



ENVIRONMENTAL PROFILE OF THE ENERGY CONSUMPTION OF PROPERTIES USED BY KESKO IN 2018

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1 Introduction

The purpose of this report is to chart the environmental impacts caused by Kesko's consumption of electricity and heat in 2018. 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 in 2018

In 2018, properties owned or used by Kesko in Finland consumed a total of 780,700 MWh of electricity and 328,842 MWh of heat.

In Finland, Kesko supplied a total of 493,347 MWh of electricity to the K-Group in 2018. This amounts to 63% of the total electricity consumption of Kesko's real estate in Finland. The supplied amount was approximately 2% lower than that of 2017. In 2018, 44% of electricity supply consisted of bioelectricity and 56% of 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 2017¹.
- As the location-based emission factor, we used the national average electricity procurement CO₂ emission factor of 164 g/kWh, as published by Motiva for the statistical year 2016². The emission factor 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 system³
- The calculations use the following primary energy multipliers: Renewable fuels 1, non-renewable fuels 1.75 and nuclear power 3.03⁴

¹ Energy Authority. 2018. Calculated production mix 2017. <https://www.energiavirasto.fi/-/vuoden-2017-jaannosjakauma-julkais-1>

² Motiva. 2018. CO₂ emission factors (statistical year 2016). 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:

- Calculated using the benefit sharing method for district heating joint production areas, the average CO₂ factor is 188 g/kWh⁵, which is used in the calculation of market-based and location-based emissions.
- For other atmospheric emissions, we used average emission factors for municipal heating, calculated by VTT in 2008⁶
- Primary energy multiplier 0.9⁷
- Emission factors used in Statistics Finland's Fuel classification 2018⁸

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 factor. The data given in the residual distribution calculation was used as the location-based emission factor for electricity; and the average CO₂ factor, calculated using the benefit sharing method for Finland's district heating joint production areas, was used for heat.

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.

⁵ Motiva. 2018. CO₂ emission factors (statistical year 2016).

https://www.motiva.fi/ratkaisut/energian kaytto_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.ymparisto.fi/download/noname/%7BA6ABCFF7-55FA-412C-A0C7-FEE5CC0A2F24%7D/30744>

⁸ Statistics Finland. 2018. Polttoaineluokitus (Fuel classification) 2018. 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, Züst & 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 493,347 GWh in 2018.

Table 1. Environmental impacts of electricity supplied by Kesko to the K-Group in 2016 – 2018

Energy	Unit	2016	2017	2018	Change 2017-2018
Purchases	GWh	459	504	493	-2,0 %
Primary energy	PJ	5,00	1,81	1,78	-2,0 %
Fossile	PJ	0,00	0,00	0,00	0,0 %
Renewable	PJ	0,00	1,81	1,78	-
Nuclear	PJ	5,00	0,00	0,00	-
Environmental effects					
Climate change	tonnes CO2-ekv	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	1,21	0,00	0,00	-

