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Annual Climate Report 2020

Magnus Cederlöf, Riikka Siljander

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<p>Abstract</p> <p>Under the Climate Change Act, the Government shall each calendar year submit to Parliament an annual climate report on the trends in emissions and the achievement of emissions reduction targets included in the medium-term plan for climate change policy. The report shall also contain information on policy measures and an assessment of the implementation of the adaptation measures included in the adaptation plan.</p> <p>The Annual Climate Report examines the meeting of the targets set for emission reduction obligations in periods 2013–2020 and 2021–2030 in the effort-sharing sector (non-emissions trading sector) and the trend in total emissions in relation to the target of carbon neutrality set for 2035. It appears likely that Finland will meet the target for 2013–2020. The measures for 2021–2030 have also been planned ensuring that the obligation will be fulfilled. However, the planned measures are not adequate to attain carbon neutrality.</p> <p>While emissions trends in the transport sector play a key role for the effort-sharing sector, measures will be necessary in all sectors. Trends in emissions from energy production and manufacturing, which are part of the emissions trade, as well as the development of carbon sinks in the land use sector will also be crucial regarding the goal of carbon neutrality. Additional measures for achieving carbon neutrality are proposed in the new Energy and Climate Strategy, the Medium-term Climate Change Policy Plan, and the Climate Programme for the Land Use Sector. These documents will be completed in 2021.</p>			
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Tiivistelmä	<p>Ilmastolain mukaan valtioneuvosto toimittaa vuosittain eduskunnalle ilmastovuosikertomuksen, jolla seurataan päästökehitystä sekä erityisesti keskipitkän aikavälin ilmastopolitiikan suunnitelmassa asetettujen tavoitteiden toteutumista. Lisäksi se sisältää kartoituksen politiikkatoimista sekä arvion sopeutumissuunnitelman toimeenpanotilanteesta.</p> <p>Ilmastovuosikertomuksessa tarkastellaan kaudelle 2013–2020 ja 2021–2030 asetettujen taakanjakosektorin (päästökaupan ulkopuoliset sektorit) päästövähennysvelvoitteiden saavuttamista sekä kokonaispäästökehitystä suhteessa vuoden 2035 hiilineutraaliustavoitteeseen. Vaikuttaa todennäköiseltä, että Suomi saavuttaa kauden 2013–2020 velvoitteen. Myös kauden 2021–2030 toimet on suunniteltu siten, että velvoite täytetään. Suunnitellut toimet eivät kuitenkaan ole riittäviä hiilineutraaliustavoitteen saavuttamiseen.</p> <p>Taakanjakosektorin kannalta keskeistä on liikennesektorin päästökehitys, mutta toimia tarvitaan jokaisella sektorilla. Hiilineutraaliustavoitteen kannalta myös päästökauppaan kuuluvien energian tuotannon ja teollisuuden päästöjen sekä maankäyttösektorin hiilinielujen kehityksellä on ratkaiseva merkitys. Lisätoimia hiilineutraaliustavoitteen saavuttamiseksi esitetään uudessa energia- ja ilmastostrategiassa, keskipitkän aikavälin ilmastopolitiikan suunnitelmassa sekä maankäyttösektorin ilmasto-ohjelmassa, jotka valmistuvat vuonna 2021.</p>		
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Referat	<p>Enligt klimatlagen ska statsrådet varje kalenderår sända riksdagen en klimatårsberättelse som ska innehålla uppgifter om utsläppsutvecklingen och framför allt information om hur målen i den klimatpolitiska planen på medellång sikt har förverkligats. Dessutom ska klimatårsberättelsen innehålla en kartläggning av de politiska åtgärderna och en bedömning av verkställighetsläget när det gäller anpassningsplanen.</p> <p>I klimatårsberättelsen granskas i vilken grad de utsläppsminskningssåtaganden inom ansvarsfördelningssektorn (sektorer som inte omfattas av utsläppshandeln) som fastställts för perioden 2013–2020 och 2021–2030 har fullgjorts samt utvecklingen av de totala utsläppen i förhållande till målet om klimatneutralitet 2035. Det verkar sannolikt att Finland kommer att fullgöra åtagandet för perioden 2013–2020. Också de åtgärder som gäller perioden 2021–2030 har planerats så att åtagandet ska fullgöras. De planerade åtgärderna är dock inte tillräckliga för att Finland ska kunna nå målet om klimatneutralitet.</p> <p>Utsläppsutvecklingen inom transportsektorn är central med tanke på ansvarsfördelningssektorn, men åtgärder behövs inom alla sektorer. Med tanke på målet om klimatneutralitet har också utvecklingen i fråga om utsläppen från energiproduktionen och industrin, som omfattas av utsläppshandeln, en avgörande betydelse, likaså utvecklingen när det gäller kolsänkorna inom markanvändningssektorn. Ytterligare åtgärder för att målet om klimatneutralitet ska kunna nås läggs fram i den nya energi- och klimatstrategin, den klimatpolitiska planen på medellång sikt och klimatprogrammet för markanvändningssektorn, som ska färdigställas under 2021.</p>		
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1 The Annual Climate Report examines the achievement of emission reduction targets

