ENVIRONMENTAL PROFILE OF THE ENERGY CONSUMPTION OF PROPERTIES USED BY KESKO IN 2019

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Table of contents

1 Introduction

The purpose of this report is to chart the environmental impacts caused by Kesko's consumption of electricity and heat in 2019. The report is a continuation of previous environmental profile calculations for Kesko's properties, and has been carried out in a similar manner.

1.1 Energy consumption 2019

In 2019, properties owned or used by Kesko in Finland consumed a total of 764,457 MWh of electricity and 327,711 MWh of heat.

In Finland in 2019, Kesko supplied a total of 488,335 MWh of electricity to K-Group. This amounted to 64% of the total electricity consumption of Kesko's real estate in Finland. The supplied amount was approximately 1% lower than in 2018. In 2019, supply of electricity consisted of bioelectricity and hydroelectric power.

1.2 On the base data used for the calculations

The following base data was used for calculating the environmental profile of electricity consumption:

- For electricity within the sphere of centralised electricity procurement, the environmental profile of Finnish bioelectricity and hydroelectric power was used, with a daily per capita emission factor of: CO2 0 g/kWh
- For off-procurement electricity, we used the environmental profile published by the Energy Authority for the calculated production mix of electricity produced from non-renewable sources for the year 2018[1]. Fossil energy sources and peat 45.44%, renewable energy sources 8.49%, nuclear power 46.07%, average daily per capital emission coefficient of calculated production mix of electricity production 289.67 g/kWh, and amount of used nuclear fuel 1.25 mg/kWh.
- As the location-based emission coefficient, we used the national average electricity procurement CO2 emission factor of 158 g/kWh, as published by Motiva for the statistical year 2017[2]. The emission coefficient has been calculated as a moving average for five years taken from the Statistics Finland's database.
- For the calculation of acidifying emissions and emissions that affect tropospheric ozone, we have used the daily per capita emissions caused during the production stage of electricity production in 2010, reported in VTT's Lipasto system[3]
- The calculations use the following primary energy multipliers: Renewable fuels 1, non-renewable fuels 1.75 and nuclear power 3.03[4]

[1] Energy Authority. 2019. Calculated production mix for 2018. https://energiavirasto.fi/tiedote/-/asset_publisher/vuoden-2018-jaannosjakauma-julkaistu

[2] Motiva. 2019. CO2 emission factors (statistical year 2017). https://www.motiva.fi/ratkaisut/energiankaytto_suomessa/co2-laskentaohje_energiankulutuksen_hiilidioksidipaastojen_laskentaan/co2-paastokertoimet

[3] VTT. 2012. Suomen rautatieliikenteen päästöjen laskentajärjestelmä RAILI 2011 TUTKIMUSRAPORTTI (in Finnish; The Research Report of 2011 for RAILI, The calculating system for the emissions in the Finnish railroads) VTT-R-03247-12

[4] Keto, Matias. 2010. Factors of Energy Sources - a Report to the Ministry of Environment. http://www.ym.fi/download/noname/%7BA6ABCFF7-55FA-412C-A0C7-FEE5CC0A2F24%7D/30744

The following base data was used for calculating the environmental profile of municipal heating:

- Statistics Finland publication on the coefficient reported by Motiva on average CO2 emissions from municipal heating in Finland (average over past five years, joint production distributed using the benefit sharing method, statistical year 2017): 164 g/kWh[5]. This coefficient is used to calculate both market-based and location-based emissions.
- For other atmospheric emissions, we used average emission factors for municipal heating, calculated by VTT in 2008[6]
- Primary energy multiplier 0.9[7]
- Emission factors used in Statistics Finland's Fuel classification 2019[8]

1.3 On the calculation principles and the accuracy of data

The heat and electricity consumption of Kesko's properties in Finland has been evaluated by expanding the daily per capita consumption figures of tracked properties by the total stock of real estate in each real estate category.

