	**8.84**
SF_6	0	0	0	0	0.001	0	**0.001**
HFC-134a	0	0	0	0	0	0	**0**
R454c	0	0	0	0	0	0	**0**

CO_2
45,987 tonnes

CH_4
123 tonnes

N_2O
9 tonnes

SF_6
1 kg

HFCs
0 kg

R454c
0 kg

Emissions intensity of energy

Reykjavík Energy's (RE) emissions intensity of its energy production, electricity, and heating, refers to the amount of GHG emitted per unit of energy generated. It is one of the measures that quantifies the environmental impact of producing energy. RE expresses its emissions intensity for electricity in grams of CO_2 equivalent per kilowatt-hour (gCO_2-eq/kWh) and for heating in grams of CO_2 equivalent per cubic meter (gCO_2-eq /m^3). The emission factors (hot water and electricity) for power plants are calculated as total power plant emissions, divided by total energy (heat and electricity). The hot water emission factor is further calculated by applying the fraction of hot water in relation to total hot water production. Factors representing distribution losses in Veitur's electricity distribution network and upstream (indirect) emissions from powerplants which can be reported in scope 3 are also calculated and presented.

In 2023, the emissions intensity for electricity is 7.3 gCO_2-eq/kWh which represents a 10% decrease compared to 2016. The emissions intensity for heating is 205.2 gCO_2-eq /m^3 which represents a 2% increase compared to 2016. This is due to increased hot water production from power plants in relation to total hot water production. See table 4.

Table 4: Emissions intensity for electricity in gCO_2-eq/kWh and for heating in gCO_2/m^3.

	Unit	User scope	2016	2017	2018	2019	2020	2021	2022	2023
Electricity	gCO_2-eq/ kWh	Scope 2	9.9	7.5	8.4	8.8	7.8	7.3	7.5	7.3
Hot water	gCO_2-eq/m^3	Scope 2	244.7	185.2	207.6	216.0	213.4	216.2	231.3	205.2
Electricity-distribution	gCO_2-eq/ kWh	Scope 3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Hot water-distribution	gCO_2-eq/m^3	Scope 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity-upstream	gCO_2-eq/ kWh	Scope 3	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Hot water-upstream	gCO_2-eq/m^3	Scope 3	44.6	45.5	44.3	44.2	49.1	53.6	55.5	50.3

[1]Based on an LCA of Hellisheidi powerplant

Energy production

Reykjavík Energy (RE) produces renewable energy, electricity, and heating, from sources such as geothermal energy and hydropower. RE utilises about 12% of produced electricity and a 1% of its heating for its own operations.

Table 5: RE's energy production from 2016-2023

	Unit	2016	2017	2018	2019	2020	2021	2022	2023
Electricity	GWh	3,400	3,500	3,500	3,500	3,600	3,550	3,450	3,500
Hot water*	GWh	5,000	5,000	5,700	5,400	5,300	5,400	5,400	6,400
High temperature fields	-	*2,200*	*2,100*	*2,600*	*2,300*	*2,200*	*2,700*	*2,800*	*3,100*
Low temperature fields	-	*2,800*	*2,900*	*3,100*	*3,100*	*3,100*	*2,700*	*2,600*	*3,300*

3,500
GWh
7.3
g CO_2-eq/kWh

6,400
GWh
205.2
g CO_2-eq/m^3

Greenhouse gas sequestration and offsetting

Biodiversity and land-based carbon insetting projects

Reykjavík Energy (RE) has undertaken land reclamation and afforestation on the company's own land for more than 70 years, or since 1950. These nature-based projects aim to restore soil and vegetation cover, improve soil, rejuvenate natural birch forests, and enhance biodiversity. In the past decade, an additional goal has been to sequester greenhouse gases

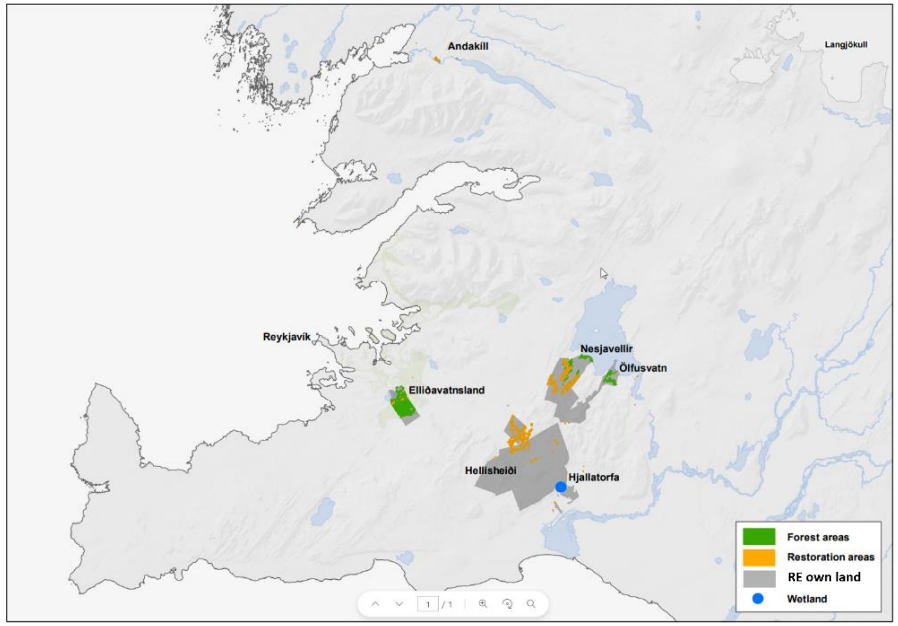


Figure 7: Overview of RE's own land in SV-Iceland and delineation of the afforestation projects, land reclamation projects and rewetting of peatland.

(GHG) in vegetation and soil, and thereby aligning RE's land management strategies with climate change insetting efforts.

The synergy between these objectives is beneficial. Land restoration in Iceland is a work of patience due to weather conditions and lack of essential nutrients in the soil, which are limiting factors for vegetation and soil biota growth.

Rewetting of peatland on RE's land took place in the fall of 2016 with the aim of reducing carbon emissions from the land and restoring wetland ecosystems.

The locations of the land-based carbon insetting projects are presented in figure 7 and figure 8.

Strengthening of biodiversity in vegetation and soil on RE's own land is and will continue to be a part of the goals of nature-based solutions at RE.

