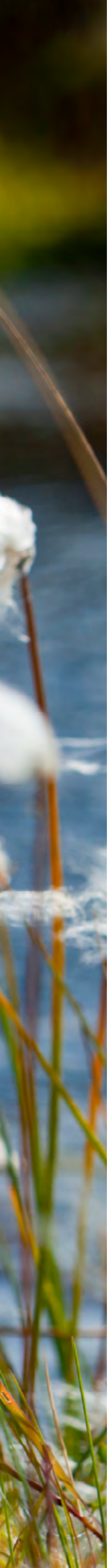
Landsvirkjun

GREEN ACCOUNTS 2015

Contents



Green Accounts 2015

Landsvirkjun has a certified environmental management system, in accordance with the international environmental standard ISO 14001. The Company has established an environmental policy and works systematically to reduce the impact of its operations.

Significant environmental aspects related to the Company's operations are managed and monitored. These include the utilisation of natural resources, emissions into air and water, waste generation and waste management, as well as other factors. The Company's Green Accounts provide numerical data on the environmental impact of Landsvirkjun's operations.

The data is compiled from Landsvirkjun's accounting records, DynamicsAX, DMM, the Company's human resource management system, the geothermal database ViewData managed by Kemía sf., Landsnet's database on electricity generation and records on land use, land-use change and forestry (LULUCF) from the Agricultural University of Iceland. The data represents either actual figures or figures calculated from measured values and these have been reviewed by EFLA Consulting Engineers. The information in this report is given to the best of knowledge and is considered accurate.

Audit statement

EFLA Consulting Engineers have reviewed Landsvirkjun's Environmental Report for the year 2015, and hereby confirm that the report contains information on significant environmental aspects in Landsvirkjun's operations. The information is consistent with the Company's monitoring of key aspects that can have a significant environmental impact. This report also contains monitoring results as required by the Company's operation permits.

Helga Jóhanna Bjarnadóttir

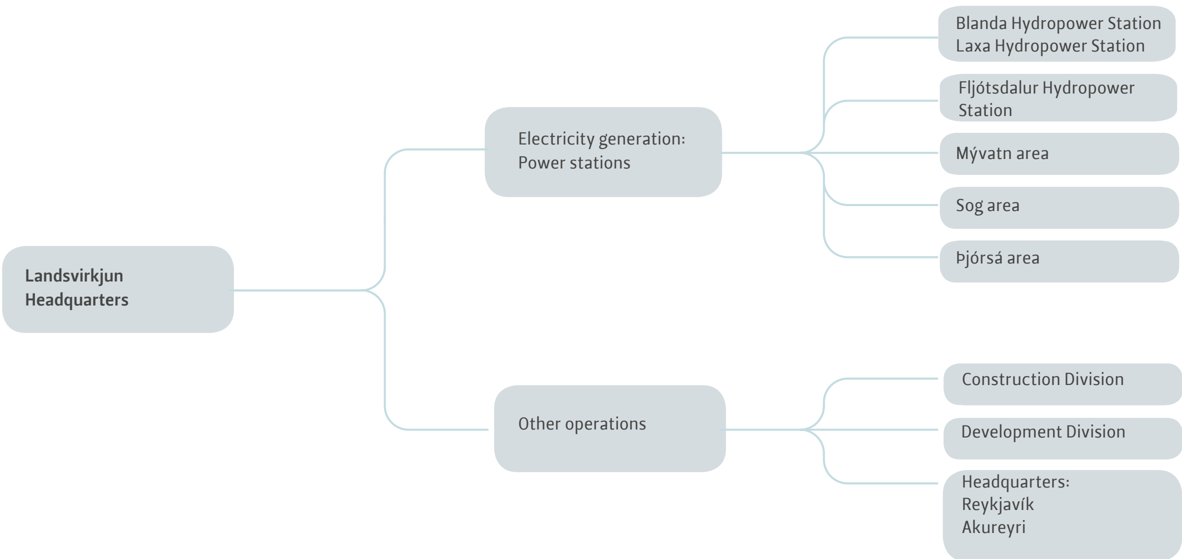
Director – Environment, EFLA Consulting Engineers

Landsvirkjun's operations

Landsvirkjun's operations in 2015 are divided into five main divisions: The Energy Division, the Research and Development Division, the Project Planning and Construction Division, the Finance Division and the Marketing and Business Development Division, as well as the services divisions and the Corporate Office.

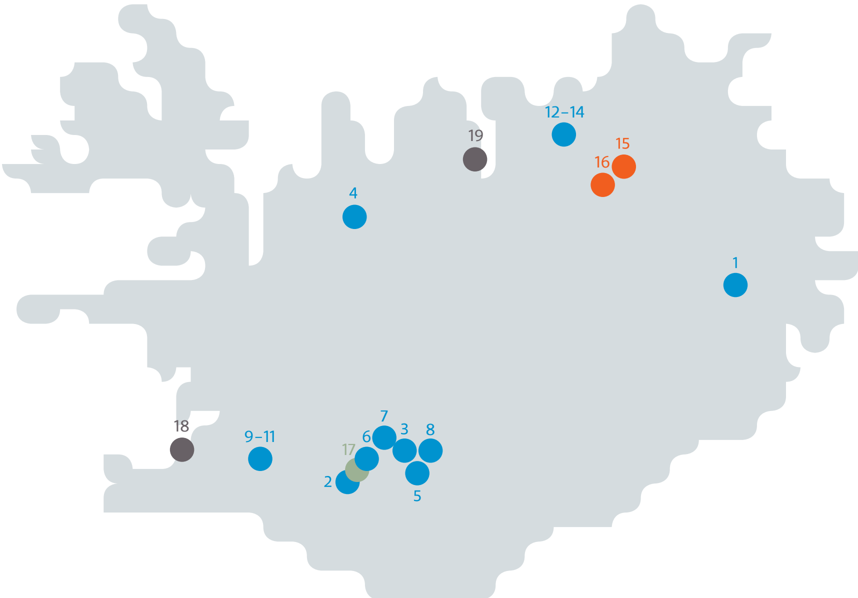
The Company's operations within the environmental management system are divided into two main parts: Electricity generation in five operational areas at the Company's power stations; Blanda Station and Laxá Stations Fljótsdalur Station, the Mývatn area, the Sog area and the Þjórsá area and Landsvirkjun's other operations including the Energy Division, the Research and Development Division, the Project Planning and Construction Division and the Company's offices in Reykjavík and Akureyri.

Figure 1 – Operations according to the Company's Environmental Management.



In 2015, Landsvirkjun operated 14 hydropower stations, 2 geothermal power stations and two wind turbines, in five areas of operation, all over Iceland. However, the Laxá 1 Hydropower Station has not generated any electricity for the last three years. The location and capacity of each power station can be seen in Figure 2.

Figure 2 — Location of operations and capacity of certain power stations.



	Hydropower stations	MW
1	Fljótsdalur	690
2	Búrfell	270
3	Hrauneyjar	210
4	Blanda	150
5	Sigalda	150
6	Sultartanga	120
7	Búðarháls	95
8	Vatnsfell	90
9	Írafoss	48
10	Steingríms	26
11	Ljósafoss	15
12	Laxá III	14
13	Laxá II	9
14	Laxá I	5

	Geothermal Power Stations	MW
15	Krafla	60
16	Bjarnarflag	3

	Wind Farms	MW
17	Hafið	1,8

	Headquarters
18	Reykjavík
19	Akureyri

Electricity Generation

Landsvirkjun's total electricity generation in 2015 was 13,709 GWh. The percentage division of electrical energy sources is 96% from hydropower, 4% from geothermal power and 0.05% from wind energy. Landsvirkjun's electricity generation in 2015 represented approx. 73% of Iceland's total electricity generation.

Energy losses and Landsvirkjun's own energy consumption amounted to 124 GWh in 2015. A large percentage of this is due to the power stations' own consumption.

Tables 1 and 2 show an overview of Landsvirkjun's electricity generation. Table 1 shows the installed capacity of Landsvirkjun's power stations, electricity generation and energy sources within each area of operation. Overall energy losses and the total electricity consumption of Landsvirkjun's power stations in 2015 are also shown as well as Landsvirkjun's total electricity generation, excluding energy losses or own consumption at power stations, between 2011 and 2015. Table 1 shows an overview of the number of Company employees. Table 2 shows the division of Landsvirkjun's electricity generation as well as the country as a whole, by energy source, in the years between 2011 and 2015. There was a 7% increase in electricity production at Landsvirkjun's hydropower stations in 2015 when compared with the previous year. However, there were reductions to the electricity supply in 2014 as a result of low water levels in reservoirs. Production was increased in 2015 as a result of increased demand from energy intensive industry and from the domestic sector. Figure 3 shows the division of electricity generated in Iceland, by Landsvirkjun and other utility companies, in 2015.

Table 1 — Summary of Landsvirkjun's electricity generation as well as employee numbers 2015.

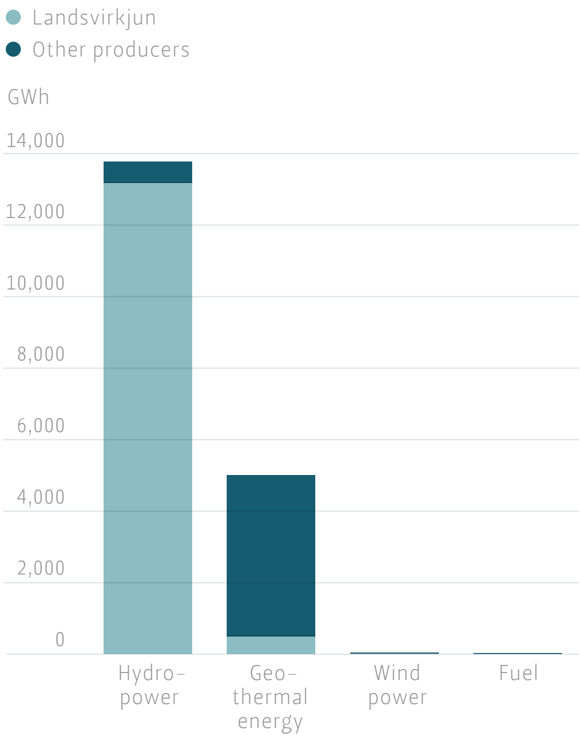
	Energy source	Total No. Employees*	Capacity (MW)	Electricity generation (GWh)	Percentage of total electricity generation (%)
Offices in Reykjavík and Akureyri	–	145	–	–	–
Power stations					
Blanda Station	Hydropower	14	150	821	6
Laxá Stations	Hydropower	6	28	177	1
Fljótsdalur	Hydropower	12	690	4,984	36
Mývatn area	Geothermal power	17	63	497	4
Sog area	Hydropower	14	91	561	4
Þjórsá area total	Hydropower & wind power	41	937	6,669	49
– Hafið	Wind power	–	(1.9)	(7)	(<1%)
Energy losses and own usage	–	–	–	(124)	(1%)
Landsvirkjun total – 2015		249	1,958	13,709	100
Landsvirkjun total – 2014		249	1,958	12,807	100
Landsvirkjun total – 2013		248	1,863	12,843	100
Landsvirkjun total – 2012		247	1,861	12,312	100
Landsvirkjun total – 2011		233	1,861	12,485	100

* Number of full time employees at year end.

Table 2 — Landsvirkjun's electricity generation and total electricity generation in Iceland 2011–2015.

