

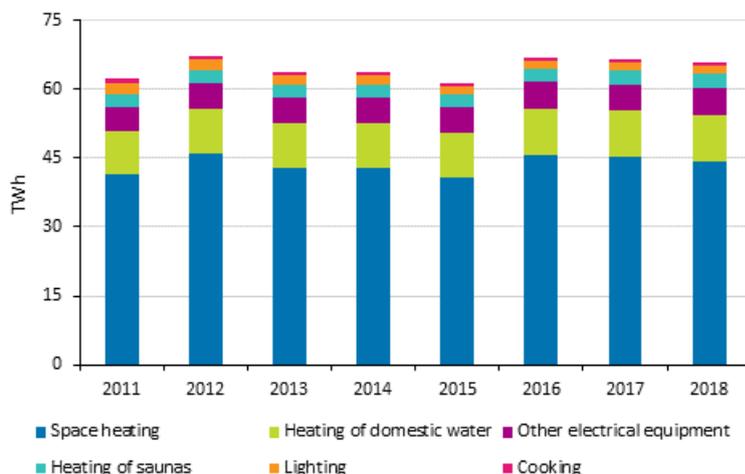
# Energy consumption in households 2018

## Energy consumption in households fell further in 2018

**Korrigering 18.6.2020.** De korrigerade punkterna är markerade med rött.

The energy consumed in housing amounted to close on 66 terawatt hours (TWh) in 2018. Consumption fell by **close to** one TWh from the previous year. The weather was warmer than in the previous year, which decreased the need for heating energy. The number and volume of dwellings increased further. Consumption of indoor space heating fell by **two** per cent from 2017 to 2018. The energy consumption of household appliances went up by two per cent. The data are based on Statistics Finland's statistics on energy consumption in households.

**Energy consumption in households 2011-2018. The figure was corrected on 18 June 2020.**



Heating of residential buildings amounted to close on 68 per cent of energy consumption in housing, heating of domestic water to 15 per cent and heating of saunas to five per cent. The share of electrical equipment, cooking and lighting was 13 per cent. Housing accounted, on average, for 20 per cent of the final energy consumption. Housing also includes free-time residences.

One-third of energy consumption in housing was electricity in 2018. Nearly one-third of consumption was district heat and good one-fifth wood. Close on 23 TWh of electricity was consumed; the consumption has remained more or less unchanged for three years. **Forty-eight** per cent of electricity was used to heat

indoor areas and 36 per cent to household appliances. The remainder of electricity was used to heat domestic water and saunas.

Heating of residential buildings consumed 44 TWh of energy in 2018. Consumption decreased by **two** per cent from the previous year. The most common sources of energy for heating indoor spaces were district heat, wood and electricity, the share of which was 82 per cent of the energy consumption for heating indoor spaces. The next most common energy source was heat pump energy.

The use of heat pumps for heating has grown significantly from the start of the millennium. This is visible as growth in both heat pump energy and electricity use of heat pumps. Heat pump energy refers to the energy extracted with heat pumps from the environment. The electricity use of heat pumps is included in electricity consumption of heating in the statistics on energy consumption in households.

In addition to the area to be heated and the energy efficiency of the building stock, the need for heating energy is also affected by the outdoor temperature. Its changes are monitored with heating degree days. The year 2018 was warmer than 2017, although both were clearly colder than the record warm year 2015.

Around 3 TWh of energy was used for heating saunas in 2018. Nearly two-thirds of energy were wood and good one-third electricity. The energy consumption of heating domestic water was 10 TWh.

The energy consumption of household appliances, that is, cooking, lighting and other electrical equipment, was good eight TWh in 2018. Appliances accounted for close on 13 per cent of the entire housing energy. One percentage point of this was used on cooking, that is, using cookers and ovens, and good two percentage points on lighting. The remaining good nine percentage points were used in other electrical equipment. They include small appliances for cooking, refrigeration equipment, washing machines, tumble dryers, televisions and computers with their accessories, lifts, and car interior heating.