Afforestation Projects:

RE's afforestation projects are all practiced within the companies own land, that is Olfusvatn and Nesjavellir (starting in the year 1990) in Grímsnes- and Grafningshreppur municipality and at Ellidavatn in the Reykjavík City (starting in the year 1950).

In the beginning, the reclamation areas where unvegetated or sparsely vegetated areas with less than 20% vegetation cover and are mostly binding areas, carbon sinks.

Afforestation takes place on land that is fenced off so that grazing livestock are kept out of the area. These fenced areas demarcate potential planting areas and are roughly 965 ha. There are more areas on RE's land that could be fenced off and afforested in the future. Expanding afforestation sites by 4 hectares annually remains a key goal. Iceland's large areas of sparsely vegetated ecosystems have a relatively high potential to act as

4% increase in sequestration from land reclamation projects from base year, 2016.

carbon sinks. The soil sequestration is added to the aboveground sequestration.

Sequestration in 2023 amounts to 5,740 tonnes CO_2-eq and is the same compared to base year 2016. The explanation for this is that within 10-year intervals an assessment is done on the sequestration and is thus the same for one decade, see table 2.

Land Reclamation Projects:

Land reclamation projects are mostly carried out on land owned by RE at Hellisheidi, (Kolvidarhóll) and Hjallatorfa in Olfus Municipality, at Nesjavellir in Grímsnes and Grafningshreppur Municipality and in Andakíll in Borgarbyggd and Skorradalshreppur municipalities. These areas account for about 87% of all RE's land reclamation sites. Around 8% of the land reclamation areas is carried out on land owned by the state in Hellisheidi, where RE has a license for operations, as well as on private land leased from ÍR by RE or 5%. These areas are around 595 ha.

Initially, all land reclamation areas where unvegetated or sparsely vegetated, with less than 20% vegetation cover and are mostly binding areas, carbon sinks. The oldest reclamation area is in Heidmork, starting in 1950, but other areas in 1990 to 2022.

The restoration method (grass seeding, fertilization, moss spreading etc.) suitable for each area is assessed and documented in RE's GIS database in Arc map and revised every year. Expanding land reclamation sites by 4 hectares annually remains a key goal. The soil sequestration is added to the vegetation sequestration.

Sequestration in 2023 amount to 1,250 tonnes CO_2-eq and has increased by 4% compared to base year 2016, see table 2.

Rewetting of Peatland Projects:

In the fall 2016 rewetting of peatland took place on a 3.2 ha of land, Ytri Thurá, owned by RE, in Olfus Municipality, see figure 7 and figure 8. Prior to the wetland excavation the land was peat and the vegetation included peat moss.

To rise the water level in the wetland to as natural level as possible, trenches were filled. The results of the rewetting seem to be in accordance with other similar studies, both in Iceland and in other countries within the coniferous forest belt. During a visual inspection in the fall of 2023, it was evident the recovery had been successful.

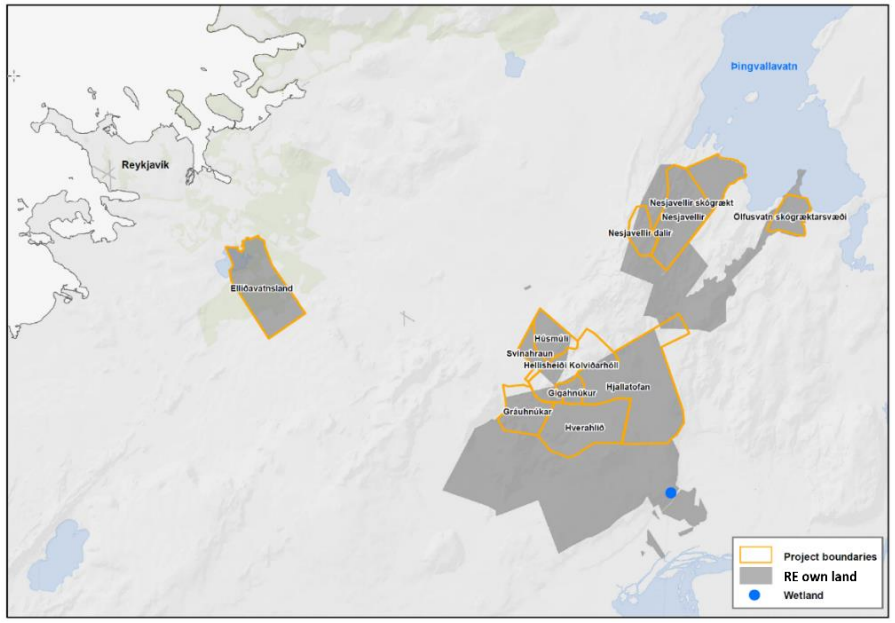


Figure 8: Project boundaries (close up) of afforestation, land reclamation and rewetting of peatland on RE's land.

Avoided emissions from the rewetted land is 40 tonnes CO_2-eq and is estimated the same since 2017, a year after the rewetting took place in the fall 2016, see table 2.

A study is scheduled to be conducted in the area during the summer of 2024 to verify the effectiveness of the initiative. Continuous monitoring and evaluation of these rewetted lands are essential for guiding future decisions strategies in peatland management.

Carbon offsetting projects

RE has actively engaged in carbon offsetting projects since 2018. These projects focus on both reducing GHG emissions and fostering sustainable development and socio-economic benefits.

RIPPLE Africa's Improved Cookstove Project in Malawi:

RE has supported this United Nations Carbon Offset Platform project since 2020. In 2023 RE offset 1,200 tonnes CO_2-eq which has increased by approximately 85% compared to 2020, see table 2. By supporting the Malawi project, it not only reduces GHG emissions but also combats deforestation and respiratory diseases, especially among women and children. RE's aim is to continue the support for this program.

Votlendissjódur:

From 2018 to 2021, RE supported this initiative, focusing on reducing GHG emissions through wetland restoration in Iceland. This collaboration with various stakeholders helped offset between 500 to 1,250 tonnes CO_2-eq of RE's carbon emissions these years, see table 2.

Figure 8. Birch planted in sparsely vegetated areas near Olfusvatn. Photo by Magnea Magnúsdóttir.

Methodology

Information used in the climate account is received directly from different business units within Reykjavik Energy (RE) as well as directly from suppliers. Each unit is responsible for their own data. All activity data is reviewed by RE's Environmental team before being applied in the climate account.