		Landsvirkjun					Iceland				
		2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Hydropower	GWh	11,982	11,822	12,337	12,316	13,206	12,507	12,337	12,863	12,872	13,781
Geothermal power	GWh	503	490	501	484	497	4,701	5,210	5,245	5,238	5,003
Fuel oil	GWh	0	0	5.5	7.0	6.7	0	0	5.0	8.0	11.0
Wind power	GWh	0	0	0	0	0	2	3	3	2	4
Total	GWh	12,485	12,312	12,843	12,807	13,709	17,210	17,550	18,116	18,120	18,799

Figure 3 – Landsvirkjun's total electricity generation and other producers in Iceland in 2015.



Utilisation of geothermal resources

Landsvirkjun generates electricity at two geothermal stations in the Mývatn area: The Krafla and Bjarnarflag Geothermal Power Stations. Table 3 shows numerical data on the utilisation of the geothermal resource, the utilisation per energy unit between 2011 and 2015 and the percentage change between years.

In 2015, approx. 5,099 thousand tonnes of steam were utilised to generate 497 GWh of electricity in the Mývatn area and the quantity of steam utilised for electricity generation has reduced significantly between 2011 and 2015 (see Figure 4).

A decrease in the output of wells is generally the main reason for any decrease as the enthalpy of the wells affects the proportion of water and steam in the geothermal fluid. When enthalpy levels decrease, the energy content of the fluid also lowers and more water is produced. The steam utilised for each produced energy unit decreased by 10% between 2014 and 2015 and has been steadily decreasing in the last few years. This improved utilisation can be attributed to the introduction of new equipment this year; less steam is needed for each energy unit.

The utilisation process produced 5,471 thousand tonnes of condensate and separated water of which 4,300 thousand tonnes were re-injected back into the geothermal reservoir. The re-injection of separated water supports the efficient utilisation of the geothermal system. Re-injection reduces the impact of geothermal utilisation at the surface and reduces the quantity of contaminating compounds, e.g. heavy metals released into surface waters.

Table 3 — Utilisation of geothermal reserves for Landsvirkjun's electricity generation 2011–2015.

		2011	2012	2013	2014	2015	Change compared with 2014
Utilisation in thousand tonnes:							
Steam	Thous. tonnes	6,123	5,857	5,634	5,498	5,099	-7%
Water	Thous. tonnes	5,170	5,230	5,190	5,667	5,471	-3%
Reinjected water*	Thous. tonnes	2,549	2,515	3,145	4,324	4,300	-1%
Utilisation per unit of energy generated:							
Steam	Thous. tonnes/GWh	12.2	12.0	11.3	11.4	10.3	-10%
Water	Thous. tonnes/GWh	10.3	10.7	10.4	11.7	11.0	-6%
Reinjected water	Thous. tonnes/GWh	5.1	5.1	6.3	8.9	8.6	-3%

* The amount of reinjected separated water between 2011 and 2014 has been updated in accordance with more accurate measurements.

Table 4 — Utilisation of geothermal reserves during exploratory drilling 2011–2015.

		2011	2012	2013	2014	2015	Change compared with 2014
Utilisation in thousand tonnes:							
Steam	Thous. tonnes	2,252	1,014	711	979	1,889	93%
Water	Thous. tonnes	1,596	233	13	1,345	1,031	-23%

Table 4 shows the amount of steam and water extracted from the geothermal reservoir due to exploratory drilling between 2011 and 2015 and the percentage change between years. Research has mainly been conducted in Northeast Iceland and the extent of research activities is highly variable between years, see Figure 4.

Figure 4 – Quantity of steam utilised for electricity generation between 2011 and 2015 and the amount of separated water re-injected during the same period.

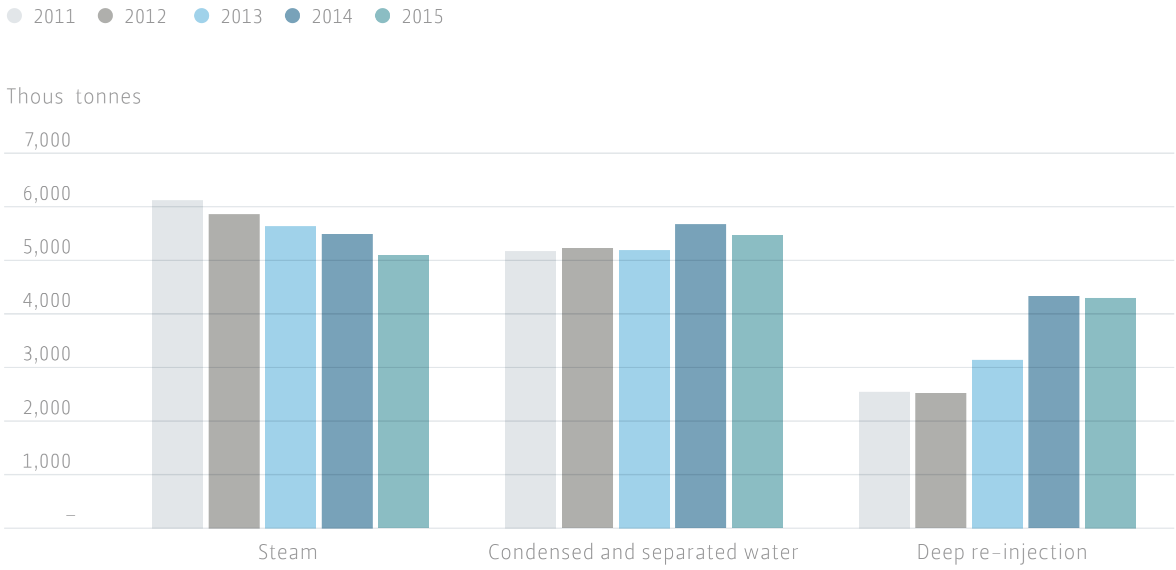
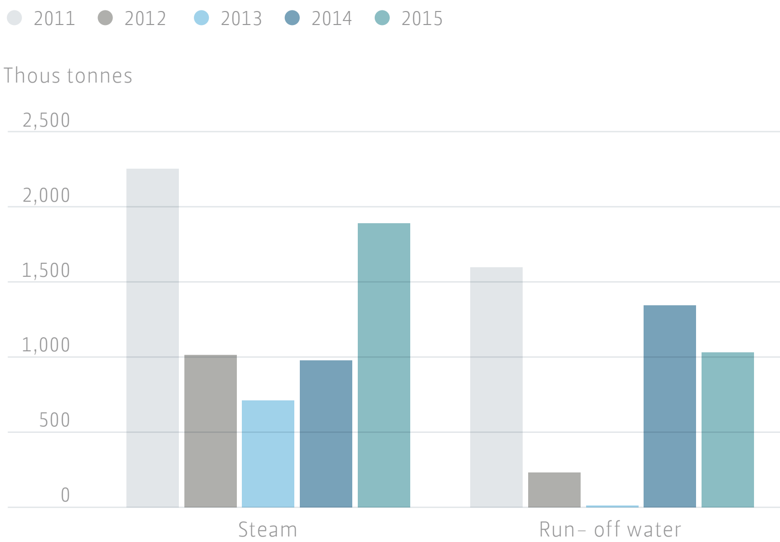


Figure 5 – Quantity of steam and water released as a result of research conducted between 2011 and 2015.



Release into water and soil from geothermal power stations

According to the operation permit, geothermal brine at Krafla and Bjarnarflag can be discharged into surface water if the resulting concentration of pollutants in the groundwater flow is under the Environmental Limit once it reaches Mývatn. The limits are outlined in regulation No. 796/1999 for the prevention of water pollution (with amendments).

Groundwater monitoring has been conducted annually since 1997 in springs by Mývatn and to the west of Námafjall Mountain to assess the impact of brine discharge from Krafla and Bjarnarflag. Monitoring is based on natural tracers such as arsenic which are at a much higher concentration in discharge water from the power stations than that found in groundwater. Monitoring in the Mývatn area shows that the concentration of arsenic has not increased and it can therefore be assumed that the water has not been affected by geothermal water from the power stations.Figure 6 shows that the concentration of arsenic in groundwater samples, collected annually at monitoring stations in Langivogur and Vogaflói has always measured below environmental limits.

Table 5 shows the quantity of released condensate and separated water from the Krafla and Bjarnarflag Geothermal Power Stations as well as the release of heavy metals, nutrients, hydrogen sulphide and carbon dioxide into groundwater and surface water between 2011 and 2015. The discharge of geothermal brine into surface water has decreased as re-injection measures have increased, thus reducing the load on Dallækur Stream due to electricity generation (see Figure 7).

The hydrogen sulphide and carbon dioxide released into surface water or re-injected into the geothermal system reduces the emission of these gases into the atmosphere. The operation permit does not outline any set limits for the emission of these gases other than the requirement that pollutants in the groundwater are under Environmental Limit 1. Table 5 also shows the quantity of heavy metals and nutrients released into surface water as a result of research conducted in the Mývatn area during the same period. Re-injection measures are not carried out during exploratory drilling.

Figure 6 – Measured concentration of arsenic in groundwater samples from Vogaflóa and Langivogur: 1997–2015.

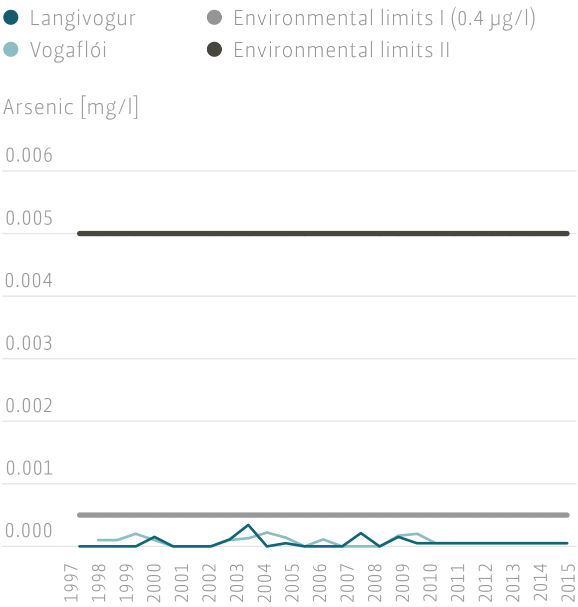


Figure 7 – Disposal at surface and deep re-injection of separated water as a result of electricity generation between 2011 and 2015.