The Climate Change Act, which entered into force in June 2015, contains provisions on producing an annual climate change report. The Act defines the elements of the national climate policy planning system as well as the schedules and responsibilities related to it. The planning system laid down in the Climate Change Act consists of three elements: a long-term plan, a Medium-term Climate Change Policy Plan, and an Adaptation Plan. In the Annual Climate Report produced every calendar year, the Government reports to Parliament on trends in emissions, the achievement of emission reduction targets set in the Medium-term Climate Change Policy Plan, and any additional actions required to reach these targets. Every second year, the report also includes information on the policy measures set out in the Medium-term Climate Change Policy Plan, and every four years, details concerning the sufficiency and effectiveness of the adaptation measures contained in the adaptation plan are provided.

The first Annual Climate Report was submitted to Parliament in June 2019. In particular, it examined the emissions trends in the effort sharing sector and the implementation of the Medium-term Climate Change Policy Plan (KAISU) completed in 2017. The plan contains the measures by which Finland intends to achieve its emission reduction target in the effort sharing sector (non-emissions trading sectors) for 2030. The effort sharing sector covers emissions from such areas as transport, agriculture, building-specific heating and waste management. The first Annual Climate Report also contained information on policy measures and adaptation.

In the context of a hearing organised in connection with the first Annual Climate Report's parliamentary review, suggestions for developing the report were made. In particular, a need emerged to discuss the trend in emissions as a whole, rather than only for the part of the effort sharing sector. The Environment Committee additionally highlighted in its report (1/2020 vp) the need to discuss emissions trends in other sectors, thus

compiling an Annual Climate Report which gives a full overview of the emissions trends. The Committee also proposed that the Annual Climate Report should be developed into a more strategic direction, particularly by evaluating the effectiveness and adequacy of the implemented emission reduction measures. The Committee stated as its opinion that, in connection with the Climate Change Act review, the Annual Climate Report should be developed into the direction referred to in its report.

In the present Annual Climate Report, the development needs brought up in the Committee report as well as the feedback received at the hearings have been taken into account, particularly regarding the scope of the report. To provide an overview, the report examines emissions trends not only in the effort sharing sector but also in the emissions trading and land use sectors. A decision was also made to include in the report information on policy measures and adaptation, similarly to the year before. The Government Programme refers to a review of the Climate Change Act which is to be carried out during the current government term and in connection of which the needs to develop the provisions on the Annual Climate Report will be considered as a whole. The review concerns especially the goal-setting and scope of the Act.

Finland's national climate policy has traditionally been based on the Government's programmes and plans. Currently, the planning system referred to in the Climate Change Act operates in parallel with the drafting process of the Energy and Climate Strategy. The Energy and Climate Strategies cover the emissions trading, effort sharing and land use sectors alike. These documents have been prepared regularly since 2001, and they have contained the outlines of energy and climate policy both at the general level and as individual measures. The most recent National Energy and Climate Strategy was published in 2016. The Government Programme states that the Government will also prepare a climate programme for the land use sector as part of planning for the energy and climate policy system. Under the Regulation on the Governance of the Energy Union and Climate Action, all Member States were obligated to notify to the Commission an integrated national energy and climate plan covering the period until 2030, as well as a long-term strategy for 2050, by the end of 2019. Finland notified its national energy and climate plan in December 2019 and its long-term strategy in spring 2020.

2 Finland has ambitious emission reduction targets

2.1 National targets set in the Government Programme are more stringent than EU-imposed obligations

The target set in Prime Minister Marin's Government Programme is that Finland will be carbon neutral in 2035 and carbon negative soon after that. This means that the emissions and sinks must be in balance in 2035 and that after this year, the sinks must exceed the emissions. The Government Programme also notes that emission reduction measures will be carried out in a way that is fair from a social and regional perspective and that involves all sectors of society. The target of carbon neutrality will be updated in the Climate Change Act as the Act is reviewed, and the emission reduction targets for 2030 and 2040 will be added to the Act in line with Finland's path to carbon neutrality. The target for 2050 in the Climate Change Act will also be updated. Under the current Act, Finland's national target is to achieve a minimum reduction of 80% in the emissions by 2050 compared to the 1990 levels. The land use sector will also be included in the Act, and a target will be set for strengthening carbon sinks.