Emission factors are selected to give the best possible reflection of emissions given available activity data. See more information on procedures in selection of emission factors on page 25.

Sections below outline significance criteria, excluded emissions sources, included greenhouse gases, changes in the methodology for the climate account from previous years, emissions factors applied in the calculations as well as a separate methodology section for biodiversity and land-based carbon insetting projects.

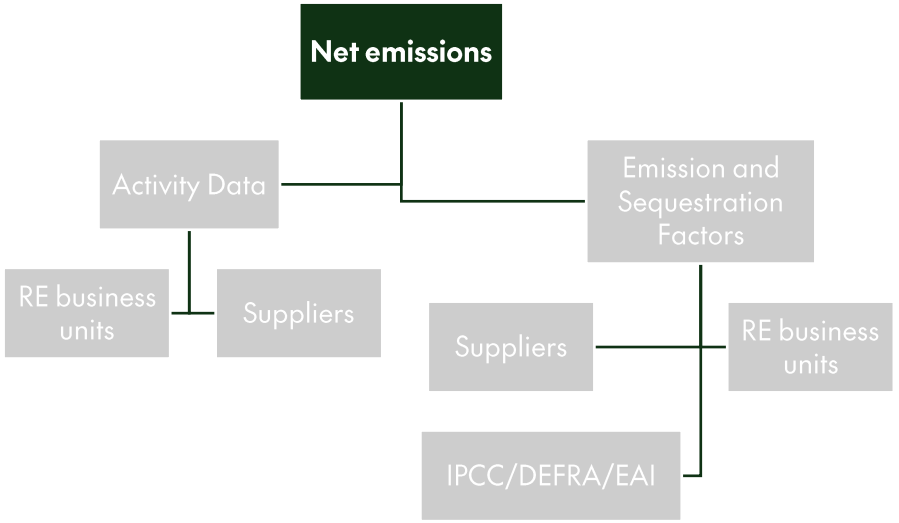


Figure 9. Basic flow of information used to estimate emissions and sequestration.

Significance criteria

All scope 1 and scope 2 emissions are considered significant. To evaluate significant emissions in scope 3 significance categories with significance criteria are used. Emissions sources only needs to fulfil one of these to be considered significant. These criteria are defined in table 6.

Table 6: Definition of significance categories and significance criteria

	Significance category	Significance criteria
1	Magnitude	**Significant if** emissions are more than 5% of RE's total emissions
2	Outsourcing	**Significant if** emissions are less than 5% of RE's total emissions but emissions are due to activities that RE outsources. This applies to borehole drilling which are a key activity in the operations of utility systems, geothermal power plants, and carbon sequestration. This also applies to trench digging which is an important part of RE's operations.
3	Employee commuting	**Significant if** emissions are less than 5% of RE's total emissions but emission is due to employee commute to and from work as well as business-related air travel.
4	RE sector-specific guidance	**Significant if** emissions are less than 5% of RE's total emissions but sector-specific guidance for RE emphasises specific emission categories, for example from the GHG Protocol or SBTi
5	Availability of data	**Significant if** emissions are less than 5% of RE's total emissions but activity data is readily available.

Exclusions

RE's climate account includes all scope 1 and 2 emissions, as well as scope 3 emissions that fall within the significance criteria. Scope 1 activities that have negligible emissions, and as a result are not included in the climate account, are listed below. Identified scope 3 activities that are excluded are also listed and explained.

Andakílsárvirkjun hydroelectric power plant (scope 1):

The 8 MWe power plant was commissioned in 1947. Since 2001, the power plant has been owned by RE. Power is generated from water in Andakílsá river, running from the power plant's Andakílsárlón intake reservoir, with the water source being from Lake Skorradalsvatn. The release of GHGs from the intake reservoir and the lake after 80 years of operation is considered insignificant and therefore excluded from RE's climate account.

Low temperature geothermal fields (scope 1):

Veitur Utilities operates low temperature geothermal fields for hot water in the Capital region. Direct emissions from these fields are negligible and therefore not included. Emissions from procurement and fuel use associated with the operation of low temperature fields are included.

Hydrogen usage (scope 1):

Emissions due to hydrogen usage of the vehicle fleet are not included as the hydrogen used is produced at RE's Hellisheidi geothermal power plant and therefore already included in scope 1. No GHGs are released from the use phase of hydrogen.

Data centres (scope 3):

Ljósleidarinn is responsible for constructing and managing the fibre-optic cables for homes and businesses, which are used by telecommunications companies. The company does not sell internet subscriptions to consumers. Therefore, emissions from data centres are excluded.

Wholesale electricity trading (scope 3):

RE buys and sells electricity from 3rd parties. Emissions from the production of this electricity can be included in scope 3, and in the GHG protocol is described as purchased electricity sold to end users. This emission category falls outside the significance criteria regarding magnitude. These emissions are excluded due to confidentiality issues.

Other emissions (scope 3):

Other scope 3 activities and emissions sources have been identified but are excluded as they fall outside of the significance criteria. This is the use of taxis, electricity uses during remote work and purchases made outside of the procurement system. Emissions from taxis as well as homeworking do not fulfil any of the significance criteria including the criteria of magnitude, sector specific guidance and availability of activity data. Emissions from purchases made outside of the procurement

system are estimated at under 5% of the total value of procurement. RE is actively working towards gaining a better understanding and overview of these emissions. No emissions occur during the use phase of products sold by RE such as electricity, heating, or other. Therefore, there is no emissions source category for use of sold products.

Wastewater discharge (Biogenic carbon emissions):

Biogenic CO_2 emissions are not included in RE's biogenic carbon emissions category. Biogenic CO_2 emissions have not been quantified in the IPCC standard used to estimate wastewater GHG emissions.

Included greenhouse gases

Table 7 displays the greenhouse gases (GHG) released directly in RE's operations, with the main ones being carbon dioxide (CO_2), methane (CH_4), sulfur hexafluoride (SF_6), hydrofluorocarbon (HFC-134a), and nitrous oxide (N_2O). There are other GHGs that may be released indirectly in RE's value chain.

In RE's climate account AR5 and GWP 100 is used for converting GHG's into CO_2-eq, following guidelines from the UNFCCC[2]. This is also consistent with the Environmental Agency of Iceland (EAI)[3] as well as the UK Department for Energy Security and Net Zero (DEFRA)[4] that use AR5 for their emissions factors.