With respect to the consumption of heating energy in indoor spaces, domestic water and saunas, the statistics on energy consumption in households are based on Statistics Finland's calculation model where various sources were utilised. Part of the data have been estimated as the interval between the inquiries used as data sources has become longer.

The concepts of the statistics correspond to the divisions of the European Union's Regulation on energy statistics concerning energy use in households. Based on the division, heating of indoor spaces and domestic water, cooking, electrical equipment, and heating of saunas are reported separately.

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# 1. Development of main heat sources in residential buildings in the 2010s

The statistics on energy consumption in households monitors the development of heating modes and heat sources in residential buildings with the help of both register data and sample surveys. Already at the beginning of the 2010s, the number of oil-heated dwellings in the register was bigger than the number observed in the survey. Correspondingly, the share of district heat and ground heat in heating of residential buildings was higher in the sample survey than in the register. The change of heat sources has continued throughout the 2010s. There has been a shift from oil to district heat especially in blocks of flats and terraced houses and from oil to ground heat in one-dwelling and two-dwelling houses. The importance of heat pumps in heating has grown. According to the sample surveys, the change has been clearly faster than could be concluded from the building register.

## Development of main heat sources

Publishing of the statistics on energy consumption in households started in 2011. When creating the statistics at the turn of the decade, it was observed that fitting the data on heating modes and heat sources of the building stock with data on energy sales requires a revision of the data on heat sources. Therefore, Statistics Finland began monitoring heat sources for heating with sample surveys.

In addition to data on the whole building stock in Finland, the building register includes data on heating modes and main heat sources. Register data are collected in the construction stage and in connection with renovations that require a building permit. A change of heat source requires at most a planning permission for minor construction, which is why the changes of heat source are not recorded in to the register.

The annual monitoring of heat sources in residential buildings with sample surveys was introduced in 2010 as part of the survey on income and living conditions. In 2015, the question was moved to the survey on renovation building of dwellings and detached houses. In addition to the annual sample surveys mentioned above, questions on heating mode and heat source have also been included in the Household Budget Survey and the survey on the use of heating energy in small-scale housing.

All households are included in the population of the survey on income and living conditions and the Household Budget Survey, so the surveys cover all modes of living. Renovation building of housing and detached houses concerns owner-occupied housing. Due to the uncertainty caused by the assumptions required to harmonise the data contents, the results are ballpark estimates and presented as graphs.

The largest differences in the heat sources between sample surveys and the building register are compared in figure 1 for blocks of flats, in figure 2 for terraced houses and in figure 3 for detached houses (one-dwelling and two-dwelling houses). Data on free-time residences included in the statistics on energy consumption in households are available only from individual sample surveys, such as the survey on the use of heating energy in small-scale housing in spring 2017.

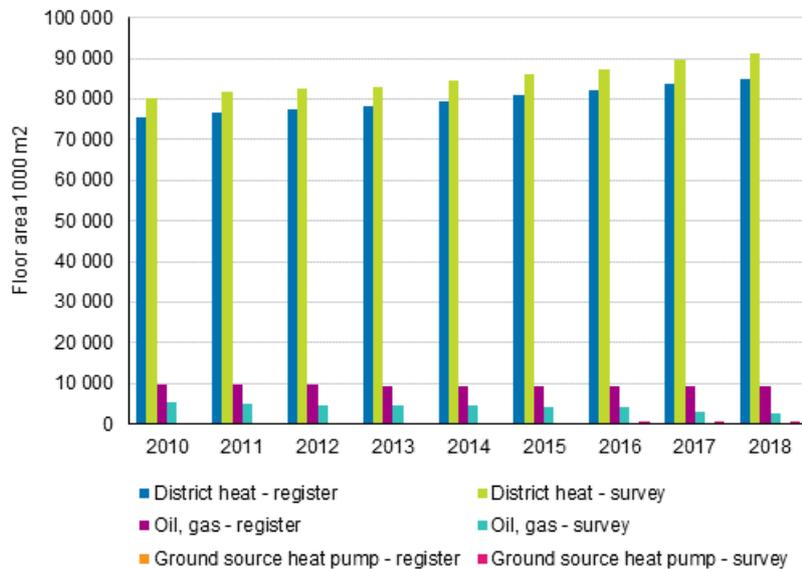
Figure 1 presents the development of heat sources in dwellings in blocks of flats according to the register and the sample surveys. The majority of blocks of flats are heated with district or local heat. According to the sample surveys, the share of district and local heat is around 7 per cent higher than in the register data. The share of oil has contracted strongly. According to the sample data, the share of oil is only a few per cent. In the 2010s, ground heat has become more common also in blocks of flats.