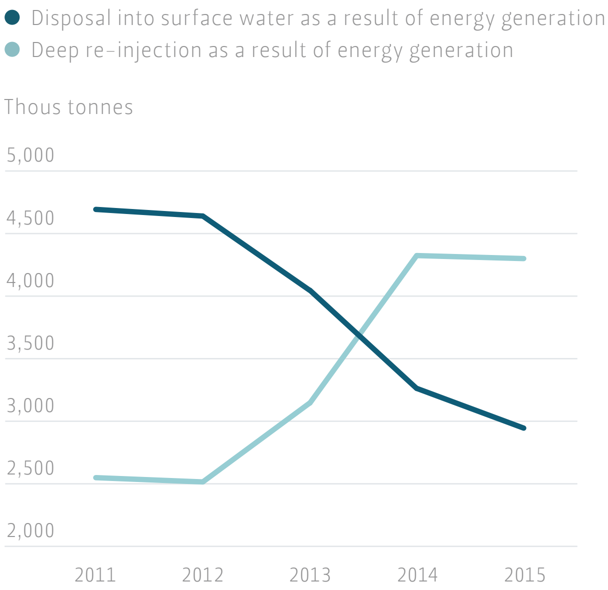


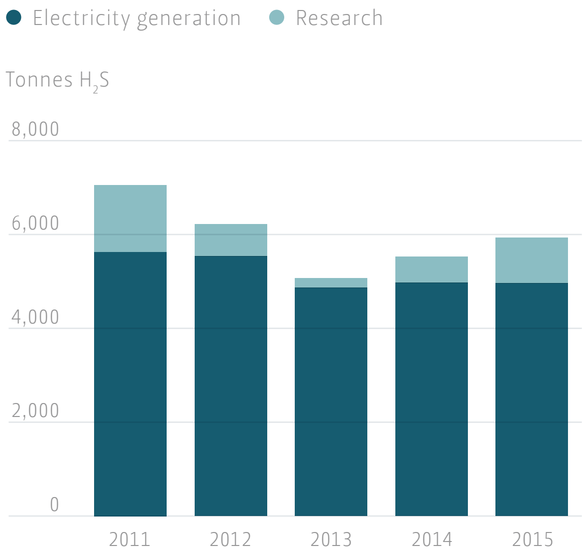
Table 5 – Quantity of materials in condensate and separated water (heavy metals, nutrients and gases) from electricity generation at Krafla and Bjarnarflag Geothermal Power Stations; also as a result of exploratory drilling and as a result of disposal at the surface or deep re-injection between 2011 and 2015.

		Electricity generation										Research				
		Release into surface water					Re-injection					Release into surface water				
		2011	2012	2013	2014	2015	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Water																
– Water from geothermal power stations	Thous tonnes	4,693	4,640	4,047	3,262	2,945	2,549	2,515	3,145	4,324	4,300	1,596	233	13	1,341	1,031
Heavy metals																
– Arsenic	kg	190	173	144	174	83	7	10	5	14	49	27	5	0	15	6
– Copper	kg	3	5	2	2	1	1	0	0	0	0	0	0	0	0	0
– Chromium	kg	4	4	3	1	4	0	0	0	0	0	0	0	0	0	0
– Nickel	kg	3	1	2	2	1	0	0	0	0	0	0	0	0	0	0
– Zinc	kg	12	6	4	23	4	2	1	1	2	1	2	0	0	0	0
Nutrients																
– Phosphorus	kg	9	9	10	32	5	3	3	3	4	4	1	0	0	5	0
Other																
– Hydrogen sulphide	kg	128,000	108,215	178,374	182,000	95,000	119,000	120,363	144,040	202,000	201,900	–	–	–	–	–
– Carbon dioxide	kg	263,000	306,260	350,216	279,000	166,900	149,000	163,511	127,224	199,000	202,100	–	–	–	–	–

Release of hydrogen sulphide into the atmosphere

Hydrogen sulphide (H2S) can have a negative impact on humans and the ecosystem. However, hydrogen sulphide emissions have so far been an unavoidable part of geothermal energy utilisation in Iceland. Natural emissions from geothermal areas also affect the concentration of hydrogen sulphide in the atmosphere. Figure 8 shows the hydrogen sulphide emission levels from electricity generation and exploratory drilling between 2011 and 2015.

Figure 8 – Hydrogen sulphide emissions from electricity generation and exploratory drilling between 2011 and 2015.

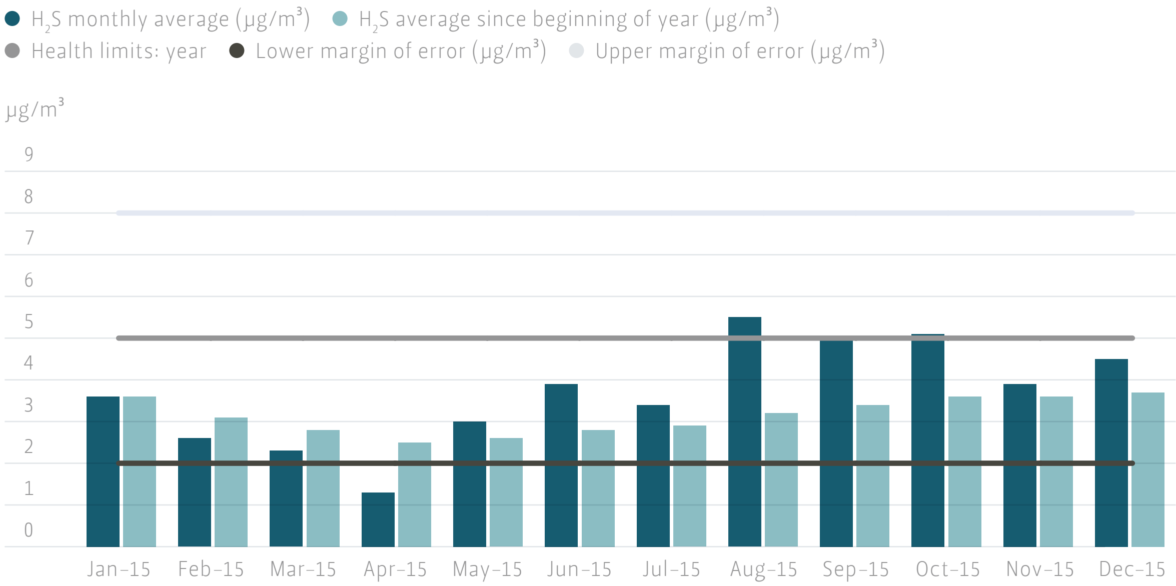


Landsvirkjun monitors the concentration of hydrogen sulphide in the atmosphere as a result of geothermal utilisation in the northeast of Iceland. Real-time results and annual reports can be accessed on Landsvirkjun's webpage. http://www.landsvirkjun.com/research-development/environmentalmonitoring

Monitoring has been conducted in the Kelduhverfi area since 2011. In 2013, Landsvirkjun also opened monitoring stations at the Reykjahlíð School and in Vogar by Mývatn. The monitor borrowed by the Icelandic Environment Agency in 2014 as a result of the volcanic eruption at Holuhraun was subsequently set up in Húsavík on the 5th of March, 2015. The monitoring station at Reykjahlíð School is closest to utilisation areas at Krafla and Bjarnarflag.

Environmental limits for hydrogen sulphide concentrations in the atmosphere, according to regulation No. 514/2010, require that the rolling average concentration of hydrogen sulphide, over a 24 hour period, must not exceed 50 µg/m3. The yearly average for hydrogen sulphide concentrations shall also be under 5 µg/m^3 (±3 µg/m^3). The monitoring results for 2015 show that the rolling average concentration of hydrogen sulphide, over a 24 hour period, never exceeded environmental limits at Landsvirkjun's monitoring stations. The yearly average for hydrogen sulphide concentrations in 2015 were within set environmental limits at all of Landsvirkjun's monitoring stations. Figure 9 shows the results from monitoring at the Reykjahlíð School where the yearly average for hydrogen sulphide concentrations for 2015 was 3.4 µg/m^3.

Figure 9 – Measurements conducted on hydrogen sulphide levels by the Reykjahlíð School. The monthly and annual average for 2015.



Fossil fuel consumption

Landsvirkjun uses fossil fuels to operate vehicles, machinery and equipment and the quantity is recorded. Table 6 shows the total consumption of fossil fuels in Landsvirkjun's operations in 2015 and Table 7 shows the total consumption between 2011 and 2015 and a comparison between years.

Landsvirkjun's total consumption of fossil fuels (diesel and petrol) in 2015 was 265 thousand litres. Diesel oil is the most common source of fuel for Landsvirkjun and accounts for 95% of consumption whereas petrol accounts for 5%. Over 13 thousand litres of biodiesel were used to operate vehicles in the Þjórsá area and 115 kilograms of methane were used at Landsvirkjun's headquarters in Reykjavík. Biodiesel was used for the first time in 2015 and was either used in its pure form or blended with fossil fuel. The benefits of using biodiesel include the fact that biodiesel only releases 40% of the GHG emissions normally released by fossil fuels.

The consumption of petrol has been reduced in Company operations in the last few years and consumption over the last three years has been under the average consumption rate recorded over the last five years (see Figure 10). The overall consumption of diesel has not been reduced significantly in the last few years. The total quantity of diesel consumption in 2015 was 4% more than in 2014. However, consumption is still under the average recorded over the last five years in most areas of operation (see Figure 11). The total consumption of diesel used to operate vehicles was reduced by 11% when compared with the previous year but there was a substantial increase in diesel consumption used for standby generators. This can be attributed to the fact that large quantities of diesel were needed for fuel reserves as a result of the installation of four new standby power units. One was installed at Landsvirkjun's headquarters in Reykjavík and three in the Þjórsá area, for a flood control system, in the case of a possible eruption at Bárðarbunga. The Þjórsá area consumes the greatest quantity of diesel oil as there are six power stations within the area. However, diesel consumption was reduced in 2015 as a result of the use of biodiesel for vehicles.

Table 6 — Fuel consumption in Landsvirkjun's operations in 2015.

		LV total 2015	Blanda	Laxá	Fljótsdalur	Mývatn	Sog	Þjórsá	R&D and PP&C Divisions	Offices RVK and AKU
Petrol	Litres	11,988	2,619	–	280	1,187	394	477	4,186	2,845
Diesel oil for	Litres	253,308	15,542	7,098	18,235	28,125	16,203	88,570	45,439	34,096
– vehicles	Litres	193,207	15,235	7,098	17,842	27,799	16,203	42,244	45,439	21,419
– standby generators	Litres	60,101	307	–	393	326	–	46,326	–	12,677
Biodiesel	Litres	13,141	–	–	–	–	–	13,141	–	–
Methane	kg	115	–	–	–	–	–	–	–	115

1) Information on biodiesel consumption in Landsvirkjun's operations can be accessed here: https://www.perstorp.com/en/products/verdis_polaris_aura

Table 7 — Fuel consumption 2011 – 2015 and comparison between years.

		LV total 2011	LV total 2012	LV total 2013	LV total 2014	LV total 2015	Change compared with 2014
Petrol	Litres	21,891	22,943	12,572	11,398	11,988	5%
Diesel oil for	Litres	257,642	243,077	271,603	244,369	253,308	4%
– vehicles	Litres	223,438	225,298	251,717	216,130	193,207	-11%
– standby generators	Litres	34,204	17,779	19,886	28,240	60,101	113%
Biodiesel	Litres	–	–	–	–	13,141	100%
Methane	kg	339	504	270	251	115	-54%
Hydrogen	kg	122	–	–	–	–	0%

Figure 10 – Fossil fuel consumption: diesel and petrol in Landsvirkjun's operations between 2011 and 2015 as well as the average consumption during the same period.