Table 7: GHGs released in RE's operations.

Greenhouse gas	GWP (100) AR5	Explanation
Carbon dioxide (CO_2)	1	CO_2 is released from the operations of RE's geothermal powerplants as well as due to research and maintenance drilling in the power plant fields. Furthermore, CO_2 is released in the operations of RE's low-temperature fields and due to the operation of fixed and mobile power stations in RE's utility systems. CO_2 is released from the combustion of fuels in the RE's car fleet and rental cars as well as other places in the supply chain.
Methane (CH_4)	28	CH_4 is released from the operations of geothermal powerplants and due to research and maintenance drilling in the powerplant fields. Furthermore, CH_4 is released due to the decomposition of sewage sludge in lakes, landfilling of waist and fuel combustion.
Nitrous oxide (N_2O)	265	N_2O is released due to the use of fertilizers, decomposition of wastewater discharge and fuel combustion.
Hydrofluorocarbons (HFCs) HFC-134a	1.300	HFCs can be released in RE's freshwater utility where it is used in air conditioning equipment in pumping stations. This gas is being phased out by R454c.
R454c	148	R454c can be released in RE's freshwater utility where it is used in air conditioning equipment in pumping stations.
Sulfur hexafluoride (SF_6)	23.500	SF_6 is used in transformers at the geothermal powerplants, it can also be released during tracer flow tests (TFT) and in RE's electricity utility where it is used as an insulator for transformers.

[2] Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention: https://unfccc.int/sites/default/files/resource/cp2022_10a01_adv.pdf#page=23

[3] EAI, 6. útgáfa 2024: https://www.ust.is/loft/losun-grodurhusalofttegunda/losunarstudlar/

[4] DEFRA, Conversion factors 2023: full set: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023

Changes in methodology and corrections

Considerable changes have been made to RE's climate account from previous publications. The scope as well as the methodology has been expanded and evaluated to better reflect the impact of RE's operations. Emissions categories have been added, and some existing categories have been corrected from previous publications. GWP100 have been updated from AR4 to AR5. Key changes made in each of the scopes are listed below.

Scope 1:

In scope 1 the added emissions sources are wastewater discharge, steam utility and the fertilizer used in afforestation and land reclamation projects, where the origin of the data used is the same for all years, 2016-2023. Emissions from geothermal power plants were corrected to reflect an updated methodology which had not been implemented for years 2016 to 2020. Emissions from the geothermal powerplants were adjusted to be rounded to the nearest ten where previous publications have rounded to the nearest hundred. The emissions category, wastewater discharge, estimates total kg N and BOD from wastewater samples and flow. Frequency of sampling has increased since 2016, and therefore years and treatment plants with less than 10 samples (2016-2020) use an average of the samples and flow, whereas years and wastewater treatment plants with more frequent sampling (2021-2023) use a weighted average approach to estimate total kg of N and BOD.

Scope 2:

In scope 2 the market-based approach was added. Scope 2 also corrected previous years location-based approach where emissions purchased from 3rd parties, including transmission losses purchased by RE. had not been accounted for in scope 2.

Scope 3:

In scope 3 all emission categories are new except for waste, employee commute, business air travel, and trench digging by contractors. Previously published emissions from businesses air travel were corrected to include the effect of emissions at higher altitudes, applying a radiative forcing factor of 3. For contractor emissions the methodology was changed, and emissions were estimated based on data directly from contractors. Categories for waste were updated, but source data for previous years kept the same. Data sources for fuel use and waste were updated in 2023, and the survey sent out to estimate employee commuting has changed since 2016, all other emission categories have the same source of data for each year, 2016-2023.

Emissions factors

Emissions factors (EMF) are selected to give the best and most accurate reflection of the greenhouse gas (GHG) emissions from Reykjavík Energy (RE). Emission factors or similar information, such as Life cycle assessments (LCAs), that is measured within RE's operations or is received directly from suppliers, have priority. This applies to direct emissions from RE's geothermal power plants, which are measured and published by RE staff. It also applies to, for example, specific 3rd party verified EMFs provided by suppliers. EMFs and LCAs provided by suppliers are critically reviewed internally before being applied to RE's climate account. This is done to assess the quality of the LCA, looking at the scope, the database used and other background data.

When specific EMFs from suppliers are not available, then EMFs applicable specifically to Iceland, or EMFs provided by the Environmental Agency of Iceland (EAI)[5] are used. EMFs from the EAI apply for example to employee commute to and from work. Emission factors designed specifically for Iceland are not always available, specific enough or sufficiently disaggregated by GHG. In such cases emission factors from the UK Department for Environment, Food and Rural Affairs (DEFRA) are used. Emission factors from DEFRA are chosen due to their availability, allowing emission factors from many emission source streams to be derived using the same methodology. DEFRA's EMFs are also commonly used in GHG reporting in Iceland. DEFRA factors are used in RE's climate account for example for waste streams, where the Icelandic emission factors are limited in the number of waste categories. They are also applied to fuel use where the Icelandic emission factors from the EAI are not disaggregated by GHG, nor do they contain WTT emissions or biofuel blend. Should it not be possible to use any of the above EMFs from DEFRA or the EAI, then RE uses information from lifecycle assessments (LCA) for example from the Ecoinvent database[6]. Emission factors for scope 1 are given in table 8, scope 2 in table 9 and scope 3 in table 10 below.

Table 8: Scope 1 emission factors.

Emission source	Activity data unit	Emission factor (EMF)[1] – kg GHG								
		CO_2	CH_4	N_2O	HFC	R454c	SF_6	CO_2-eq	Uncertainty	Data source
Geothermal power plants		X	X					N/A	12.5%	Direct measurement at emission source
Steam utility in Hveragerdi town		X	X					N/A	100%	Direct measurement at emission source
Wastewater discharge – BOD[2]	kg BOD		0.114					3.2	233%	EMF: IPCC table 6.8
Wastewater discharge – N[3]	Kg N			0.008				2.08	2,495%	EMF: IPCC table 6.8A
Fuel use TTW[4] Petrol	Litres	2.08	0.00029	0.00002				2.1	10%	EMF: DEFRA
Fuel use TTW[4] Disel	Litres	2.48	0.00001	0.00012				2.51	10%	EMF: DEFRA
Fuel use TTW[4] Methane (CH_4 and N_2O)	Nm^3							0.002	10%	EMF: EAI
SF_6	Kg SF_6						1	23,500	10%	EMF: IPCC page. 16
HCF-134a	Kg HCF-134a				1			1,300	10%	EMF: IPCC page. 17
R454c	Kg R454c					1		148	10%	EMF: Gas supplier
Fertilizer for land reclamation and afforestation	Kg N			0.016				4.16	10%	EMF: EAI

[1] The EMF can be variable between years. Table shows EMF for 2023, EMF for previous years may differ. The most recent EMF, from the "Data source" column is used.