Figure 2 describes terraced houses. At the start of the decade, the most important sources of heat in terraced houses were district heat, electricity and oil, in order of volume. Today, the order is district heat, electricity and ground heat.

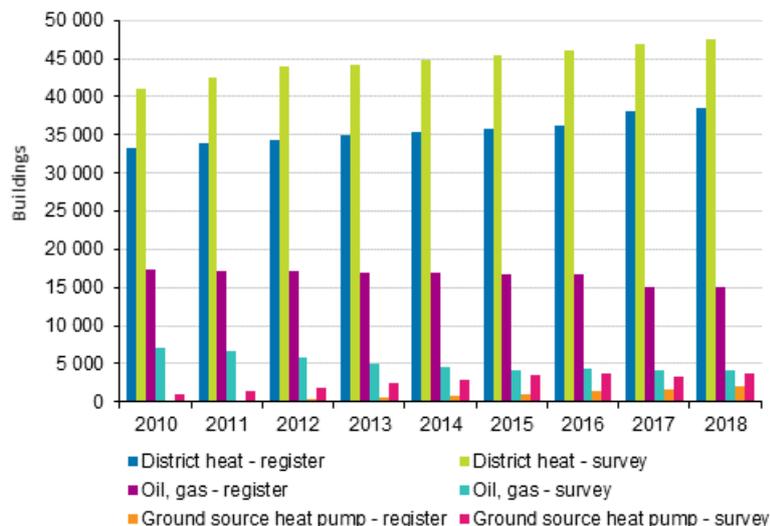
Figure 3 shows the development in one-dwelling and two-dwelling houses. Electricity is the most important main source of heat in one-dwelling and two-dwelling houses. No great changes in its share is noticeable in either data source. However, the sample surveys show that the number of air heat pumps used as an additional heat source has increased steadily in electrically heated one-dwelling and two-dwelling houses (figure 4). As in blocks of flats and terraced houses, the biggest changes have occurred in the use of oil,

district heat and ground heat. Ground heat is clearly more important in one-dwelling and two-dwelling houses than in blocks of flats and terraced houses.

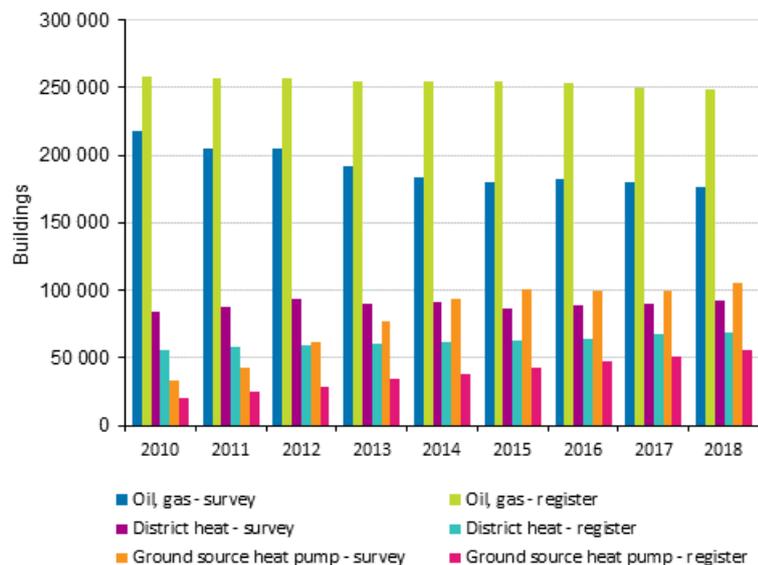
**Figure 1. The heating sources in blocks of flats in the 2010s - the largest differences between register data and sample surveys**