The notification recommendations issued to electricity suppliers for each calendar year only apply to the production methods of sold energy, the carbon dioxide emissions created during production and the amount of nuclear fuel used. The publication dates of the data have not been specified; rather, we have used the latest available information for each supplier. The years of the emission profiles used for calculation are indicated in Paragraph 1.2. No obligation exists to declare acidifying emissions or emissions that affect tropospheric ozone, and, for calculating these emissions, we used the daily per capita emission factors of the production stage of Finnish energy production. If the source data for the calculation year was not available for the previous year's calculations, this data was recalculated for this report on the basis of the source data declared for the year. Due to these recalculations, the emission data reported for the previous year may diverge from the one reported in earlier reports.

The updated GHG Protocol standard from 2015 recommends the reporting of emissions for purchased electricity and heat, in accordance with both the market-based and location-based coefficient. The location-based emission coefficients for electricity and heating are Motiva's reported overall emission coefficient for Finland and coefficient for average CO2 emissions from municipal heating in Finland, respectively.

Acidifying gases have been made commensurate[9,10]and their environmental impacts have been reported as SO2 equivalents.

The total greenhouse gas emissions generated by own heat production have been estimated on the basis of the fuel emission factors published by Statistics Finland.

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[5] Motiva. 2019. CO2 emission factors (statistical year 2017). https://www.motiva.fi/ratkaisut/energiankaytto_suomessa/co2-laskentaohje_energiankulutuksen_hiilidioksidipaastojen_laskentaan/co2-paastokertoimet

[6] VTT 2010, Research Report VTT-R-04737-10

[7] Keto, Matias. 2010. Factors of Energy Sources - a Report to the Ministry of Environment. http://www.ym.fi/download/noname/%7BA6ABCFF7-55FA-412C-A0C7-FEE5CC0A2F24%7D/30744

[8] Statistics Finland. 2019. Polttoaineluokitus (Fuel classification) 2019. http://www.tilastokeskus.fi/tup/khkinv/khkaasut_polttoaineluokitus.html

[9] IPCC. 2007. Fourth assessment report. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf

[10] Wimmer Wolfgang, Zűst & LeeKun-Mo (2004): Ecodesign Implementation A Systematic Guidance on Integrating Environmental Considerations into Product Development. Springer

2 Environmental profile

2.1 Environmental profile of electricity supplied by Kesko

The environmental impacts of electricity supplied by Kesko to the K-Group, calculated from the base data, are presented in Table 1. These impacts have not been proportioned to daily per capita consumption figures; rather, they were calculated for the overall amount of supplied electricity of 488,335 GWh in 2019.

Table 1. Environmental impacts of electricity supplied by Kesko to K-Group in 2017–2019

Energy	Unit	2017	2018	2019	Change 2018-2019
Purchases	GWh	504	493	488	-1,0 %
Primary energy	PJ	1,81	1,78	1,76	-1,0 %
Fossile	PJ	0,00	0,00	0,00	0,0 %
Renewable	PJ	1,81	1,78	1,76	-
Nuclear	PJ	0,00	0,00	0,00	-
Environmental effects					
Climate change	tonnes CO2-eqv	0	0	0	0 %
Acidification	tonnes SO2-ekv	0	0	0	0 %
Nitrous oxides	tonnes NOX	0,0	0	0	0 %
Sulfur oxides	tonnes SO2	0,0	0	0	0 %
Used nuclear fuel	tonnes	0,00	0,00	0,00	-