[2] Only applies to Hvanneyri and Reykhotl where wastewater is discharged to lakes. For wastewater discharged to marine environments CH_4 does not form due to high oxygen saturation, high ocean currents, and little to no sediment formation from discharge: G. A. Auðunsson.

[3] Uncertainty of N_2O emissions from wastewater discharge is based on a range IPCC presents. This is in line with the 2023 Icelandic National Inventory report (page 293)

[4] Tank to wheel (TTW)

[5] EAI, 6. útgáfa 2024: https://www.ust.is/loft/losun-grodurhusalofttegunda/losunarstudlar/

[6] Ecoinvent: https://ecoinvent.org/

Table 9: Scope 2 emission factors.

Emission source	Activity data unit	Emission factor (EMF)[1] – kg GHG								
		CO_2	CH_4	N_2O	HFC	R454c	SF_6	CO_2-eq	Uncertainty	Data source
Electricity – Location based RE[2]	kWh							0.0073	1%	EMF_{ON}: RE
Electricity – Location based Iceland[3]	kWh							0.00854	1%	$EMF_{Iceland}$: EAI
Heating – Location based[4]	m^3							205.2	1%	EMF: RE
Electricity – Market based[5]	kWh							510.71	1%	EMF: Orkustofnun
Heating – Market based[6]	m^3							205.2	1%	EMF: RE

[1]The EMF can be variable between years. Table shows EMF for 2023, EMF for previous years may differ. The most recent EMF, from the "Data source" column is used.
[2]The EMF from RE is subtracted from the grid factor for electricity within the RE operational boundary (electricity from grid purchased from ON Power) to avoid double counting with scope 1. In years where the grid factor is lower than the RE EMF, scope 2 emissions are 0.
[3]The EMF form the EAI is applied to electricity purchased from 3rd parties.
[4]Emissions already included in scope 1.
[5]Orkustofnun, the Icelandic National Energy Authority, publishes data with one year lag, EMF for reporting year 2023 is physically relevant to 2022 and so on. The RE EMF is subtracted from the Orkustofnun EMF for electricity within the RE operational boundary (electricity from grid purchased from ON Power) to avoid double counting with scope 1.
[6]Same as for location based as no guarantees of origin are sold for the heating market in Iceland.

Table 10: Scope 3 emission factors.

Emission source	Activity data unit	Emission factor (EMF)[1] – kg GHG								
		CO_2	CH_4	N_2O	HFC	R454c	SF_6	CO_2-eq	Uncertainty	Data source
Purchased capital goods[2]	Piece/m/kg							Variable	60%	EMF: DEFRA supplier LCA
Purchased goods[2]	Piece/m/kg							Variable	60%	EMF: DEFRA supplier LCA
Trench digging by contractors	m							0.00054	50%	EMF: Suppliers
Drilling by contractors – diesel	Litres	2,48	0,00001	0,00012				2.51	20%	EMF: DEFRA
Transportation of goods[3]	ISK							Variable	70%	EMF: DEFRA
Upstream emissions of purchased electricity[4]	kWh							0.00065	1%	EMF: Supplier LCA
Transmission losses[5]	kWh							0.00854	1%	EMF: EAI
Fuel use WTT[6] Petrol	Litres							0.58	10%	EMF: DEFRA
Fuel use WTT[6] Disel	Litres							0.61	10%	EMF: DEFRA
Fuel use WTT[6] Methane (CH_4 and N_2O)	Nm^3							0	0%	EMF: DEFRA
Transmission grid, SF_6	kg						1	23,500	5%	EMF: IPCC page. 16
Sewage waste - Screening waste (Combustion)	Tonne							684	35%	EMF: EAI
Sewage waste - Fat and grease (Combustion)	Tonne							684	35%	EMF: EAI

Table 10: Scope 3 emission factors. Continued

Emission source	Activity data unit	Emission factor (EMF)[1] – kg GHG CO_2	CH_4	N_2O	HFC	R454c	SF_6	CO_2-eq	Uncertainty	Data source
Sewage waste - Sludge from biological treatment (Landfill)	Tonne							700.21	35%	EMF: DEFRA
Sewage waste – Sand (Landfill)	Tonne							0	35%	EMF: DEFRA
Waste – General (Combustion)	Tonne							21.3	35%	EMF: DEFRA
Waste – Bulk (Landfill)	Tonne							1.2	35%	EMF: DEFRA
Waste – Asbestos (Landfill)	Tonne							5.9	35%	EMF: DEFRA
Waste – Metal (Closed loop)	Tonne							0.99	35%	EMF: DEFRA
Waste – Timper, unpainted (Composting)	Tonne							8.9	35%	EMF: DEFRA
Waste – Timber, painted (Landfill)	Tonne							925.3	35%	EMF: DEFRA
Waste – Garden waste (Landfill)	Tonne							646.6	35%	EMF: DEFRA
Waste – Glass and minerals (Landfill)	Tonne							8.89	35%	EMF: DEFRA
Waste – Tyres (Closed loop)	Tonne							21.3	35%	EMF: DEFRA
Waste – Plastic (Combustion)	Tonne							21.3	35%	EMF: DEFRA
Waste – Corrugated cardboard (Closed loop)	Tonne							21.3	35%	EMF: DEFRA
Waste – Mixed cardboard (Closed loop)	Tonne							21.3	35%	EMF: DEFRA
Waste – Office paper (Closed loop)	Tonne							21.3	35%	EMF: DEFRA
Waste – Newspapers and magazines (Closed loop)	Tonne							21.3	35%	EMF: DEFRA
Waste – Organic (Composting)	Tonne							8.9	35%	EMF: DEFRA
Hazardous Waste – Unknown material (Landfill)	Tonne							497	35%	EMF: DEFRA
Hazardous Waste – Light bulbs (Landfill)	Tonne							8.89	35%	EMF: DEFRA
Hazardous Waste – Batteries (Open loop)	Tonne							21.3	35%	EMF: DEFRA
Hazardous Waste – Accumulators (Open loop)	Tonne							21.3	35%	EMF: DEFRA
Hazardous Waste – Electrical items (Open loop)	Tonne							21.3	35%	EMF: DEFRA
Hazardous Waste – Paint and printing waste (Landfill)	Tonne							520	35%	EMF: DEFRA
Hazardous Waste – Oil and oil contaminated waste (Landfill)	Tonne							520	35%	EMF: DEFRA
Hazardous Waste – Plaster (Landfill)	Tonne							71.95	35%	EMF: DEFRA
Hazardous Waste – Solvents	Tonne							0	35%	EMF: EAI
Hazardous Waste – Organic hazardous material and cooking oil	Tonne							0	35%	EMF: EAI