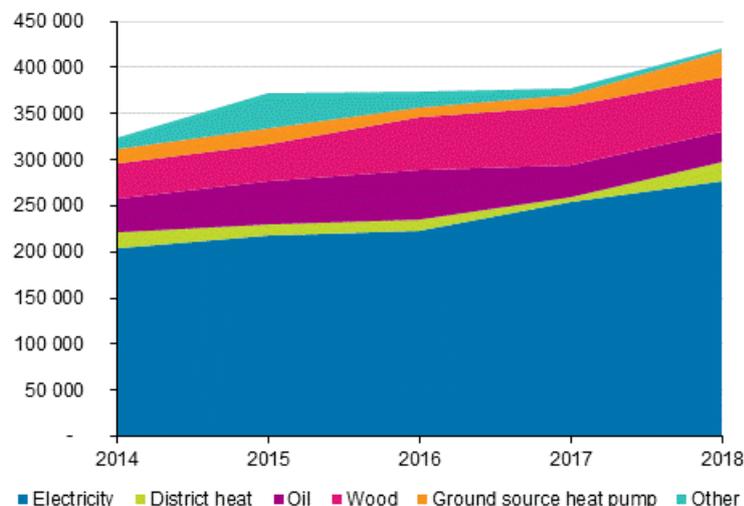
**Figure 2. The heating sources in terraced houses in the 2010s - the largest differences between register data and sample surveys**



**Figure 3. The heating sources in one-dwelling and two-dwelling houses in the 2010s - the largest differences between register data and sample surveys**



**Figure 4. Development of number of air heat pumps by main heat source in one-dwelling and two-dwelling houses according to sample surveys**

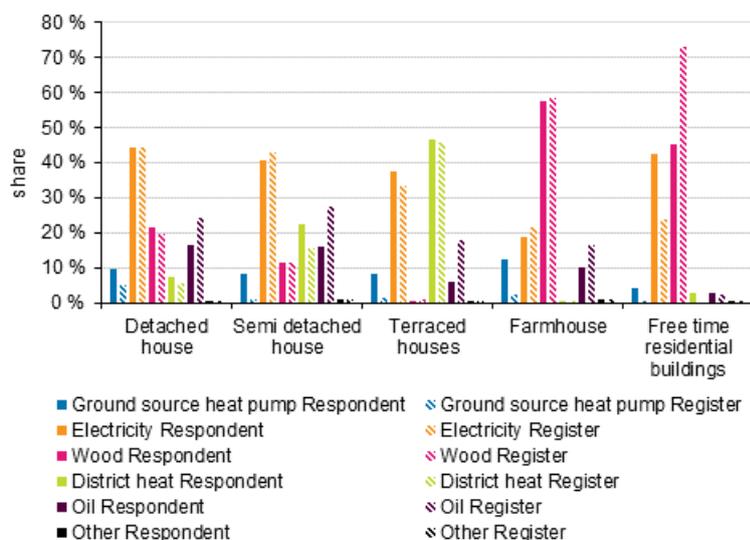


### Unit-specific comparison of heat sources in detached and semi-detached houses

In the survey on the use of heating energy in small-scale housing, the response was compared with register data by dwelling. The results are presented in figure 5. The response is marked in uniform colour and the register data in halftone. According to respondents, oil heating is clearly less used and ground heat, in turn, more commonly used than the register data indicate. The differences recur in all building types. When it comes to electricity, wood and district heat, the differences between register data and data given by respondents are clearly smaller. The unit-level comparison is in line with the data from the sample surveys presented above.