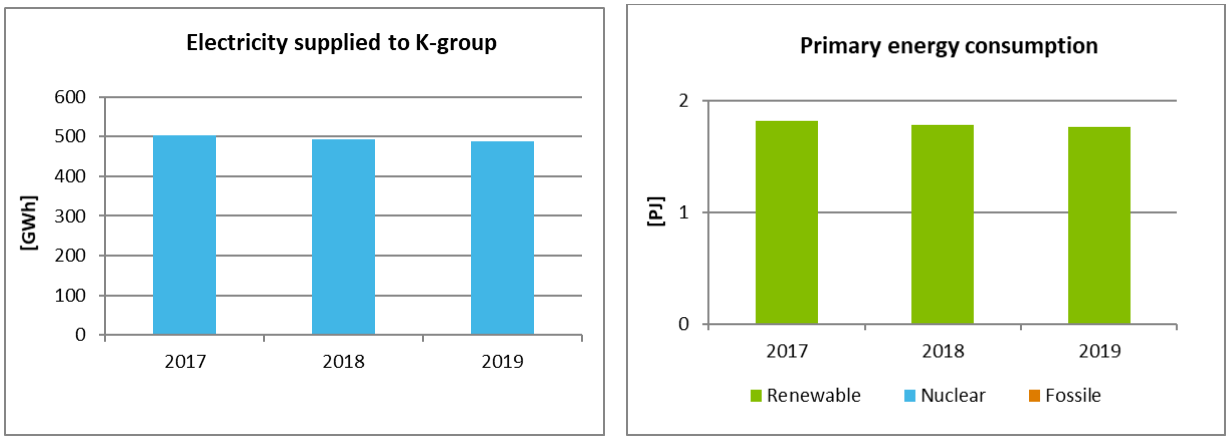


Figure 1. Amount of electricity supplied by Kesko to the K-Group and its environmental profile, calculated for the total amount of electricity supplied in 2017–2019

2.2 Properties owned and used by Kesko in Finland

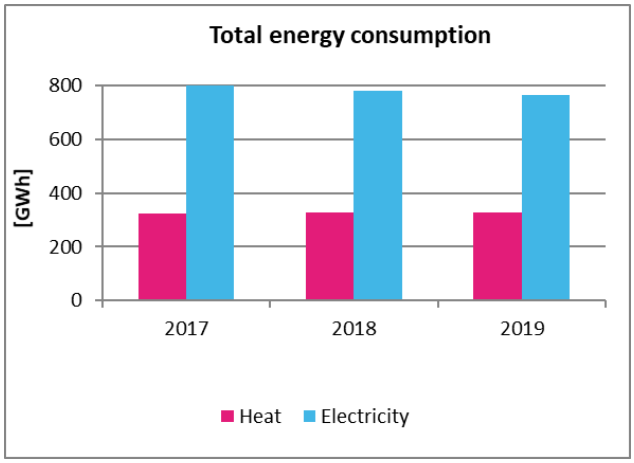
This chapter presents an overview of the environmental impacts of the energy consumed by the properties owned or used by Kesko in Finland. In addition to the electricity procured for its retailers by Kesko, presented in the previous chapter, we have also taken the electricity purchased independently by K-retailers into account as well as purchased heat or own heat production used for heating the properties. The heat and electricity consumption of Kesko's properties in Finland has been evaluated by expanding the daily per capita consumption figures of tracked properties by the total stock of real estate.

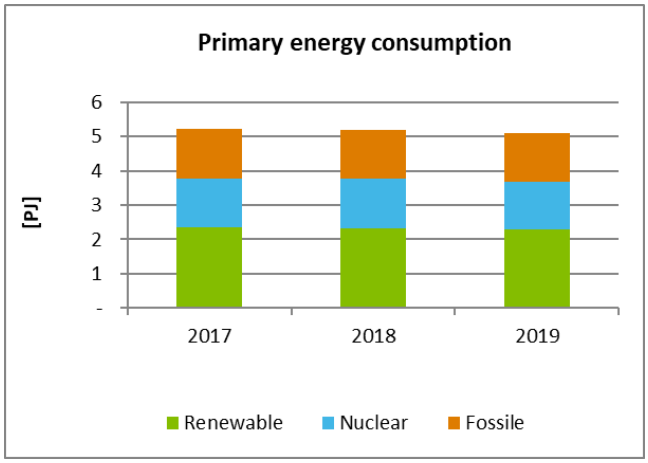
For the environmental profile for total electricity purchasing, we used the profile described in the previous paragraph for electricity supplied by Kesko, and we used the environmental profile published by the Energy Authority for the calculated production mix of electricity produced from non-renewable sources for electricity independently purchased by K-retailers. Electricity supplied by Kesko amounts to approximately 64% of the total consumption of Kesko's properties in Finland. The base data for calculating the environmental impacts of heating is presented in paragraph 1.2.