Table 10: Scope 3 emission factors. Continued

Emission source	Activity data unit	Emission factor (EMF)[1] – kg GHG CO_2	CH_4	N_2O	HFC	R454c	SF_6	CO_2-eq	Uncertainty	Data source
Hazardous Waste – Inorganic hazardous material	Tonne							0	35%	EMF: EAI
Employee commute – Petrol/diesel[7]	km travelled							0.2	5%	EMF: EAI
Employee commute – EV[8]	km travelled							0	5%	EMF: EAI
Employee commute – Plug in hybrid[8]	km travelled							0	5%	EMF: EAI
Employee commute – Full hybrid[8]	km travelled							0.137	5%	EMF: EAI
Employee commute – Methane	km travelled							0.0026	5%	EMF: EAI
Employee commute – Motorcycle	km travelled							0.067	5%	EMF: EAI
Employee commute – Carpool[9]	km travelled							0.1	5%	EMF: EAI
Employee commute – Walking/bike/scooter	km travelled							0	5%	EMF: EAI
Employee commute – Bus/Strætó[10]	km travelled							0.051	5%	EMF: EAI
Business travel – Air travel[11]	Passengers per trip							Variable	45%	EMF: ICAO
Business travel – Hotel stays[12]	Nights							38.8	5%	EMF: DEFRA
Downstream event related travel[11]	Passengers per trip							Variable	45%	EMF: ICAO

[1]The EMF can be variable between years. Table shows EMF for 2023, EMF for previous years may differ. The most recent EMF, from the "Data source" column is used.

[2]Includes purchased made in the procurement system, including transportation paid for indirectly as well as any major purchased made outside the procurement system. All emissions paid for in the reporting year are included as emissions in the same year.

[3]Only freight services directly paid for by RE, indirect freight services included in purchased goods and capital goods. Average EMF of land, sea and air transportation used.

[4]Only purchased and used electricity from suppliers other than ON Power, upstream emissions from heating and electricity from ON power is already included in scope 1.

[5] Same approach as scope 2: The EMF from RE is subtracted from the grid factor for electricity within the RE operational boundary (electricity from grid purchased from ON Power) to avoid double counting with scope 1. The EMF form the EAI is applied to electricity purchased from 3rd parties. In years where the grid factor is lower than the RE EMF, and no electricity is purchased from 3rd parties, scope 2 emissions are 0. National grid operator Landsnet publishes losses around 2%, annually see "Töp sem hlutfall af notkun" which translates to "Losses in relation to use": landsnet.is/fjarmal/lykiltolur/

[6]Well to Tank (WTT)

[7]EMF is adjusted from EAI. Diesel and petrol average

[8]In-house charging assumed to cover transportation to and from work

[9]EMF is adjusted from EAI. Average of 2 people assumed in diesel/petrol car.

[10]EMF is adjusted from EAI. Diesel bus with average of 15 passengers assumed.

[11]EMF is not used as different emissions are different between destinations. Radiative Forcing Factor of 3 is applied to EMFs from the ICAO. See Radiative Forcing Associated with Emissions from Air Travel and Lee, et.al, 2021

[12]Average of all DEFRA hotel stay EMFs

Methodology for Biodiversity and Land Based Carbon Insetting Projects

This section discusses the methodology for estimating emissions and sequestration related to land reclamation and afforestation, as well as rewetting of peatlands.

Significance criteria:

All scope 1 emissions in the carbon insetting projects, such as those due to fuel use and fertilizer use, are counted for and reported in RE's climate account. Emissions due to fuel use (TTW) and fertilizer use are specified in RE's climate account under scope 1, for both afforestation and land reclamation, but there is no fertilizer use in rewetting of peatland. No electricity or heating (scope 2) is purchased for these projects. Indirect emissions in scope 3 must meet significance criteria to be included in the climate account, sources like fuel use (WTT) and commuting of employees to the carbon insetting sites. Actions such as fence maintenance, use of tools, safety clothing and production of grass seeds are not significant and therefore excluded. The significance criteria are defined in table 6.

Included greenhouse gases for Biodiversity and Land Based Carbon Insetting Projects:

Table 11 shows the greenhouse gas (GHG) released directly in RE's carbon insetting projects, i.e. carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

Table 11: GHGs released in RE's carbon insetting projects .

Greenhouse gas	GWP (100) AR5	Explanation
Carbon dioxide (CO_2)	1	CO_2 is released form fuel use (TTW) and (WTT).
Methane (CH_4)	28	CH_4 is released from decay of biological material.
Nitrous oxide (N_2O)	265	N_2O is released due to fertilizer use.

Exclusions for Biodiversity and Land Based Carbon Insetting Projects:

RE's climate account includes all scope 1 and 2 emissions, as well as scope 3 emissions that fall within the significance criteria. Scope 1 activities that have negligible emissions, and as a result are not included in the climate account are listed below. Identified scope 3 activities that are excluded are also listed and explained.

Land use activities (scope 1). Where land that is distributed in RE's operations is restored and reclaimed. Nature-based restoration activities of disrupted land are considered to compensate for the emissions caused by the disruption, making the emissions arising from the disruption as negligible. The sequestration from the land reclamation of disrupted areas is therefore not included in the carbon sequestration calculations.

Categories that do not meet significance criteria (scope 3), are fuel use of contractors, fencing and fencing maintenance, purchases such as tools, safety clothing and production of grass seeds.

Sparsely vegetated or bare land. Carbon sequestration or emission from land owned by RE where there has been no land use, land reclamation, or afforestation are not accounted for, as emissions from sparsely vegetated or bare land are considered negligible according to the National Inventory Report 2023, section 6.10.1, (CRF 4F1).