The survey on the use of heating energy in small-scale housing also included free-time residences. The importance of electricity as the main heat source has increased in them, whereas that of wood has decreased.

**Figure 5. Main heat source for heating according to survey responses and register by type of detached and semi-detached house – unit-level comparison**

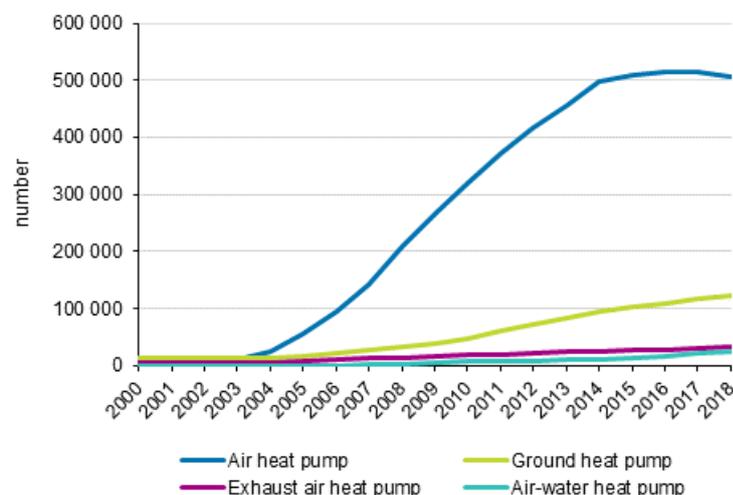


## Heat pumps for heating

Figure 6 presents the development of the number of heat pumps estimated from sales data collected by the Finnish Heat Pump Association (Energy 2018 table service, table 2.11.). From the beginning of the millennium, the number of ground source heat pumps has grown nine-fold and the number of air heat pumps has grown at least 150-fold. A presumed life time of 10 years is used in the evaluation. With a life time of 15 years, the number of air heat pumps would be more than 200-fold.

The total number of heat pumps can be estimated from sales statistics, but they do not reveal the division of heat pumps between different sectors. The development of the number of heat pumps in housing has, therefore, been monitored also with the above-mentioned sample surveys. The number of ground source heat pumps according to sales statistics is in line with the results from the sample surveys. The same also applies to air-to-water and exhaust air heat pumps.

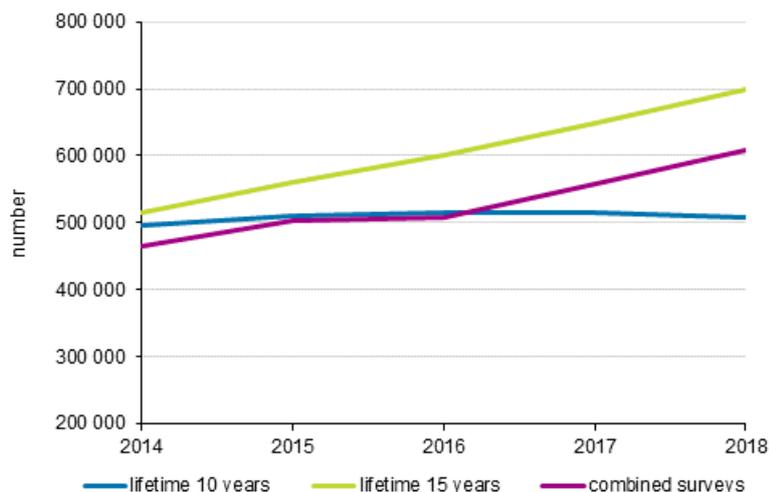
**Figure 6. Development of the number of heat pumps in the 2000s estimated from sales volumes**



Heat pumps of detached houses, two-dwelling houses, terraced houses, blocks of flats and free-time residences are included in housing. The available surveys concern only part of housing. It is, however,

possible to form a rough estimate on the number of heat pumps in housing by combining results from different sample surveys and comparing that to the development of the number calculated from sales data with different life times. Such an examination is presented in figure 7. Until 2016, the number of air heat pumps in housing calculated based on sample surveys was lower than the total number calculated with a ten-year life time. The situation changed in 2017, and now the number of air heat pumps in the housing sector exceeds the number calculated from the sales statistics based on the previous presumed life time.