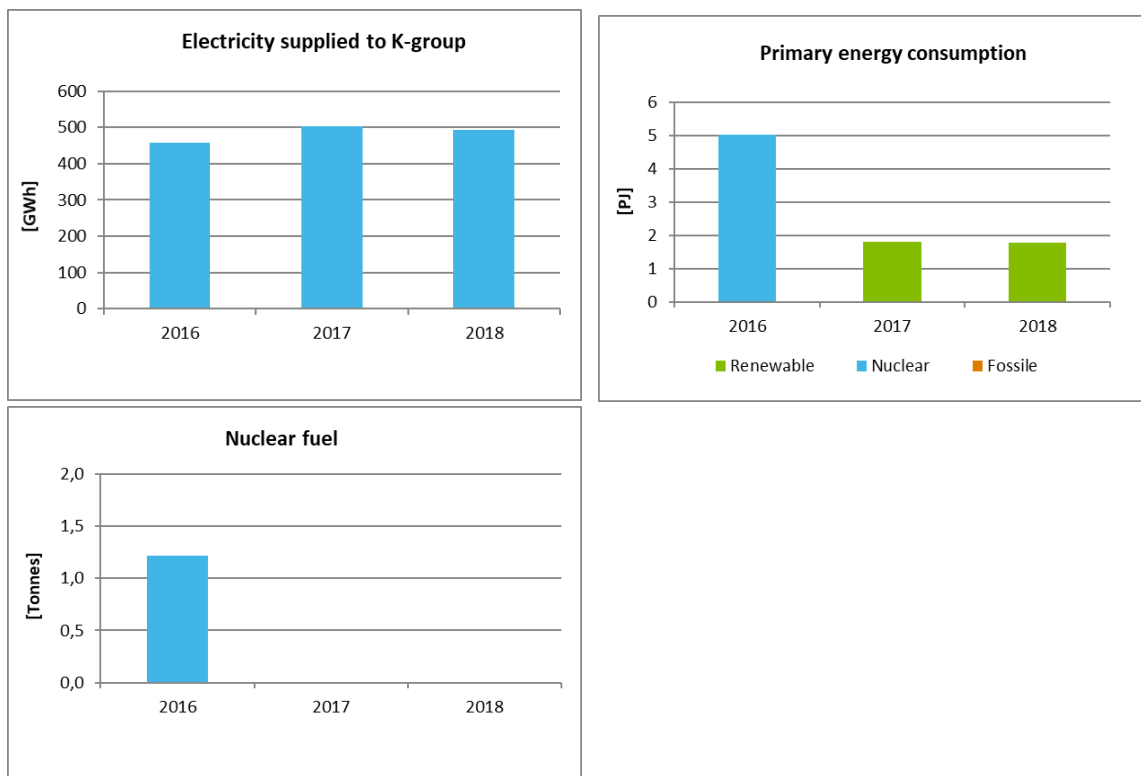


Figure 1. Amount of electricity supplied by Kesko to the K-Group and its environmental profile, calculated for the total amount of electricity supplied in 2016 - 2018

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 63% 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, 2017 - 2018.

Energy	Unit	2017			2018			Change 2017-2018		
		Electricity	Heat	Total	Electricity	Heat	Total	Electricity	Heat	Total
Purchases	GWh	799,9	323,5	1 123,4	780,7	328,8	1 109,5	-2,4 %	1,7 %	-1,2 %
Primary energy	PJ	4,17	1,05	5,23	4,07	1,07	5,13	-2,6 %	1,6 %	-1,8 %
Fossile	PJ	0,80	0,65	1,44	0,77	0,65	1,43	-3,0 %	1,0 %	-1,2 %
Renewable	PJ	1,96	0,41	2,36	1,91	0,42	2,33	-2,1 %	2,5 %	-1,3 %
Nuclear	PJ	1,42	-	1,42	1,38	-	1,38	-3,0 %		-3,0 %
Environmental effects										
Climate change	tonnes CO2-eqv	78 231	61 459	139 690	75 873	62 278	138 151	-3,0 %	1,3 %	-1,1 %
Nitrous oxides	tonnes NOX	117,9	139,1	257,0	114,4	141,4	255,8	-3,0 %	1,7 %	-0,5 %
Sulfur oxides	tonnes SO2	94,8	122,9	217,7	92,0	125,0	216,9	-3,0 %	1,7 %	-0,4 %
Used nuclear fuel	tonnes	0,36	-	0,36	0,35	-	0,35	-3,0 %		-3,0 %