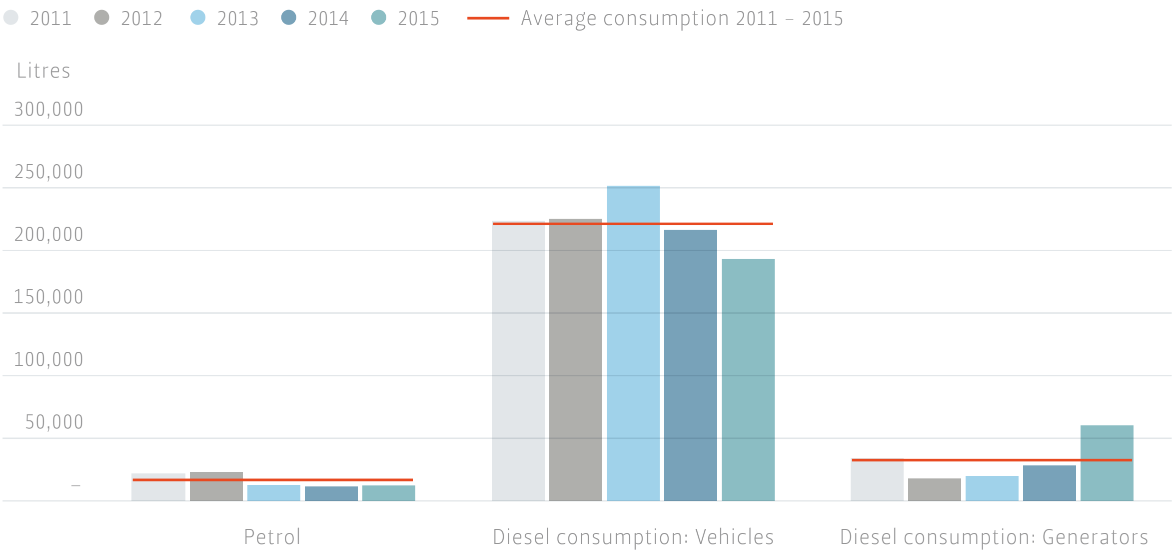
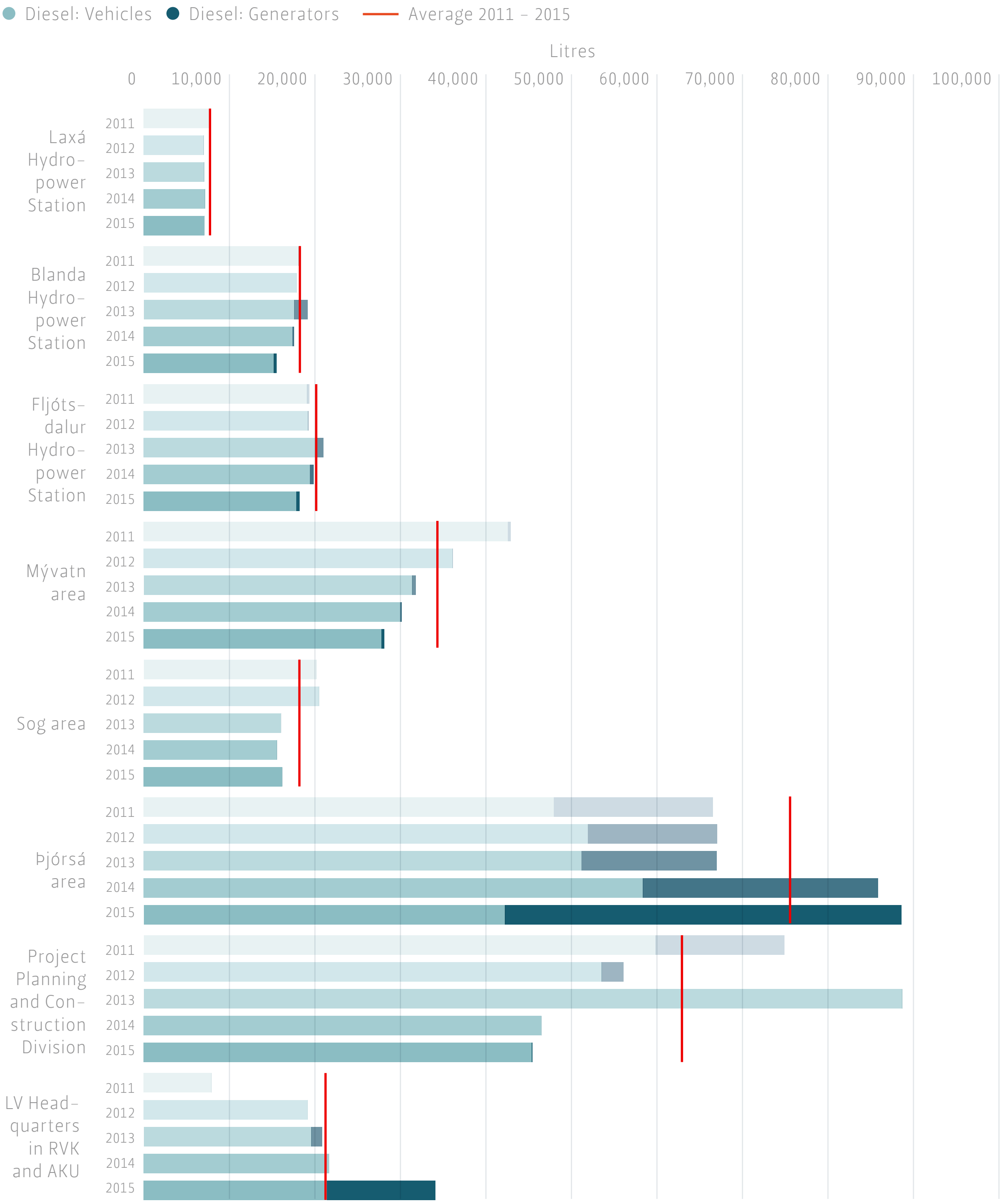


Figure 11 – Diesel consumption for vehicles and stand by power in Landsvirkjun's operations between 2011 and 2015 according to operational area. The average consumption for each area is also shown for the same period



Waste and hazardous waste

Waste

All waste produced within each area of operation is recorded and sorted according to the available resources in each area. Waste from Landsvirkjun's operations can be divided into three categories: waste for reuse or recycling, waste for disposal and inert waste. The total quantity of waste produced within each category can vary between years and mostly depends on the scope of maintenance projects carried out each year.

The total quantity of waste produced between 2011 and 2015 can be seen in Table 8. The total quantity of waste produced in 2015 amounted to more than 163 tonnes: 120 tonnes were sent away for recycling or reuse, approx. 43 tonnes were landfilled and there was less than one tonne of inert waste (Figure 12). Table 9 shows the quantity of waste produced by Landsvirkjun in 2015 in each area of operation.

Figure 13 shows the quantity of unsorted waste from Landsvirkjun's operations between 2011 and 2015. The total quantity of unsorted waste increased in 2015 by 42% when compared with the previous year. The quantity of unsorted waste in 2015 in five areas of operation was under the average recorded for the last five years. However, an increase was recorded at the Fljótsdalur and Sog Hydropower Stations and at the headquarters in Reykjavík. This can be attributed to construction work carried out in these areas.

Table 8 — Quantity of waste by category and treatment between 2011 and 2015.

		LV total 2011	LV total 2012	LV total 2013	LV total 2014	LV total 2015
Unsorted waste:	kg	52,207	46,274	35,453	30,331	42,952
– landfilled	kg	41,997	39,515	34,093	30,331	42,952
– incinerated	kg	10,210	6,759	1,360	0	0
Waste for recycling and reuse:	kg	466,256	79,135	282,682	119,787	119,481
Household goods	kg	0	35	105	30	95
Biodegradable waste	kg	13,830	12,301	19,644	18,704	17,903
Metals and various equipment	kg	225,034	36,943	125,063	39,954	37,635
Paper, cardboard and packaging	kg	16,560	12,514	14,072	14,748	13,756
Plastic	kg	379	451	3,302	1,411	4,083
Timber	kg	210,454	16,891	120,495	44,940	46,009
Inert waste:*	kg	8,296	55,860	353,948	32,875	898
Earth, minerals, glass and porcelain	kg	8,296	55,860	353,948	32,875	898
Total waste	kg	526,759	181,269	672,083	182,992	163,331

* Disposed of at landfills for inert wast.

Table 9 – Quantity of waste from Landsvirkjun's operational bases in 2015 by category and treatment.

		LV total 2015	Blanda	Fljótsdalur	Mývatn	Laxá	Sog	Þjórsá	LV other operations
Unsorted waste:	kg	42,952	3,991	5,930	2,247	704	12,510	8,520	9,050
landfilled	kg	42,952	3,991	5,930	2,247	704	12,510	8,520	9,050
Waste for recycling and reuse:	kg	119,481	2,046	15,100	32,921	2,386	13,765	29,831	23,432
Household goods	kg	95	–	–	–	65	–	–	30
Biodegradable waste	kg	17,903	915	2,480	2,830	–	–	3,560	8,118
Metals and various equipment	kg	37,635	450	210	22,873	1,486	1,100	10,091	1,425
Paper, cardboard and packaging	kg	13,756	315	990	846	30	1,010	3,530	7,035
Plastic	kg	4,083	130	–	3,668	5		–	280
Timber	kg	46,009	236	11,420	2,704	800	11,655	12,650	6,544
Inert waste:*	kg	898	–	–	28	470	–	–	400
Earth, minerals, glass and porcelain	kg	898	–	–	28	470	–	–	400
Total waste	kg	163,331	6,037	21,030	35,196	3,560	26,275	38,351	32,882

* Disposed of at landfills for inert waste.

Figure 12 – Quantity of waste for recycling and landfill as well as the quantity of inert waste from Landsvirkjun's operations between 2011 and 2015, including averages for the same period.