**Figure 7. Number of air heat pumps calculated from sales statistics with a life time of 10 and 15 years and total number calculated from sample surveys**



The evaluation gives cause to raise the life time of air heat pumps. Based on practical experiences, it has been suggested that the life time should be 15 years. In this case, around 15 per cent of air heat pumps would be allocated outside the housing sector. This requires that data on the use of air heat pumps needed in energy evaluation are surveyed also in other sectors than the housing sector.

## Monitoring the development of heat sources

Reliable data on the use of heat sources in residential dwellings is needed for statistics on energy use in households. Sample surveys are needed to correct data on heat sources in the building register and to estimate the importance of additional heat sources such as air heat pumps. Due to the energy transition, the simultaneous use of several heat sources becomes more common. It is necessary to monitor the change with sample surveys, but the use of other data sources should also be examined.

# Appendix tables

**Appendix table 1. Energy consumption in households 2010-2018, GWh. Appendix table was corrected on 18 June 2020.**

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Heating of spaces	48 765	41 419	45 928	42 739	42 831	40 804	45 692	45 349	44 343
Residential buildings proper, total	46 365	39 339	43 663	40 643	40 690	38 760	43 252	42 876	41 884
- Detached houses	29 101	25 091	27 641	25 595	25 967	24 507	27 373	27 504	26 993
- Terraced houses	4 462	3 767	4 215	3 972	3 925	3 816	4 208	4 127	4 033
- Blocks of flats	12 802	10 481	11 807	11 076	10 798	10 437	11 671	11 245	10 858
Free-time residential buildings	2 399	2 080	2 265	2 097	2 140	2 044	2 440	2 473	2 459
Household appliances <sup>1)</sup>	9 087	8 315	8 850	8 389	8 091	7 886	8 295	8 126	8 284
- Lighting	2 702	2 482	2 349	2 115	1 919	1 876	1 770	1 633	1 599
- Cooking	826	799	714	697	689	680	681	673	674
- Other electrical equipment	5 559	5 034	5 787	5 577	5 483	5 330	5 844	5 820	6 011
Heating of saunas	2 880	2 871	2 894	2 902	2 924	2 920	3 049	3 057	3 063
Heating of domestic water	9 522	9 584	9 658	9 727	9 789	9 850	9 961	9 954	9 977
<b>Housing, total</b>	<b>70 254</b>	<b>62 189</b>	<b>67 330</b>	<b>63 757</b>	<b>63 635</b>	<b>61 460</b>	<b>66 997</b>	<b>66 486</b>	<b>65 667</b>

1) Apart from electricity consumption, consumption of household appliances includes use of natural and liquid gas in cookers.

**Appendix table 2. Energy consumption in households by energy source in 2018, GWh. Appendix table was corrected on 18 June 2020.**