In order to achieve carbon neutrality, greater emissions reductions will be required in the effort sharing sector by 2030 than what the Medium-term Climate Change Policy Plan adopted in 2017 aspired to on the basis of the binding national target set for Finland in EU legislation. The preconditions for attaining carbon neutrality additionally include achieving faster reductions in the emissions trading sector and strengthening the sinks in the land use sector. This is why more stringent national emission reduction targets than those required under the current EU legislation will probably be set for 2030 in the Climate Change Act. The EU has set the long-term goal of being carbon neutral by 2050. Finland's schedule is more ambitious than the one adopted by the EU, also regarding carbon neutrality.

2.2 EU targets will also be increased in the next few years

The EU is committed to a 20% reduction in greenhouse gas emissions by 2020 and a 40% reduction by 2030 compared to the 1990 levels. Divided between the sectors, the emissions reduction obligation for 2020 is 21% in the emissions trading sector and 10% in the effort sharing sector compared to 2005. The corresponding obligations for 2030 are 43% in the emissions trading sector and 30% in the effort sharing sector. Additionally, the LULUCF Regulation sets for the first time an obligation applicable to the land use sector for 2030. In December 2019, the EU adopted the long-term target of being carbon neutral by 2050.

The EU's emission reduction targets for 2020 and 2030 are enforced by means of legislative packages concerning the emissions trading and effort sharing sectors and, regarding the target for 2030, also the land use sector. Rather than defining obligations for individual Member States, the emissions trading scheme focuses on the EU level, and its obligations apply to operators. There will be a linear reduction in the amount of emission allowances issued year by year, ensuring that the obligations to cut emissions in this sector set for 2020 and 2030 will be fulfilled. Corresponding emissions reduction obligations are defined for the Member States for 2020 and 2030 in the Effort Sharing Decision and the Effort Sharing Regulation. The Member States have annual emission allocations for the periods 2013–2020 and 2021–2030. In the land use sector, the LULUCF Regulation obligates the Member States to maintain their calculated removals of LULUCF sector greenhouse gases at a level at least equal to their calculated emissions between 2021 and 2030.

Member States can use certain flexibilities to help them attain their targets in the effort sharing sector. In the period 2013–2020, Member States can use temporal flexibilities by banking and borrowing emissions between individual years. If necessary, emission units can also be purchased from other Member States to meet the emission reduction obligation, or previously purchased international emission reduction units can be utilised. In the period 2021–2030, Member States may utilise similar flexibilities as during the ongoing period, with the exception of international emission reduction units. Two new flexibilities have also been added. The one-off flexibility allows a limited amount of emission allowances to be transferred from the emissions trading sector to cover emissions in the effort sharing sector. It is additionally possible, under certain conditions and to a very limited degree, to utilise possible credits from the land use sector to meet the obligation in the effort sharing sector. On the other hand, if the land use sector becomes a net emission source, it may be necessary to reduce emissions in the effort sharing sector further to compensate for the calculated emissions in the land use sector. Member States may also trade in land use sector units.

In February 2020, the European Commission published its European Green Deal, a package of measures whose goals include significant emissions reductions, investments in leading edge research and innovation, and preserving ecosystems in Europe. The Green Deal aims for a transition that is just and inclusive of all. This package of measures contains a plan for increasing the EU's targets for 2030 and a European climate law, which will include the target of climate neutrality by 2050. The European Commission issued its proposal for a climate law on 4 March 2020. Legislative proposals concerning higher emission reduction targets for 2030 will be issued in summer 2021.

3 Emissions decreased in 2019 but further measures will be needed over the long term

3.1 Emissions in the emissions trading sector decreased and sinks in the land use sector grew in 2019

Finland's total emissions in 2018 were 56.4 Mt CO₂ eq. Compared to the year before, the total emissions (the sum of emissions in the emissions trading and effort sharing sectors) increased by 2%, or approx. 1 Mt CO₂ eq. (see Figure 1). Driven by increased use of natural gas and peat in the energy sector, the increase in the emissions trading sector accounted for the entire growth in emissions in 2018. In 2019 both the total emissions and the emissions from the emissions trading sector fell clearly. According to the proxy estimate for 2019 the total emissions decreased by 6 % compared to the previous year and amounted to about 52.8 Mt CO₂ eq. The emissions in the emissions trading sector were 23.2 Mt CO₂ eq. or 3.0 Mt CO₂ eq. less than in 2018. The decrease corresponds to a change of approx. 11%. The reduction in emissions is explained by a decrease in the use of fossil fuels. A particularly rapid decrease – by over 20% – was seen in the use of coal for energy production in 2019. In the non-emissions trading sectors (effort sharing sectors), the emissions decreased by 2 % compared to the previous year.