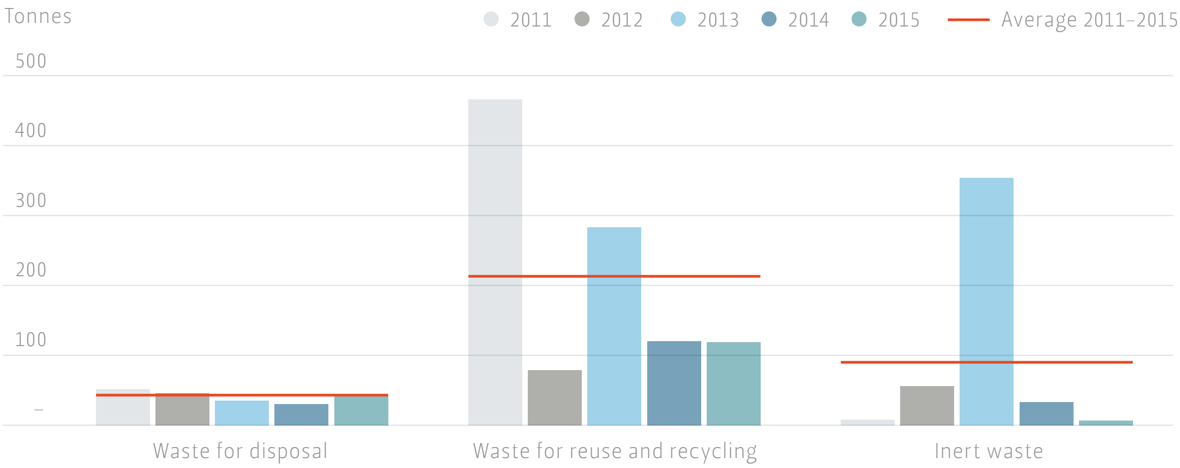
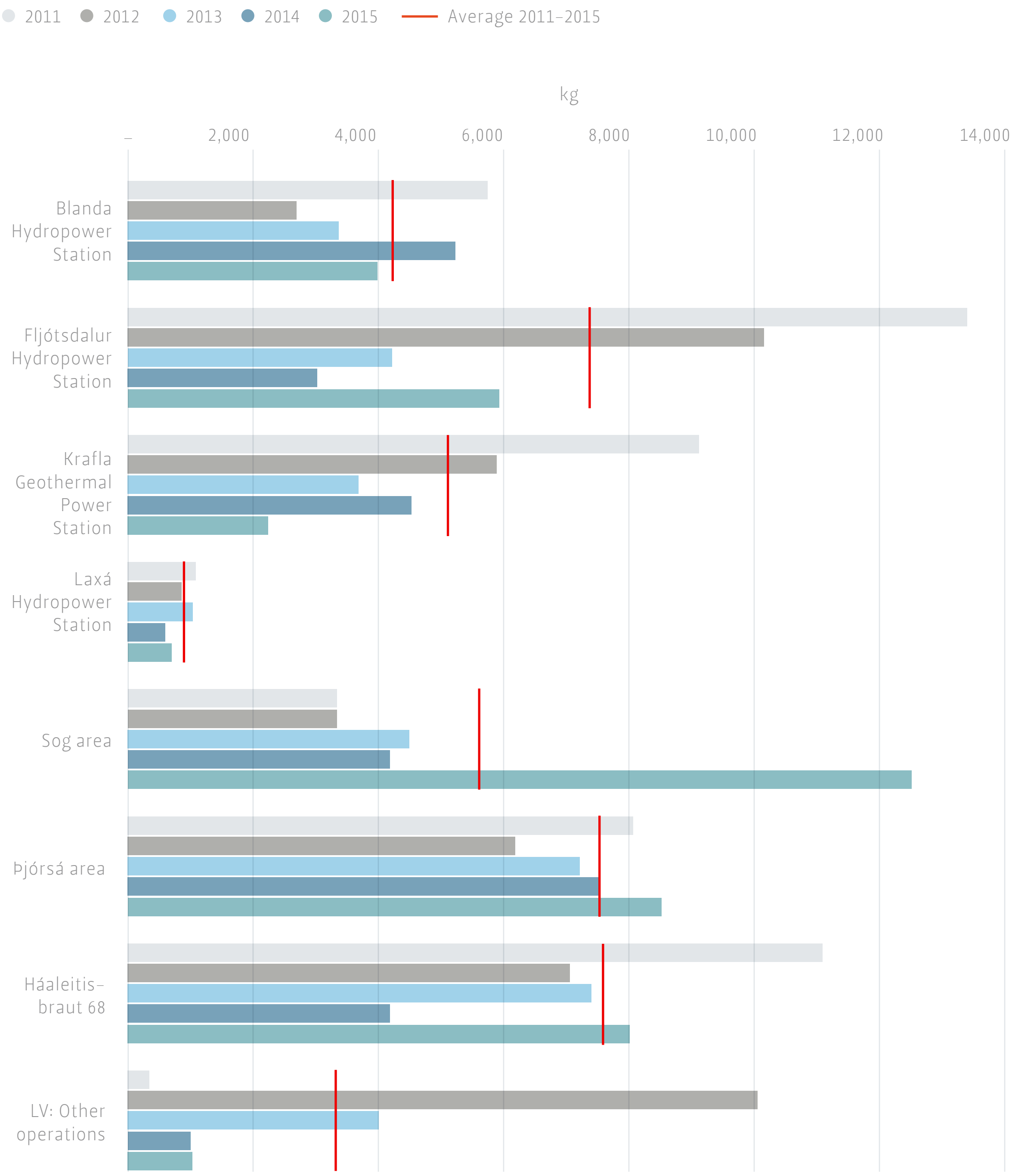


Figure 13 – Quantity of unsorted waste from Landsvirkjun's operational bases between 2011 and 2015 sent to landfill and including averages for the last 5 years.



Hazardous waste

All hazardous waste produced as a result of Landsvirkjun's operations is sorted and recorded. Waste is handled in accordance with legal requirements and regulations and all hazardous waste is handed over to recognised waste disposal services.

The quantity of hazardous waste produced each year is mostly related to the scope of maintenance work carried out by the Company. In 2015, approximately 14 tonnes of hazardous waste (mostly oil waste) was sent away for disposal. Table 10 shows the quantity of hazardous waste from Landsvirkjun's operations between 2011 and 2015 and Table 11 shows the quantity of hazardous waste produced by each area of operation in 2015.

Table 10 — Quantity of hazardous waste between 2011 and 2015.

		LV total 2011	LV total 2012	LV total 2013	LV total 2014	LV total 2015
Hazardous waste for disposal:	kg	2,944	2,582	3,999	7,685	7,333
Batteries and electrical equipment	kg	1,255	1,237	2,921	6,222	3,013
Other hazardous waste	kg	1,689	1,345	1,079	1,463	4,320
Oil waste:	kg	8,703	2,750	1,828	14,976	6,355
Total hazardous waste	kg	11,647	5,332	5,827	22,660	13,688

Table 11 — Quantity of hazardous waste from Landsvirkjun's operational bases in 2015.

		LV total 2015	Blanda	Fljótsdalur	Mývatn – Krafla	Mývatn – Laxá	Sog	Þjórsá	LV: other operations
Hazardous waste for disposal:	kg	7,333	0	1,462	637	60	743	4,262	169
Batteries and electrical equipment	kg	3,013	0	1,355	167	0	373	954	164
Other hazardous waste	kg	4,320	0	107	470	60	370	3,308	5
Oil waste:	kg	6,355	200	281	639	1,305	102	3,828	0
Total hazardous waste	kg	13,688	200	1,743	1,276	1,365	845	8,090	169

Land reclamation and carbon sequestration

Landsvirkjun has been involved in the extensive land reclamation and re-forestation of the areas surrounding their power stations since 1968. The aim of land reclamation is to reinstate land quality, reduce disturbance to vegetated areas and stop soil erosion and vegetation destruction. The removal of carbon from the atmosphere is also an objective.

Table 12 shows the quantity of fertiliser distributed by Landsvirkjun as well as the number of plants planted in areas surrounding the power stations between 2011 and 2015. Landsvirkjun planted 97 thousand plants in areas surrounding its power stations in 2015.

Table 12 – Distribution of fertiliser and the number of plants planted on behalf of Landsvirkjun between 2011 and 2015.

		2011	2012	2013	2014	2015
Fertiliser distribution (inorganic fertiliser)	Tonnes	501	484	414	447	441
Planting of plants in vicinity of power stations	Number	72,150	5,480	63,050	83,634	97,370

Landsvirkjun has for years run an enterprise that goes by the name of “Many hands lighten the load”. The initiative offers various projects access to Landsvirkjun’s summer staff. The number of plants planted as a result of the initiative between 2011 and 2015 can be seen in Table 13. Over 55 thousand plants were planted this year by the initiative but cooperative projects can vary between years. Carbon removal resulting from the initiative is not recorded in Landsvirkjun’s carbon accounts as the projects are not carried out directly for Landsvirkjun.

Table 13 – Plants planted during the "Many hands lighten the load" initiative between 2011 and 2015.

		2011	2012	2013	2014	2015
Plants planted during the "Many hands lighten the load" project	Number	73,690	30,450	162,500	125,196	55,183

Carbon footprint

Landsvirkjun's carbon footprint is defined as annual net greenhouse gas (GHG) emissions from Landsvirkjun's operations, including estimated carbon sequestration or offsetting.

Landsvirkjun's carbon footprint = *total GHG emissions – carbon offsetting*

Landsvirkjun's carbon footprint in 2015 was approx. 52, 000 tonnes CO_2-eq. Table 14 shows emissions into the atmosphere from Landsvirkjun's operations in 2015, by source. The largest source of GHG emissions can be traced to Landsvirkjun's geothermal power stations which account for 68% of emissions. The reservoirs at the Company's hydropower stations account for 29% and another 2% is caused by the burning of fossil fuels, waste disposal and SF_6 emissions from electrical equipment (<3%). See Figure 14.

Figure 14 – GHG emissions from Landsvirkjun's operations between 2011 and 2015 by source.

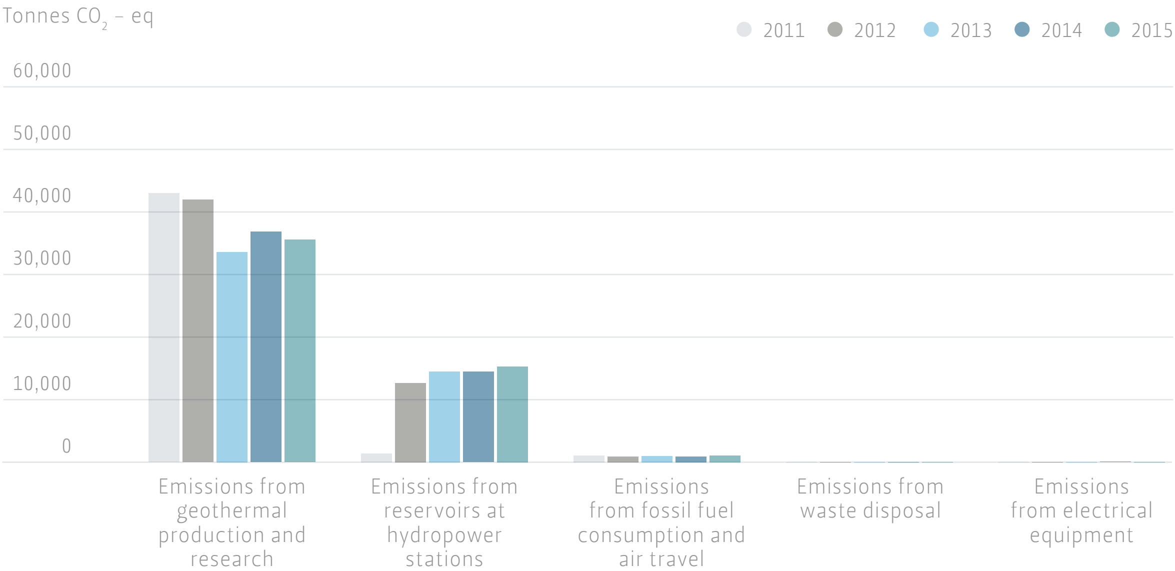


Table 15 shows total GHG emissions by source between 2011 and 2015 and a comparison between years. The table also shows the scope of carbon removal measures for the same period and Landsvirkjun's carbon footprint for each operational year.

Landsvirkjun has been involved in the extensive land reclamation and re-forestation of the areas surrounding their power stations for over forty years and the total amount of carbon sequestered is estimated to be 22,000 tonnes CO_2–eq per year.

Landsvirkjun has worked in cooperation with Kolviður since 2013 on carbon neutralisation measures related to the Company's fossil fuel consumption and waste disposal. These emissions were equal to approx. 1,061 tonnes of CO_2-eq in 2015. Landsvirkjun's carbon footprint (including total carbon offsetting) was estimated to be approx. 29,000 tonnes CO_2 equivalents in 2015, see Figure 15. The Company's carbon footprint has decreased in the last few years and is below the average recorded for the last five years, despite the fact that energy generation has increased during this period. The decrease can be attributed to the more efficient utilisation of steam per energy unit at geothermal stations.

Table 14 – Utilisation of natural resources, quantity of waste for landfill, emissions released into the atmosphere and corresponding GHG emissions from Landsvirkjun's operations in 2015.