Changes in methodology and corrections of Biodiversity and Land Based Carbon Insetting Projects:

Considerable changes have been made to RE's climate account from previous publications. The scope as well as the methodology of the climate account of carbon insetting projects has been reviewed, described, and evaluated to better reflect the impact of RE's sequestration projects. Ownership of land and sites have been better described to increase transparency, background emissions due to organic breakdown have been included, as well as impact of trees from nurseries and production of grass seeds. Furthermore, uncertainties have been assessed as well as risk assessment accomplished.

Sequestration and emission factors:

Reykjavík Energy (RE) is involved in various projects that contribute to the land-based carbon sequestration and emissions of carbon dioxide in vegetation and soil, through afforestation, land reclamation, and peatland restoration activities. Sequestration factors and emission factors (EMF) are selected to give the best and most accurate reflection of RE's GHG sequestration and emissions. Sequestration factors and EMF are selected to give the best and most accurate reflection of RE's GHG sequestration and emissions, see table 12 below. Please note that EMFs due to fuel and fertilizer use in nature-based carbon insetting projects is discussed in the section on Emission Factors above, page 25-29.

Sequestration factors or similar information that is received directly from RE have priority. This applies to sequestration in afforestation which are RE-specific, that is which are measured on RE's land and published by the Agricultural University of Iceland[7,8,9]. When specific RE sequestration factors are not available, then sequestration factors are used which are applicable to Icelandic conditions and published by the Environment Agency of Iceland[10] and a new agency, Land og skógur, e.g. merging of the Soil Conservation Service of Iceland[11], and the Icelandic Forest Service[12]. This applies for example to land reclamation sites and rewetted peatland.

If no Iceland-specific sequestration factors are available, general IPCC factors, which are also used in Iceland's National Inventory Report, are used.

[7] Carbon sequestration and growth of different forest types in three forests in South-West Iceland. Heidmörk, Nesjavellir and Ölfusvatn https://skemman.is/handle/1946/45738
[8] Measurement of carbon sequestration of different forest types (Sigurddson et al, 2008) https://timarit.is/page/7489640?iabr=on#page/n301/mode/2up
[9] Joel Owona (soil carbon slope [a], table 20) https://skemman.is/bitstream/1946/34470/1/Joel%27s%20thesis_%20AUI_final.pdf
[10] National Inventory Report 2023 (pg. 234. Table 6.22): https://ust.is/library/Skrar/loft/NIR/ISL_NIR%202023_15%20april_on_web.pdf
[11] Landgræðsla https://land.is/
[12] Skógraektin https://www.skogur.is/is

Table 12: Scope 3 sequestration factors and uncertainty. An overview of the sites and projects where afforestation, land reclamation and rewetting of peatland have taken place 2016-2023

Sequestration source (site)	Project	Sequestration factor unit (tonn CO_2-eq/ha)	Uncertainty (95% confidence interval)	Sequestration factor source
Afforestation - sequestration above ground				
Heidmörk	Young forest <10 years	0.67	23%	Icelandic[1]
Heidmörk	Conifer forest <5m	7.8	23%	RE[2]
Heidmörk	Conifer forest >5m	15.2	23%	RE[2]
Heidmörk	Mixed forest	3.2	23%	RE[2]
Heidmörk	Natural birch forest	1.2	23%	RE[2]
Ölfusvatn	Conifer forest	8.0	50%	RE[3]
Ölfusvatn	Planted birch forest	0.4	50%	RE[3]
Nesjavellir	Planted birch forest	0.6	50%	RE[4]
Nesjavellir	Natural birch forest	0.7	50%	RE[4]
Land reclamation - revegetation				
Hellisheidi Kolviðarhóll	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Hellisheidi Húsmúli	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Hellisheidi Svínahraun	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Hellisheidi Gráuhnjúkar	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Hellisheidi Hverahlíd	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Hellisheidi Hjallatorfa	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Nesjavellir dalir	Grassland/Mossy Heathland/Heathland)	2.1	20%	Icelandic[5]
Nesjavellir	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Andakíll	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]
Heidmörk	Grassland/Mossy Heathland/Heathland	2.1	20%	Icelandic[5]

Table 12: Scope 3 sequestration factors and uncertainty. An overview of the sites and projects where afforestation, land reclamation and rewetting of peatland have taken place 2016-2023. Continued.

Sequestration source (site)	Project	Sequestration factor unit (tonn CO_2-eq/ha)	Uncertainty (95% confidence interval)	Sequestration factor source
Soil sequestration in afforestation sites				
Heidmörk	Afforestation	1.50	85%	RE[2]
Ölfusvatn	Afforestation	1.50	85%	RE[2]
Nesjavellir	Afforestation	1.50	85%	RE[6]
Rewetted peatland				
Hjallatorfa	Peatland	13.5	83%	Icelandic[7]
Emissions deducted from sequestration				
All	All land reclamation projects	0		Icelandic[8]
All	Coniferous and mixed forests	0.3		Icelandic[5]
Young forest	All afforestation projects	0.2478		LCA[9]

[1] Measurement of carbon sequestration of different forest types (Sigurddson et al, 2008)
[2] Carbon sequestration and growth of different forest types in three forests in South-West Iceland. Heiðmörk, Nesjavellir and Ölfusvatn (Viðarsson, G.J, 2023) (Table 11 pg. 46)
[3] Carbon sequestration and growth of different forest types in three forests in South-West Iceland. Heiðmörk, Nesjavellir and Ölfusvatn (Viðarsson, G.J, 2023) (Table 12 pg. 47)
[4] Carbon sequestration and growth of different forest types in three forests in South-West Iceland. Heiðmörk, Nesjavellir and Ölfusvatn (Viðarsson, G.J, 2023) (Table 13 pg. 48)
[5] National Inventory Report 2023 (pg. 234, Table 6.22, factors for mineral soil and biomass gains under revegetation since 1990 – Limited controlled grazing allowed, converted to CO_2)
[6] Changes in carbon-stock and soil properties following afforestation in SW Iceland Owona, J., 2019 (soil carbon slope [a], table 20)
[7] Losun gróðurhúsalofttegunda úr votlendi. Yfirlit umræðu og rannsókna VSÓ, 2020.
[8] National Inventory Report 2023 (pg. 200, Table 6.5, see Grazing areas, carbon stock changes not applicable)
[9] Estimated from: Life cycle assessment of a field-grown red maple tree

INDEPENDENT LIMITED ASSURANCE STATEMENT

To the intended user of Reykjavik Energy

Introduction and objectives of work

Bureau Veritas Denmark has been engaged by Reykjavik Energy to provide limited assurance of the following report within the organisational and reporting boundaries of the company as described below:

The assertion or report of the company covered by the statement:

The report to be verified is *2023 climate account Reykjavik Energy_updated March 4th 2024* for the year 2023 using the base year 2016.