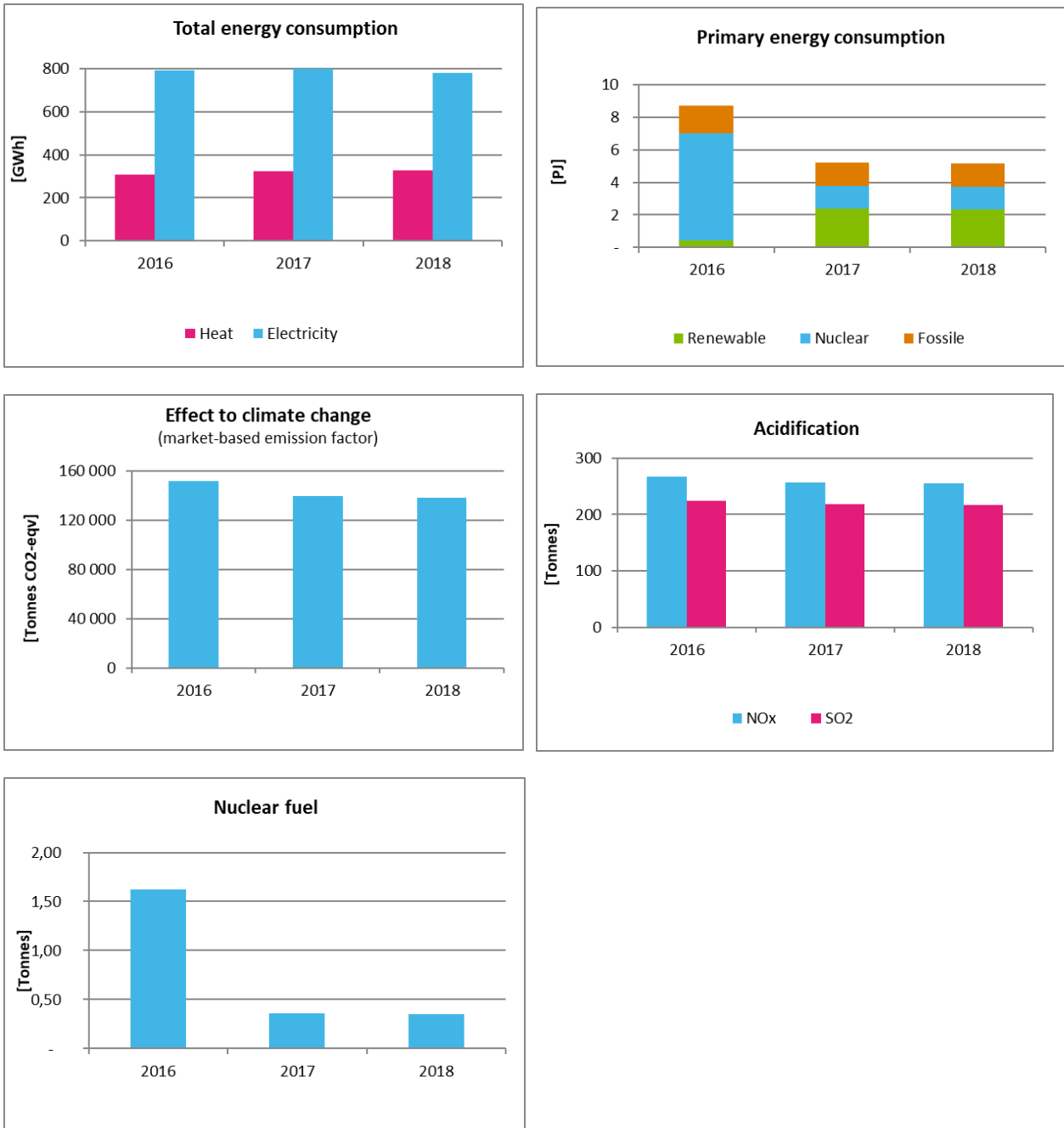


Figure 2. Comparison of the heat and electricity consumption and environmental impacts of the properties owned and used by Kesko in Finland, 2016 - 2018.

2.3 Discussion of the results

The total consumption of electricity in properties owned or used by Kesko decreased by 2.4% from 2017, whereas the total non-normalised consumption of heat increased by 1.7%. No significant changes in consumption occurred between 2017 and 2018.

The environmental impacts of electricity consumption decreased by 3% in comparison to the previous year. As in previous years, the electricity purchased by Kesko is entirely carbon dioxide-free (produced by bioenergy and hydroelectric power in 2018) and has therefore caused no atmospheric emissions. The reduction in environmental impact was mainly due the decrease in total consumption and secondarily by the lower emission factor used in the calculated production mix for off-procurement electricity.

The environmental load of heating increased slightly from the previous year by 1.3%, mainly due to the increase in district heating consumption.

2.4 Share of Finnish energy consumption and emissions

In 2018, the amount of primary energy consumed by Kesko in Finland accounted for approximately 0.4% of the total energy consumption in Finland (1350 PJ in 2017)¹¹. The electricity consumption of Kesko's Finnish properties in 2018 represented approximately 0.9% of the total consumption of electricity in Finland (85 TWh in 2017)¹¹, and Kesko's share of the total consumption of municipal heating (33.2 TWh in 2017)¹² was approximately 1%. Kesko's greenhouse gas emissions represented roughly 0.2% of total Finnish emissions (approximately 56.1 million tonnes in 2017¹³).