	Quantity	Atmospheric emissions [tonnes]	Global warming potential [kg CO_2-eq]
Steam from geothermal power stations	3,320,046 tonnes	3,320,046	
– Carbon dioxide emissions		32,820	32,819,800
– Methane emissions		15	375,000
– Hydrogen sulphide emissions		4,960	0
Steam from geothermal research wells	1,889,393 tonnes	1,889,393	
– Carbon dioxide emissions		2,345	2,345,000
– Methane emissions		1	25,000
– Hydrogen sulphide emissions		971	0
Hydropower reservoirs	264 km²		
– Carbon dioxide emissions		7,631	7,631,025
– Methane emissions		306	7,652,787
Fuel consumption: Petrol	11,988 litres		
– Carbon dioxide emissions		28	27,603
– Methane emissions		0.010	247
– Nitrous oxide emissions		0.004	1,072
Fuel consumption: Diesel oil for vehicles	193,207 litres		
– Carbon dioxide emissions		518	517,718
– Methane emissions		0.003	81
– Nitrous oxide emissions		0.032	9,673
Fuel consumption: Diesel oil for standby generators	60,101 litres		
– Carbon dioxide emissions		161	161,047
– Methane emissions		0.001	25
– Nitrous oxide emissions		0.010	3,009
Fuel consumption: Biodiesel	13,141 litres		
– Carbon dioxide emissions		14	14,085
– Methane emissions		0.000	2
– Nitrous oxide emissions		0.001	263
Air travel (employees)			
– Domestic, carbon dioxide emissions		105.8	105,782
– International, carbon dioxide emissions		209.9	209,920
Waste disposal			
– Landfill gas emissions	43 tonnes		24,912
Electrical equipment			
– SF_6 emissions	0.001 tonnes	0.001	22,800
Total GHG emissions			**51,946,851**

Table 15 – GHG emissions, carbon sequestration and the carbon footprint from Landsvirkjun's operations between 2011 and 2015.

		2011 LV total	2012 LV total	2013 LV total	2014 LV total	2015 LV total	Change compared with 2014
Geothermal stations: total emissions	tonnes CO_2-equiv	42,992	41,956	33,617	36,832	35,565	-3%
Energy generation	tonnes CO_2-equiv	40,164	37,836	32,319	34,985	33,195	-5%
Exploratory drilling	tonnes CO_2-equiv	2,828	4,120	1,298	1,847	2,370	28%
Hydropower reservoirs	tonnes CO_2-equiv	13,780	12,680	14,504	14,460	15,284	6%
Fossil fuel consumption	tonnes CO_2-equiv	1,083	940	1,001	924	1,050	14%
Petrol: vehicles	tonnes C02 equiv	55	57	31	28	29	4%
Diesel: vehicles	tonnes CO_2-equiv	609	613	686	589	527	-11%
Diesel: Stand by power	tonnes CO_2-equiv	93	49	54	77	164	113%
Biodiesel: vehicles	tonnes CO_2-equiv	0	0	0	0	14	100%
Air travel: total emissions	tonnes CO_2-equiv	326	221	230	230	316	37%
– *Domestic flights*	tonnes CO_2-equiv	76	92	109	109	106	-3%
– *International flights*	tonnes CO_2-equiv	250	129	121	121	210	74%
Waste	tonnes CO_2-equiv	43	39	30	24	25	4%
Electrical equipment	tonnes CO_2-equiv	24	24	24	72	23	-68%
GHG emissions	tonnes CO_2-equiv	57,922	55,639	49,176	52,312	51,947	-1%
Carbon sequestration (LV)	tonnes CO_2-equiv	-22,000	-22,000	-22,000	-22,000	-22,000	0%
Carbon sequestration (Kolviður)	tonnes CO_2-equiv	0	0	-1,031	-948	-1.061	12%
Landsvirkjun's carbon footprint	tonnes CO_2-equiv	35,922	33,639	27,176	29,364	28,886	-2%

* SF6 emissions from electrical equipment between 2011 and 2014 has been updated from previous Environmental Reports as a result of a lack of registration in the Þjórsá area.

Figure 15 – Total quantity of GHG emissions, carbon sequestration and carbon footprint afrom landsvirkjun's operations between 2011 and 2015.

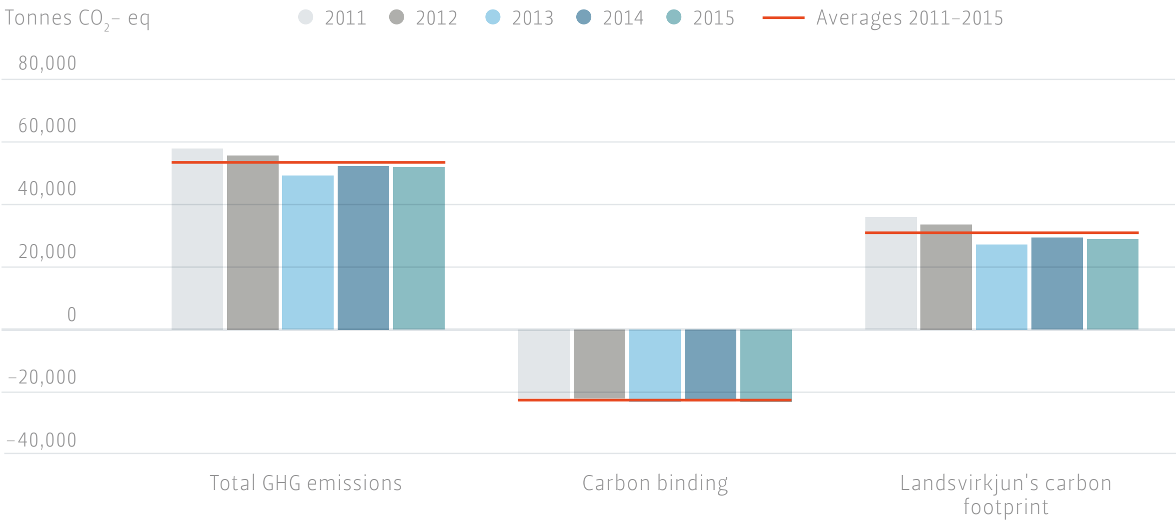


Table 16 shows GHG emissions for each generated GWh per year, between 2011 and 2015. Emissions due to exploratory drilling are not included as these are not directly connected to the electricity generation for each particular year. The carbon footprint for every GWh generated in 2015 was approx. 1.9 tonnes CO_2-eq/GWh. The table shows the positive effects of the more efficient utilisation of natural resources on the carbon footprint. Emissions from geothermal stations have decreased by 11% between years as less steam was utilised to generate more energy units.

The GHG emissions released by hydropower stations and geothermal power stations vary significantly. Table 17 shows a summary of GHG emissions from Landsvirkjun's operations by energy source: Hydropower and geothermal power, in 2015. Wind energy is not specifically included. The table shows the total GHG emissions from the Company's operations by energy source so that the direct emissions from generation are associated with the appropriate energy source. Gas emissions and fossil fuel consumption in the Mývatn area are therefore direct emissions from geothermal power stations and GHG emissions from reservoirs, SF_6 emissions from electrical equipment and fossil fuel consumption are direct emissions from hydropower stations. Indirect emissions from other fuel consumption such as air travel, office waste and carbon offsetting is divided between energy sources according to the percentage of energy production.

The carbon footprint for every GWh produced by geothermal power stations in 2015 was approx. 65.2 tonnes CO_2-eq/GWh. The carbon footprint for every GWh produced by hydropower stations was 0.445 tonnes CO_2-eq/GWh as carbon offsetting exceeds emissions from energy generation via hydropower.

Table 16 – GHG emissions, carbon sequestration and carbon footprint for each generated GWh and a comparison between years.

		2011 LV total	2012 LV total	2013 LV total	2014 LV total	2015 LV total	Change compared with 2014
Geothermal electricity generation	Tonnes CO_2-eq /GWh	3.217	3.073	2.516	2.732	2.421	-11%
Hydropower reservoirs	Tonnes CO_2-eq /GWh	1.104	1.030	1.129	1.129	1.115	-1%
Fuel: Petrol for vehicles	Tonnes CO_2-eq /GWh	0.004	0.005	0.002	0.002	0.002	0%
Fuel: Diesel oil for vehicles	Tonnes CO_2-eq /GWh	0.049	0.050	0.053	0.046	0.038	-17%
Fuel: Diesel oil for standby generators	Tonnes CO_2-eq /GWh	0.007	0.004	0.004	0.006	0.012	100%
Fuel: Biodiesel for vehicles	Tonnes CO_2-eq /GWh	0	0	0	0	0.001	100%
Air travel: total emissions	Tonnes CO_2-eq /GWh	0.026	0.017	0.017	0.018	0.023	28%
- *Domestic flights*	Tonnes CO_2-eq /GWh	0.006	0.007	0.008	0.009	0.008	-11%
- *International flights*	Tonnes CO_2-eq /GWh	0.020	0.010	0.009	0.009	0.015	67%
Waste	Tonnes CO_2-eq /GWh	0.003	0.003	0.002	0.002	0.002	0%
Emissions from electrical equipment	Tonnes CO_2-eq / GWh	0.002	0.002	0.002	0.006	0.002	-67%
GHG emissions, excluding emisisons from research wells	tonn CO_2-eq /GWh	4.413	4.184	3.728	3.940	3.616	-8%
Carbon sequestration (Lands-virkjun)	Tonnes CO_2-eq /GWh	-1.762	-1.787	-1.713	-1.718	-1.605	-7%
Carbon sequestration (Kolviður)	Tonnes CO_2-eq /GWh	-	-	-0.080	-0.074	-0.077	4%
Landsvirkjun's carbon foot-print, excluding emissions from research wells and in-cluding carbon sequestration	Tonnes CO_2-eq /GWh	2.651	2.397	1.935	2.148	1.934	-10%

Table 17 – GHG emissions, carbon sequestration and carbon footprint for each produced GWh in 2015: hydropower stations and geothermal power stations.

		Hydropower	Geothermal power
Total electricity generation in 2015 (GWh)	GWst	13,206	497
Petrol	tonnes CO_2 – eq/GWh	0.002	0.006
Diesel oil for vehicles	tonnes CO_2 – eq/GWh	0.034	0.167
Diesel oil for standby generators	tonnes CO_2 – eq/GWh	0.012	0.004
Biodiesel	tonnes CO_2 – eq/GWh	0.001	–
Geothermal power stations	tonnes CO_2 – eq/GWh	–	66,764
Hydropower reservoirs	tonnes CO_2 – eq/GWh	1.157	–
Air travel	tonnes CO_2 – eq/GWh	0.023	0.022
Waste	tonnes CO_2 – eq/GWh	0.002	0.002
SF_6 emissions from electrical equipment	tonnes CO_2 – eq/GWh	0.002	–
GHG emissions, excluding emissions from research wells	tonnes CO_2 – eq/GWh	1.233	66,965
Carbon sequestration (Landsvirkjun)	tonnes CO_2 – eq/GWh	–1.606	–1.605
Carbon sequestration (Kolviður)	tonnes CO_2 – eq/GWh	–0.072	–0.201
Landsvirkjun's carbon footprint, excluding emissions from research wells and including carbon sequestration	tonnes CO_2 – eq/GWh	–0.445	65,159

Table 18 shows the estimated GHG emissions from Landsvirkjun's hydropower reservoirs in 2015. Emissions from Landsvirkjun's hydropower stations can largely be attributed to reservoirs as 80% of emissions can be traced to the Blanda and Gilsárlón Reservoirs. There is almost no release of carbon dioxide when reservoirs are covered in ice and GHG emissions are therefore not assumed at reservoir sites during periods when ice covers the reservoirs. Landsvirkjun registers the number of 'ice cover' days in its reservoirs and the number of 'ice free' days recorded in 2015 was 191 at the Blanda Reservoir and 187 days at the Gilsárlón Reservoir. The number of 'ice free' days recorded at the Fljótsdalur Hydropower Station was 163. The number of 'ice free' days is not recorded at other reservoir sites but the Company estimates the number to be approx. 215 days.

Table 18 – GHG emissions from Landsvirkjun's hydropower reservoirs in 2015.