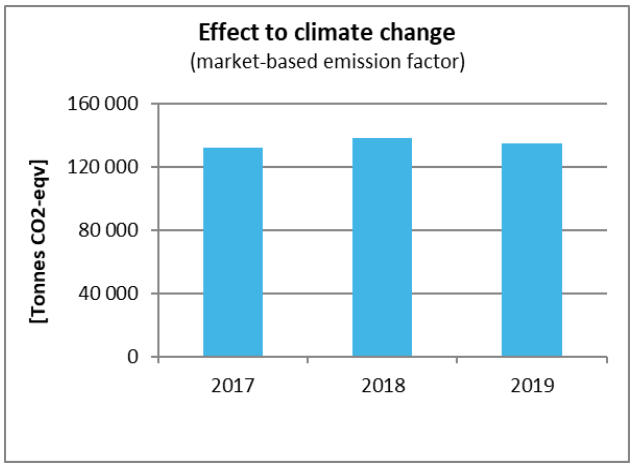
The environmental impacts of the heat and electricity consumed by properties are presented in Table 2 and Figure 2. The indicated change in energy consumption includes changes resulting from changes to the stock of real estate.

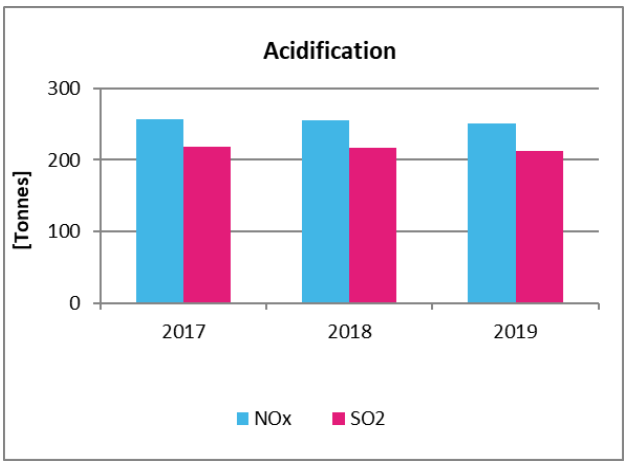
Table 2. Estimate of the heat and electricity consumption and environmental impacts of the properties owned and used by Kesko in Finland, 2018–2019.

Energy	Unit	2018			2019			Change 2018-2019		
		Electricity	Heat	Total	Electricity	Heat	Total	Electricity	Heat	Total
Purchases	GWh	780,7	328,8	1 109,5	764,5	327,7	1 092,2	-2,1 %	-0,3 %	-1,6 %
Primary energy	PJ	4,13	1,07	5,20	4,02	1,07	5,09	-2,7 %	-0,3 %	-2,2 %
Fossile	PJ	0,82	0,60	1,42	0,79	0,60	1,39	-3,9 %	0,5 %	-2,1 %
Renewable	PJ	1,86	0,47	2,33	1,84	0,46	2,30	-1,2 %	-1,2 %	-1,2 %
Nuclear	PJ	1,45	-	1,45	1,39	-	1,39	-3,9 %		-3,9 %
Environmental effects										
Climate change	tonnes CO2-eqv	83 238	54 589	137 826	79 984	54 594	134 579	-3,9 %	0,0 %	-2,4 %
Nitrous oxides	tonnes NOX	114,4	141,4	255,8	109,9	140,9	250,8	-3,9 %	-0,3 %	-1,9 %
Sulfur oxides	tonnes SO2	92,0	125,0	216,9	88,4	124,5	212,9	-3,9 %	-0,3 %	-1,9 %
Used nuclear fuel	tonnes	0,36	-	0,36	0,35	-	0,35	-3,9 %		-3,9 %