¹¹ Statistics Finland. 2018. Use of renewable energy continued growing in 2017. https://www.stat.fi/til/ehk/2017/ehk_2017_2018-12-11_tie_001_en.html

¹² Finnish Energy. 2018. Year in energy 2017 District heating. <https://www.slideshare.net/energiateollisuus/energiavuosi-2017-kaukolmp-88289580>

¹³ Statistics Finland. 2018. Finnish greenhouse gas emissions in 2017. https://tilastokeskus.fi/til/khki/2017/khki_2017_2018-05-24_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 and the related production indicators.

302-1: Purchased energy	Unit	2016			2017			2018			Change 2017-2018		
		Electricity	Heat	Total	Electricity	Heat	Total	Electricity	Heat	Total	Electricity	Heat	Total
Purchases	TJ	2 859	1 091	3 951	2 880	1 125	4 005	2 811	1 153	3 964	-2,4 %	2,5 %	-1,0 %
Primary energy	TJ	7 710	982	8 692	4 175	1 013	5 187	4 066	1 038	5 104	-2,6 %	2,5 %	-1,6 %
Fossil	TJ	1 001	658	1 659	797	608	1 405	773	623	1 396	-3,0 %	2,5 %	-0,6 %
Renewable	TJ	110	324	434	1 955	405	2 360	1 914	415	2 329	-2,1 %	2,5 %	-1,3 %
Nuclear	TJ	6 598	-	6 598	1 422	-	1 422	1 379	-	1 379	-3,0 %	-	-3,0 %
305-2 Energy indirect GHG emissions													
Climate change (market-based)	tonnes CO2-eqv	96 592	56 984	153 576	78 231	58 755	136 986	75 873	60 232	136 105	-3,0 %	2,5 %	-0,6 %
Climate change (location-based)	tonnes CO2-eqv	130 265	56 984	187 249	131 188	58 755	189 942	128 035	60 232	188 267	-2,4 %	2,5 %	-0,9 %
305-7 Other air emissions													
Acidification	tonnes SO2-eqv	200,9	206,4	407,3	177,4	212,8	390,2	172,0	218,2	390,2	-3,0 %	2,5 %	0,0 %
Nitrous oxides	tonnes SO2	133,6	130,3	263,9	117,9	134,4	252,3	114,4	137,8	252,1	-3,0 %	2,5 %	-0,1 %
Sulfur oxides	tonnes NOX	107,4	115,2	222,6	94,8	118,8	213,6	92,0	121,7	213,7	-3,0 %	2,5 %	0,1 %
Used nuclear fuel	tonnes	1,63	-	1,63	0,36	-	0,36	0,35	-	0,35	-3,0 %	-	-3,0 %

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

302-1: Fuels	Unit	2016			2017			2018			Change 2017-2018		
		Oil	Gas	Total	Oil	Gas	Total	Oil	Gas	Total	Oil	Gas	Total
Primary energy	TJ	13,03	7,98	21,00	28,55	10,97	39,52	19,57	10,97	30,54	-31,4 %	0,0 %	-22,7 %
Fossil	TJ	13,03	7,98	21,00	28,55	10,97	39,52	19,57	10,97	30,54	-31,4 %	0,0 %	-22,7 %
305-1 Direct GHG emissions													
Climate change	tonnes CO2-eqv	957,4	441,2	1 398,6	2 098,1	606,7	2 704,8	1 438,7	606,7	2 045,3	-31,4 %	0,0 %	-24,4 %

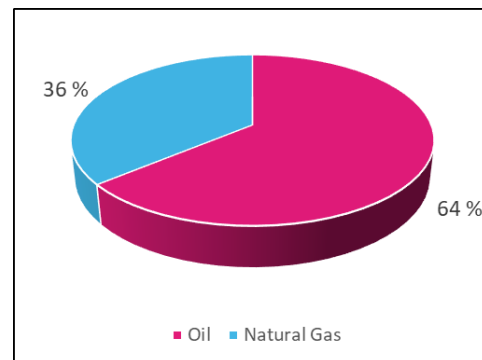


Figure 3. Fuel distribution of the own heat production of properties owned or used by Kesko in 2018.