Station/Source	Reservoir/Lake	Total surface area [km²]	Total surface area for calculations [km²]	CO_2 Ice-free* [tonnes CO_2]	CH_4 Ice-free* [tonnes CO_2-eq]	Total GHG emissions [tonnes CO_2-eq]
Blanda Station		70 (8)**	62	6,290	6,315	12,605
Blanda Station	Blöndulón	57	57	5,084	5,090	10,174
Blanda Station	Gilsárlón	5	5	1,206	1,225	2,431
Blanda Station	(Lakes on diversion)	(8.2)	0	0	0	0
Fljótsdalur Station		70 (4)	66	433	433	866
Fljótsdalur Station	Hálslón	61 (2.6)	58	371	371	743
Fljótsdalur Station	Kelduárlón	7.5 (1.1)	6	52	52	103
Fljótsdalur Station	Ufsárlón	1.1 (0.14)	1	10	10	20
Fljótsdalur Station	Grjótárlón	0.1 (0.02)	0	<1	<1	<1
Laxá Stations		38 (38.0)	0	0	0	0
Laxá Stations	(Mývatn)	(38.0)	0	0	0	0
Sog area		86 (86)	0	0	0	0
Sog area	Úlfljótsvatn	(3)	0	0	0	0
Sog area	Þingvallavatn	(83.0)	0	0	0	0
Þjórsá area		206 (70)	136	908	905	1,813
Þórisvatn Diversion	Þórisvatn	85.2 (70)	15	50	48	98
Þórisvatn Diversion	Sauðafellslón	5	5	20	12	32
Sigalda Station	Krókslón	14	14	70	71	141
Hrauneyjafoss Station	Hrauneyjalón	9	9	20	24	44
Búrfell Station	Bjarnalón	1	1	<10	<10	<10
Hágöngur Diversion	Hágöngulón	37	37	130	131	261
Kvíslar Diversion	Kvíslavatn	22	22	270	274	544
Kvíslar Diversion	Dratthalavatn	2	2	40	36	76
Kvíslar Diversion	Eyvindarlón	0	0	<1	<1	<1
Kvíslar Diversion	Hreysislón	0	0	<1	<1	<1
Kvíslar Diversion	Þjórsárlón	4	4	10	12	22
Vatnsfell Station	Vatnsfellslón	1	1	0	0	0
Búðarháls Station	Sporðöldulón	7	7	258	262	520
Sultartangi Station	Sultartangalón	20	20	40	36	76
Total		470 (206)	264	7,631	7,653	15,284

* GHG emissions are not expected when reservoirs are covered by ice.

** The figures in brackets show the total surface area of the reservoirs not included in GHG emissions data: These include natural reservoirs (Mývatn and Þingvallavatn), where a natural balance in emissions has been achieved (Ulflótsvatn) and where carbon-free land was submerged (Þórisvatn).

Updated emission factors for carbon footprint calculation

Greenhouse gases have the ability to absorb and emit radiation in the atmosphere, thus impacting the Earth's temperature. The global warming potential is calculated by converting different GHG emissions into CO_2 equivalents (CO_2-eq) by using so-called emission factors, using the most advanced knowledge available at each time. Landsvirkjun uses the same emission factors to calculate GHG emissions as the Environment Agency of Iceland uses to compile the National Inventory Report. The factors have been updated in the 2015 Inventory Report and in Landsvirkjun's Green Accounts for 2015. However, calculations have not been backdated. The updated and older factors can be seen in the table below.

Updated and older global warming potentials used to calculate the GHG impact.

Greenhouse gases		Updated factors	Previous factors
Carbon dioxide (CO_2)	kg CO_2- eq/ kg	1	1
Nitrous oxide (N_2O)	kg CO_2- eq/ kg	298	310
Methane (CH_4)	kg CO_2- eq/ kg	25	21
Sulphur hexafluoride (SF_6)	kg CO_2- eq/ kg	22,800	23,900

Emission factors from the GaBi software are used for emissions due to the disposal of unsorted waste. GaBi is recognised sustainability software used for Life Cycle Assessment (LCA) modelling and reporting. The software's database is updated annually and emission factors for the landfilling of unsorted waste have been updated accordingly. Calculations have, however, not been backdated. Updated and older emission factors can be seen in the table below.

Updated and older global warming potentials used to calculate the GHG impact of the landfill of unsorted waste.

		Updated factors	Previous factors
Landfilling of unsorted waste	kg CO_2- eq/ kg waste	0.58	0.715

Environmental incidents

Landsvirkjun's objective is to operate without environmental incident. An environmental incident is defined as an incident, which according to the Company's operation permit has to be reported to the environmental authorities or an incident during operations that violates the law, regulations, or the Company's work regulations. There were two environmental incidents during Landsvirkjun's operations in 2015 (Table 19).

A hose on a drill burst open during drilling work at Krafla. Three hundred litres of hydraulic fluid leaked onto soil and snow as a result. Approximately 200 litres of snow and hydraulic fluid was cleaned up and disposed of by a recognised waste disposal service. The Public Health Authority for the Northeast of Iceland was notified of the incident and the area will be assessed to decide on the need for any further clean-up measures once the snow has disappeared. The incident occurred as a result of human error.

Hot discharge water spilled over into areas outside a designated drill platform area during well testing at Þeistareykir in November, damaging surrounding vegetation surrounding the area. The incident occurred as a result of a blockage in a drainage pipe as well as an increase in the quantity of water in the drainage system due to meltwater. Reparation measures will be carried out in 2016 to restore the area damaged by the incident. Working procedures for well testing have also been improved by outlining procedures to prevent flooding or spills.

Table 19 – Number of environmental incidents between 2011 and 2015.

	2011	2012	2013	2014	2015
Number of environmental incidents per year	0	2	1	0	2

Noise

Noise levels are regularly monitored in chosen locations at Krafla, Bjarnarflag and at Þeistareykir. The Icelandic regulation on noise specifies a reference limit for industrial zones of 70 dB (A) at site boundary according to Regulation No. 724/2008 on noise. In 2015, noise levels within all operational areas were beneath these limits. Landsvirkjun has set strong reference limits for popular tourist destinations within the industrial zones at Lake Mývatn, ensuring that sound levels do not exceed 50 dB (A) in these areas.

Krafla Geothermal Station

Noise level measurements were conducted at Krafla in May, July, September and December of 2015 and an additional monitoring station (monitoring station 9) was installed this year. Table 20 shows the results of noise level measurements at Krafla in 2015 as well as information on weather conditions and data collection times. The results show that noise levels were below set limits for industrial areas (70 dB(A)) in all cases. Traffic levels (due to tourism and other traffic) within the area were high when measurements were conducted and this can affect the results. The monitoring locations can be seen in the accompanying map.

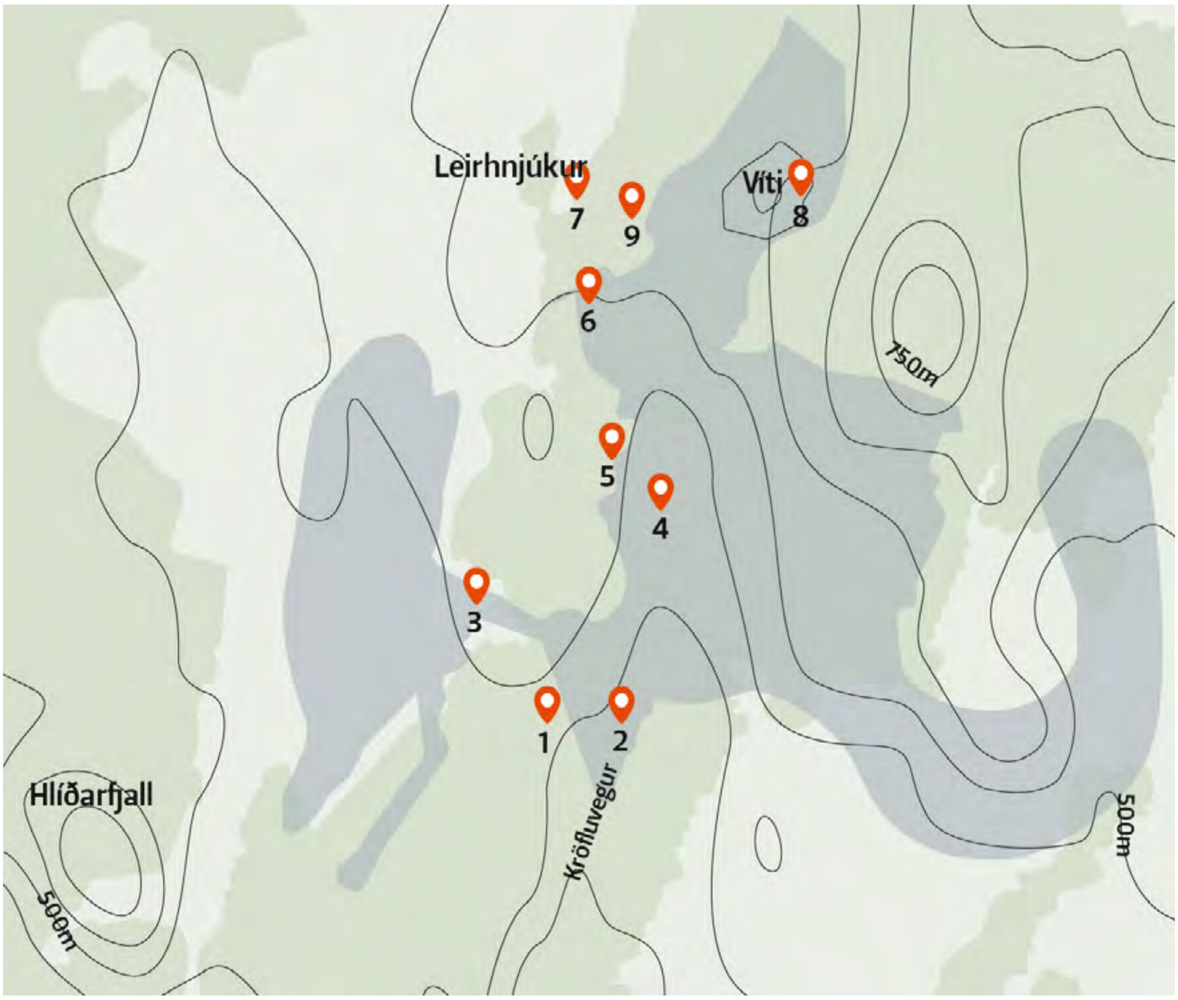
Noise levels were below 40 dB(A) in all instances at monitoring station 3 which is located within the industrial area to the southwest of Þríhyrningur. The reference limit for quiet areas within rural areas is 40 dB (A).

Víti and Leirhnjúkur are popular tourist destinations in close proximity to the industrial area at Krafla. Monitoring station 7 is by the rambling path at Leirhnjúkur and noise levels at this location measured under 43 dB(A) in all the four measurements conducted. Noise levels were approx. 55 dB(A) or under at monitoring station 8. The monitoring station is located to the south of a crater edge close to the wells and it can therefore be assumed that noise levels are lower elsewhere surrounding Víti.

Table 20 – Measurements by Krafla in 2015. All values are dB(A) and are rounded up to the next whole number.