The organisational boundary of the company covered by the statement:

The organisational boundary of the climate account is defined by the operational control approach. Reykjavík Energy (RE) has operational control over its subsidiaries, namely ON Power, Veitur Utilities, Reykjavík Fibre Network, and Carbfix. All the addresses within Reykjavik Energy and its subsidiaries are included. The headquarter is situated at Bæjarháls 1, 110 Reykjavík, Iceland

Associated companies in which RE holds a minority stake are not considered within the operational control approach. These are Orkuskólinn REYST, Netorka hf., Íslensk Nýorka, and Aflvaki. Associated companies are those where RE has limited influence over the financial and operational policy but does not have operational control. The company name Reykjavík Energy (RE) is used when referring to all the companies within the organisation and organisational boundary.

The reporting boundaries of the company covered by the statement:

Emissions sources are defined according to the GHG Protocol, with scope 1 (direct emissions), scope 2 (indirect emissions from energy use), and scope 3 (other indirect emissions) along with a scope for carbon insetting and a specific scope for carbon dioxide equivalents (CO_{2e}) emissions of biological origin. All emissions sources from scope 1 and 2 are included, while emissions sources in scope 3 are selected based on the significance criteria:

- Significant if emissions are more than 5% of RE's total emissions.
- Significant if emissions are less than 5% of RE's total emissions but emissions are due to activities that RE outsources, ex. borehole drilling and trench digging.
- Significant if emissions are less than 5% of RE's total emissions but emission is due to employee commute to and from work as well as business-related air travel.

Issuing Office:
Bureau Veritas Certification Denmark A/S, Oldenborggade 25-31, 7000 Fredericia

- Significant if emissions are less than 5% of RE's total emissions but sector-specific guidance for RE emphasizes specific emission categories, for example from the GHG Protocol or SBTi.
- Significant if emissions are less than 5% of RE's total emissions but activity data is readily available.

All excluded sources falling outside those criteria are well explained.

Reporting criteria document or standard used for the verification:

The reporting criteria is all the requirements of DS/EN ISO 14064-1:2019.

Assessment Standard for Bureau Veritas Certification

Bureau Veritas Certification DK holds a DANAK accreditation to verify a company assertion / report of the International Standard DS/EN ISO 14064-1:2019 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals in accordance with the requirements to the verification body laid down in the international ISO 14064-3:2019 Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions.

The conclusion of the statement

Limited assurance:

On the basis of our methodology and the activities described above, nothing has come to our attention to indicate that *"2023 climate account Reykjavik Energy_updated March 4th 2024" for the year 2023 using the base year 2016* has not been prepared, in all material respects, in accordance with the criteria document DS/EN ISO 14064-1:2019 and with a materiality of 5 %.
The following emissions have been verified:

Total emission from sources: 72.285 tonnes CO2e
Scope 1 emissions verified: 51.820 tonnes CO2e
Scope 2 location-based emissions verified: 525 tonnes CO2e
Scope 3 emissions verified: 19.940 tonnes CO2e
Biogenic emissions verified: 45 tonnes CO2e

Total GHG sequestration and offsetting: -8230 tonnes CO2e
Total biodiversity and land insetting projects: emissions verified: -7040 tonnes CO2e
Offsetting project in Malawi: - 1200 tonnes CO2e

Net emissions: 64.055 tonnes CO2e

Limitations and exclusions of the statement

Not covered by the statement is any information relating to:

- Activities outside the defined verification period 2023 and the baseline 2016; and
- Other information included in the Report which are not covered in the criteria document.

This limited assurance engagement relies on a risk based selected sample of data and the associated limitations that this entails.

Limited: This independent statement should not be relied upon to detect all errors, omissions or misstatements that may exist.

Bureau Veritas Certification Denmark A/S
Fredericia
March 5th 2024

Morten Bertelsen

This statement con only by used in its entire length including annexes.

Annex 1: Summary of work performed.

As part of its independent verification, Bureau Veritas undertook the following activities:

1. Assessed the appropriateness of the Reporting Criteria for the Selected Information;
2. Conducted interviews with relevant personnel of Reykjavik Energy;
3. Carried out detailed on-site review of data from Reykjavik Energy sites;
4. Reviewed the data collection and consolidation processes used to compile the Selected Information, including assessing assumptions made, the data scope and reporting boundaries;
5. Reviewed documentary evidence produced by Reykjavik Energy;
6. Agreed a sample of the Selected Information to the corresponding source documentation; and
7. Re-performed aggregation calculations of the Selected Information.
8. Obtain limited assurance about whether the Selected Information has been prepared in accordance with the Reporting Criteria;
9. Form an independent conclusion based on the assurance procedures performed and evidence obtained; and
10. Report our conclusions to the management of Reykjavik Energy.

Annex 2: Statement of Independence, Integrity and Competence

This preparation and presentation of the Selected Information in the Report are the sole responsibility of the management of Reykjavik Energy.

Bureau Veritas was not involved in the drafting of the Report or of the Reporting Criteria.

Bureau Veritas Denmark has been accredited by the Danish Accreditation Body (DANAK) for a wide range of ISO Management Standards since their issues with all the requirements needed for an independent third-party certification body.

Regarding GHG schemes and standards, Bureau Veritas is accredited by the Danish Accreditation Body (DANAK) for performing GHG Verification and Validation in accordance with:

DS/EN ISO 14064-1:2019 Specification with guidance at the organisation level for quantification and reporting af GHG emissions and removals or

DS/EN ISO 14064-2:2019 Specification with guidance at the project level for quantification, monitoring and reporting of GHG emission reductions or removal enhancements

following the requirements in

ISO 14064-3:2019 Specification with guidance for the verification and validation of GHG statements and ISO 14065:2013.

The verification team for this work does not have any involvement in any other Bureau Veritas projects with Reykjavik Energy.