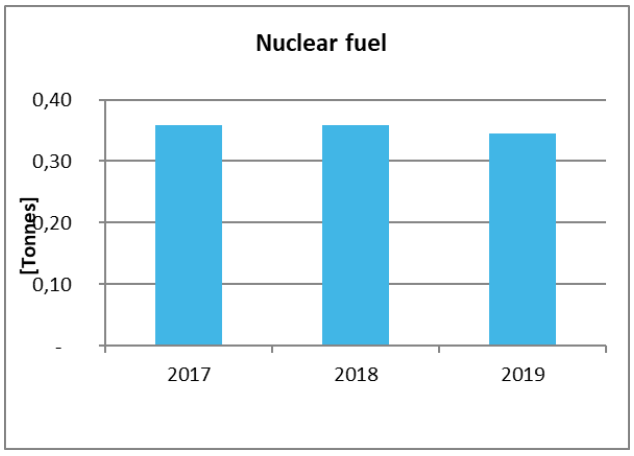


Figure 2. Comparison of the heat and electricity consumption and environmental impacts of the properties owned and used by Kesko in Finland, 2017–2019.

2.3 Discussion of the results

Total consumption of electricity in properties owned or used by Kesko decreased by 2.1% from 2018, whereas total non-normalised consumption of heat decreased by 0.3%. No significant changes in consumption occurred between 2018 and 2019.

The environmental impacts of electricity consumption decreased by 3.9% from the previous year. As in previous years, the electricity purchased by Kesko is entirely CO2-free (produced by bioenergy and hydroelectric power in 2019) and has therefore caused no atmospheric emissions. The decrease in environmental impacts is mainly due to lower total consumption.

The environmental load of heat use has remained largely unchanged from 2018.

2.4 Share of Finnish energy consumption and emissions

In 2019, the amount of primary energy consumed by Kesko in Finland accounted for approximately 0.4% of the total energy consumption in Finland (1,381 PJ in 2018)[11]. The electricity consumption of Kesko's Finnish properties in 2019 represented approximately 0.9% of the total consumption of electricity in Finland (87.5 TWh in 2018)[11], and Kesko's share of the total consumption of municipal heating (33.5 TWh in 2018)[12] was approximately 1%. Kesko's greenhouse gas emissions represented roughly 0.2% of total Finnish emissions (approximately 56.5 million tonnes in 2018[13]).

[11] Statistics Finland. 2019. The use of fossil fuels and renewable energy increased in Finland in 2018. https://www.stat.fi/til/ehk/2018/ehk_2018_2019-12-12_tie_001_fi.html

[12] Finnish Energy. 2019. Municipal heating 2018. https://www.slideshare.net/energiateollisuus/kaukolmp-2018

[13] Statistics Finland. 2019. Finnish greenhouse gas emissions in 2018. https://www.stat.fi/til/khki/2018/khki_2018_2019-05-23_kat_001_fi.html

3 Indicators specified in the GRI reporting guidelines

The environmental impacts of the energy use of Kesko's properties, reported in accordance with the guidelines of the Global Reporting Initiative Standards.

3.1 Energy consumption

According to the GRI Standards guidelines, the organisation's own energy consumption is divided by the indicator 302-1 into direct (Scope 1) consumption and indirect (Scope 2) consumption.

- Direct energy consumption (302-1: Fuels) is energy produced by the company itself, e.g. in generating heat by burning fuel oil and LNG.
- Indirect energy consumption (302-1: Purchased energy) consists of energy purchased by the company, e.g. purchased electricity and heat.

The direct and indirect energy consumption of properties owned and managed by Kesko is presented by primary source in Tables 3 and 4.

3.2 Emissions

Regarding emissions, the results cover the following indicators.

- 305-1 and 305-2 Direct and indirect greenhouse gas emissions (Scope 1 and 2)
- 305-7 Nitrogen oxides, sulphur oxides and other significant air emissions; of these, only indirect (Scope 2) nitrogen and sulphur dioxide emissions are reported.