Monitoring station at Krafla	18.5.2015 dB(A)	10.7.2015 dB(A)	17.9.2015 dB(A)	4.12.2015 dB(A)
1	46	53	49	45
2	40	47	45	36
3	35	22	19	25
4	45	37	40	33
5	44	46	59	45
6	41	31	27	36
7	42	43	35	39
8	55	47	51	54
9	–	49	44	38
Time	13:05–16:30	16:35–18:45	10:10–14:00	08:10–13:00
Temperature	5°C	7°C	6°C	-8°C
Wind direction	NW	NW	NW	ESE
Wind velocity	3–5m/s	4–6m/s	1–4m/s	3–5m/s

Figure 16 – Location of monitoring stations by Krafla. The shaded area on the map shows industrial areas used for energy generation.



Bjarnarflag Geothermal Station

Noise level measurements were conducted at Bjarnarflag in May, July, and September 2015 and in January 2016. Table 21 shows the results of noise level measurements at Bjarnarflag in 2015 as well as information on weather conditions and data collection times. Noise levels reached a maximum of 56 dB(A). Traffic can have a significant effect on noise levels at Bjarnarflag including coach and car traffic on the national road and by tourist locations such as the Mývatn Nature Baths. There were high levels of traffic within the area when monitoring was conducted in 2015, especially in the month of July. The location of monitoring stations can be seen in the accompanying map.

The noise levels at monitoring station 1 can be attributed to natural hot springs, traffic, weather conditions and other factors as the area is at a distance from the geothermal utilisation areas at Bjarnarflag and Krafla. The data from this area gives us an indication of noise levels in areas unaffected by power stations. The difference between the highest and lowest recorded level was 19 dB(A) and can mostly be attributed to variations in traffic levels within the area. The noise level can reach above 50 dB when traffic levels are high and can drop to 40 dB when they are low (when noise is mostly from the hot spring).

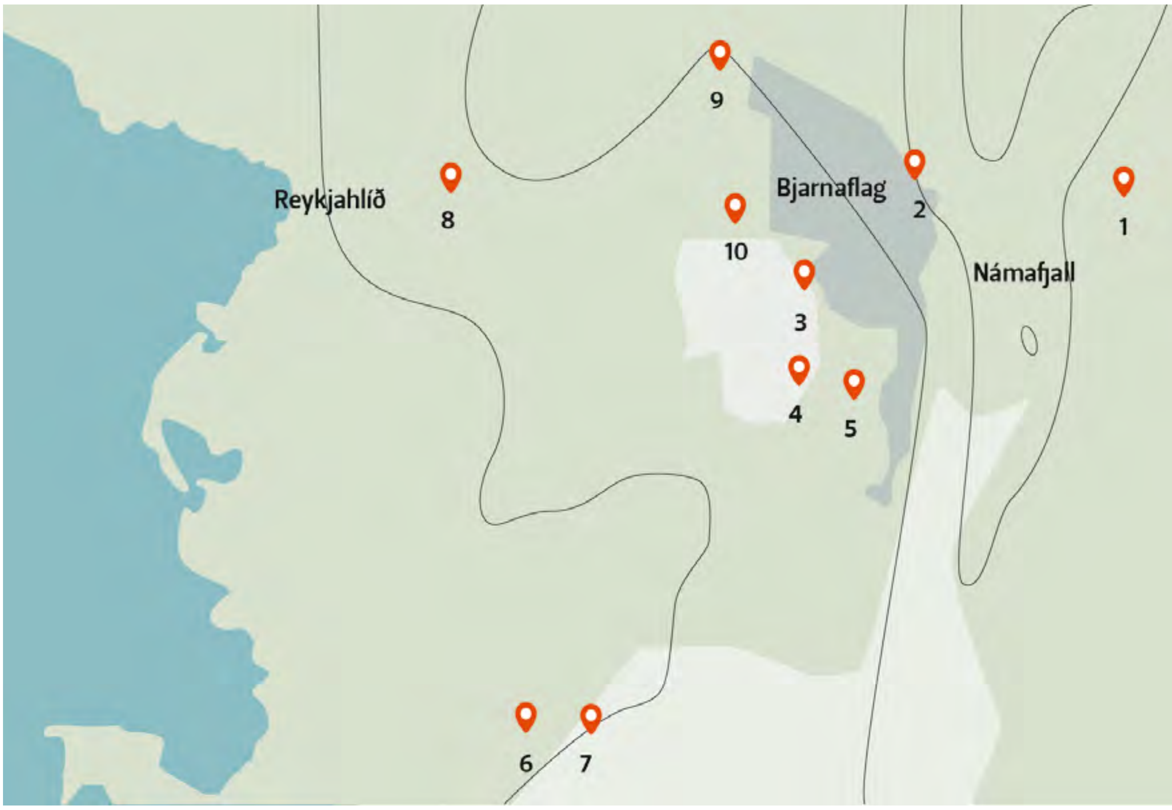
Noise levels were mostly approx. 40 dB(A) or below at Grjótagjá, Hverfjall and the Reykjahlíð School (monitoring stations 6, 7, 8).

Table 21 – Measurements by Bjarnarflag in 2015. All values are dB(A) and are rounded up to the next whole number.

	Monitoring station at Bjarnarflag	27/05/2015 dB(A)	10/07/2015* dB(A)	02/09/2015 dB(A)	11/01/2016 dB(A)
1		41	56	46	37
2		53	50	52	47
3		46	53	46	41
4		53	51	47	40
5		39	30	37	36
6		38	51	42	42
7		45	35	33	37
8		52	34	36	40
9		50	30	29	35
10		45	46	46	50
	Time	10:15–14:13	13:40–16:30	13:23–17:05	12:50–16:30
	Temperature	4°C	6°C	12°C	–9°C
	Wind direction	NE	NW	NE	ESE
	Wind velocity	3–5m/s	3–4m/s	2–4m/s	0–3m/s

* Heavy traffic due to tourism within the area during monitoring.

Figure 17 – Location of noise monitoring stations by Bjarnarflag. The shaded area on the map shows industrial areas used for energy generation.



Þeistareykir

Noise level measurements were conducted at Þeistareykir in February, May, July, and September 2015 and in January 2016. Table 22 shows the results of noise level measurements at Þeistareykir in 2015 as well as information on weather conditions and data collection times. Monitoring station 7 was added this year at the Þeistareykir cabin. Noise levels measured below 70 dB(A) in all cases. The location of monitoring stations can be seen in the accompanying map.

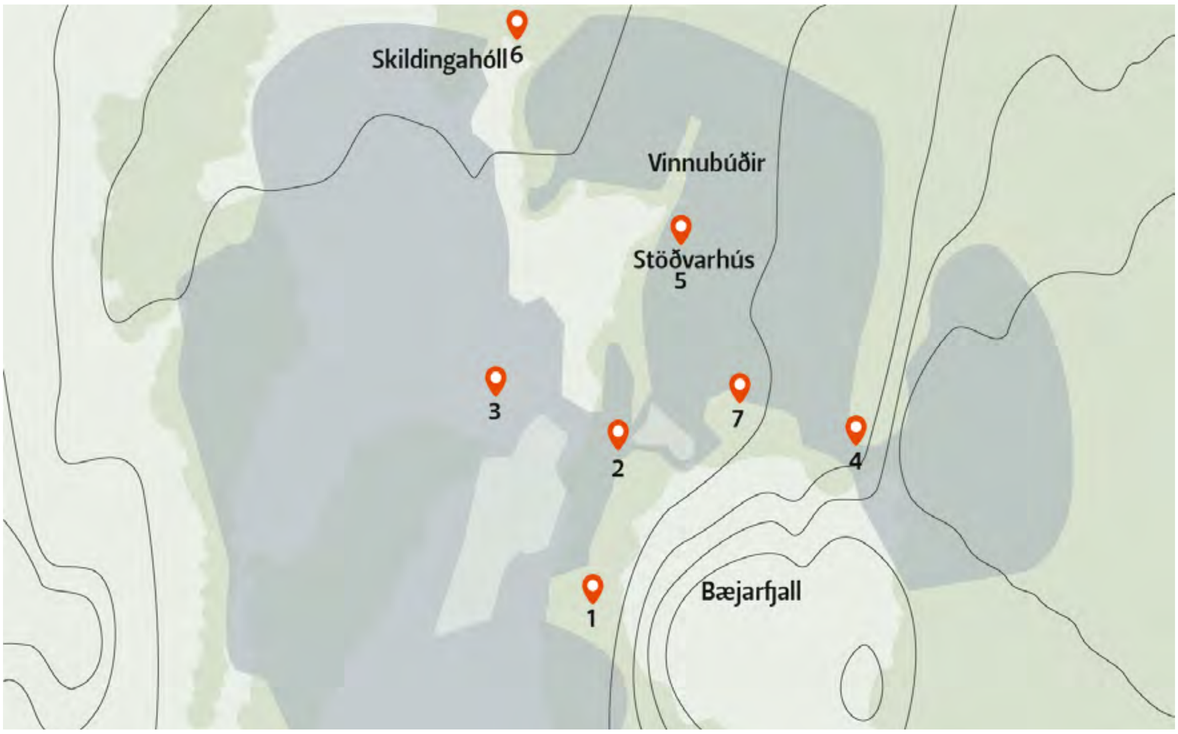
Wells were active in the area during the first part of the year (observed at monitoring stations 1-4 during measurements). The results are similar to those recorded in the latter part of 2014 when wells were also active. Construction work on Landsvirkjun's new power station is being carried out in the area and this affects noise levels. The results showed that noise levels were mostly approx.40 dB(A) or below, which is the set limit for quiet areas within rural areas according to the noise regulations.

Construction work was temporarily on hold when measurements were conducted in September, wells were not active and there was no outside traffic entering the area. The noise levels recorded that day were similar to those recorded before construction began.

Table 22 – Measurements by Þeistareykir in 2015. All values are dB(A) and are rounded up to the next whole number.

Monitoring station at Þeistareykir	26.2.2015 dB(A)	13.5.2015 dB(A)	14.7.2015 dB(A)	2.9.2015 dB(A)	12.1.2016 dB(A)
1	33	40	39	27	42
2	53	41	48	29	33
3	47	39	33	25	40
4	65	57	49	29	35
5	41	50	52	53	29
6	33	40	39	25	47
7	–	–	49	30	49
Time	13:45–16:00	10:26–12:10	9:00–12:10	8:47–11:55	07:30–11:00
Temperature	–3°C	1°C	5°C	8°C	–6°C
Wind direction	E	S	NE	W	N
Wind velocity	0–8m/s	4–6m/s	5–7m/s	1–3m/s	6–8m/s

Figure 18 – Location of noise monitoring stations by Þeistareykir. The shaded area on the map shows industrial areas used for energy generation.



Þeistareykir Geothermal Power Station

Construction work continued at Þeistareykir in 2015. Table 23 shows the quantity of waste produced on site at Þeistareykir in 2015 as well as fossil fuel consumption by contractors. The estimated GHG emissions as a result of fossil fuel consumption and the landfilling of unsorted waste can also be seen.

Table 23 – Quantity of waste and hazardous waste from construction by Þeistareykir as well as fossil fuel consumption and GHG emissions in 2015.

	Quantity		GHG emissions [tonnes CO_2-eq]
Total fuel consumption	268,571	litres	
Diesel oil, contractor	268,407	litres	733
Petrol, contractor	164	litres	0.4
Total unsorted waste	9,080	kg	
Landfilled	9,080	kg	5
Waste for recycling and reuse	66,390	kg	
Paper	3,367	kg	
Timber	32,910	kg	
Plastic	1,443	kg	
Metals	22,060	kg	
Biodegradable waste	6,610	kg	
Total GHG emissions			738

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