	Wood	Peat	Coal	Heavy fuel oil	Light fuel oil	Natural gas <sup>1)</sup>	Ambient energy <sup>2)</sup>	District heat	Electricity <sup>3)</sup>	Total
<b>Housing, total</b>	14 554	42	2	31	3 252	359	5 970	18 726	22 731	65 667
Heating of spaces	12 282	28	2	22	2 617	221	5 125	13 235	10 811	44 343
Residential buildings proper, total	10 963	27	1	22	2 570	220	4 853	13 232	9 996	41 884
- Detached houses	10 774	23	1	0	2 212	61	4 273	1 775	7 874	26 993
- Terraced houses	146	1	0	0	94	43	484	2 092	1 173	4 033
- Blocks of flats	43	3	0	22	264	116	96	9 365	949	10 858
Free-time residential buildings	1 319	1	0	0	48	1	272	3	815	2 459
Household appliances	..	..	..	..	..	79	..	..	8 205	8 284
- Lighting	..	..	..	..	..	..	..	..	1 599	1 599
- Cooking	..	..	..	..	..	79	..	..	595	674
- Other electrical equipment	..	..	..	..	..	..	..	..	6 011	6 011
Heating of saunas	1 838	..	..	..	..	..	..	..	1 225	3 063
Heating of domestic water	434	14	0	9	635	59	845	5 491	2 490	9 977

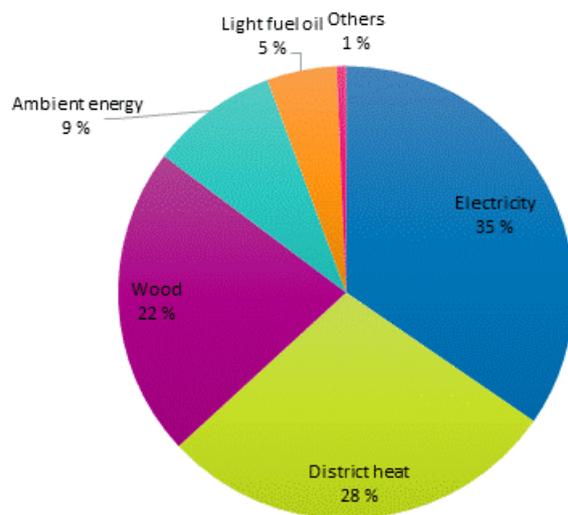
1) Includes liquid gas.

2) Ambient energy refers to energy extracted with heat pumps from the environment (ground, air or water) for space heating. Electricity spent by heat pumps in heating and cooling use is included in electricity consumption.

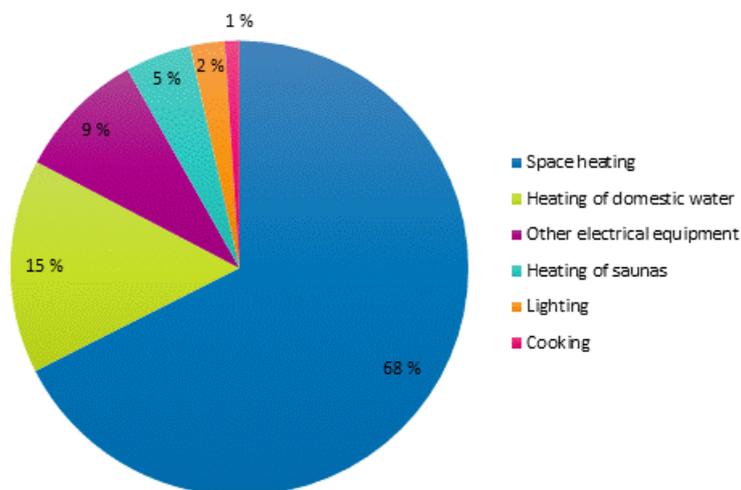
3) Electrical heating of residential buildings includes direct electrical heating, electric storage heating, additional heating and floor heating by electricity, electricity used by heat pumps, heating of domestic water by electricity, electric sauna stoves and electricity consumed by heating systems and heat distribution equipment.

## Appendix figures

**Appendix figure 1. Energy consumption in households by energy source in 2018. The figure was corrected on 18 June 2020.**



**Appendix figure 2. Energy consumption in households by use in 2018. The figure was corrected on 18 June 2020.**



## Inquiries

Virve Rouhiainen           029 551 3395  
Director in charge:  
Jan Nokkala

[energia@stat.fi](mailto:energia@stat.fi)  
[www.stat.fi](http://www.stat.fi)

Source: Energy consumption in households 2018, Statistics Finland