The direct and indirect greenhouse gas emissions of properties owned and managed by Kesko are presented in Tables 3 and 4.

Table 3. Consumption of purchased energy of properties owned and used by Kesko in 2015 and the related production indicators.

302-1: Purchased energy	Unit	2017			2018			2019			Change 2018-2019		
		Electricity	Heat	Total	Electricity	Heat	Total	Electricity	Heat	Total	Electricity	Heat	Total
Purchases	TJ	2 880	1 125	4 005	2 811	1 153	3 964	2 752	1 140	3 892	-2,1 %	-1,2 %	-1,8 %
Primary energy	TJ	4 175	1 013	5 187	4 132	1 038	5 170	4 021	1 026	5 047	-2,7 %	-1,2 %	-2,4 %
Fossile	TJ	797	608	1 405	823	571	1 394	790	564	1 355	-3,9 %	-1,2 %	-2,8 %
Renewable	TJ	1 955	405	2 360	1 864	467	2 331	1 842	462	2 304	-1,2 %	-1,2 %	-1,2 %
Nuclear	TJ	1 422	-	1 422	1 445	-	1 445	1 389	-	1 389	-3,9 %	-	-3,9 %
305-2 Energy indirect GHG emissions													
Climate change (market-based)	tonnes CO2-eqv	78 231	51 254	129 485	83 238	52 543	135 781	79 984	51 924	131 909	-3,9 %	-1,2 %	-2,9 %
Climate change (location-based)	tonnes CO2-eqv	126 388	51 254	177 642	123 351	52 543	175 894	120 784	51 924	172 708	-2,1 %	-1,2 %	-1,8 %
305-7 Other air emissions													
Acidification	tonnes SO2-eqv	177,4	212,8	390,2	172,0	218,2	390,2	165,3	215,6	380,9	-3,9 %	-1,2 %	-2,4 %
Nitrous oxides	tonnes SO2	117,9	134,4	252,3	114,4	137,8	252,1	109,9	136,1	246,0	-3,9 %	-1,2 %	-2,4 %
Sulfur oxides	tonnes NOX	94,8	118,8	213,6	92,0	121,7	213,7	88,4	120,3	208,7	-3,9 %	-1,2 %	-2,4 %
Used nuclear fuel	tonnes	0,36	-	0,36	0,36	-	0,36	0,35	-	0,35	-3,9 %	-	-3,9 %

Table 4. Self-production of heat in properties owned and used by Kesko and production indicators.

302-1: Fuels	Unit	2017			2018			2019			Change 2018-2019		
		Oil	Gas	Total	Oil	Gas	Total	Oil	Gas	Total	Oil	Gas	Total
Primary energy	TJ	28,55	10,97	39,52	19,57	10,97	30,54	25,46	14,64	40,09	30,0 %	33,4 %	31,3 %
Fossile	TJ	28,55	10,97	39,52	19,57	10,97	30,54	25,46	14,64	40,09	30,0 %	33,4 %	31,3 %
305-1 Direct GHG emissions													
Climate change	tonnes CO2-eqv	2 098,1	606,7	2 704,8	1 438,7	606,7	2 045,3	1 860,8	809,4	2 670,2	29,3 %	33,4 %	30,5 %

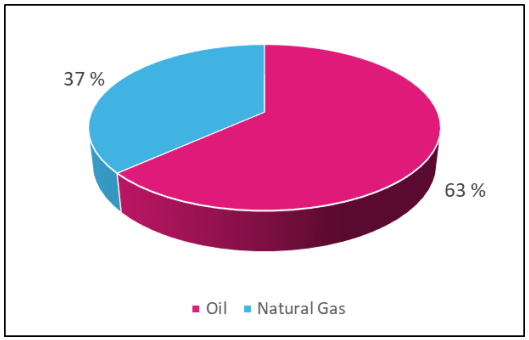


Figure 3. Fuel distribution of the own heat production of properties owned or used by Kesko in 2019.