The trend in the land use sector was exceptional in 2018, as the net sink in this sector was as low as 10.3 Mt CO₂ eq. (see Figure 1). The proxy estimate for 2019 puts the net sink in this sector at 17.4 Mt, indicating that the net sink has grown clearly since the year before. The land use sector consists of six land use categories: forest land, cropland, grassland, wetlands, settlements and other land. The net sink in the land use sector is obtained by adding up the emissions and sinks in the different categories of the sector (see Figure 2). Forest land is the most significant net sink in this sector, as its removals from the atmosphere exceed the emissions. Wood products have also mainly served as carbon sinks. The sinks in forest land are affected especially by the increment and felling volumes

of trees. A particular cause for the decrease in net sinks in 2018 thus was reduced sinks in forest land as a consequence of record-breaking volumes of roundwood harvesting. The harvesting volume was 78.2 million cubic metres, or 8% greater than in the year before. Similarly, the preliminary data provided by the Natural Resources Institute Finland indicates that the harvesting volumes in 2019 were clearly smaller than in 2018 at approx. 71.8 million cubic metres.

There are major fluctuations in the emissions and sinks of the land use sector from year to year. Additionally, the effectiveness and knowledge base of land use sector actions are associated with greater uncertainties than other sectors.

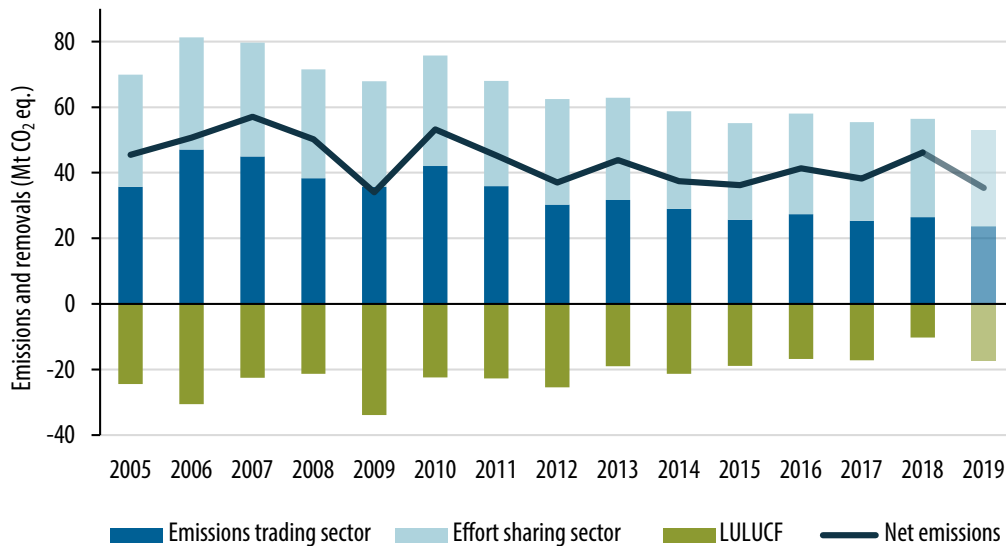


Figure 1. Emissions trends in the emissions trading (incl. domestic air traffic), effort sharing and land use (LULUCF) sectors in 2005–2019. The data from 2019 is a proxy estimate. The land use sector has been a net sink over the entire period under scrutiny. Net emissions describe the total emissions in the emissions trading and effort sharing sectors, from which the net sink of the land use sector has been deducted.

The trend in net emissions plays a key role in terms of the carbon neutrality target. In this context, net emissions refer to the total combined emissions in the emissions trading and effort sharing sectors, from which the net sink of the land use sector has been deducted. A precondition for attaining the Government's target of carbon neutrality is that the net emissions should be zero by 2035 and subsequently negative. In 2018, the net emissions were 46 Mt CO₂ eq., which is almost equal to the 2005 level (see Figure 1). The proxy estimate for 2019 indicates a significant year-on-year decrease in the net emissions to 35 Mt CO₂ eq. Both a reduction in emissions and strengthening of the carbon sinks contributed to the decrease in net emissions.

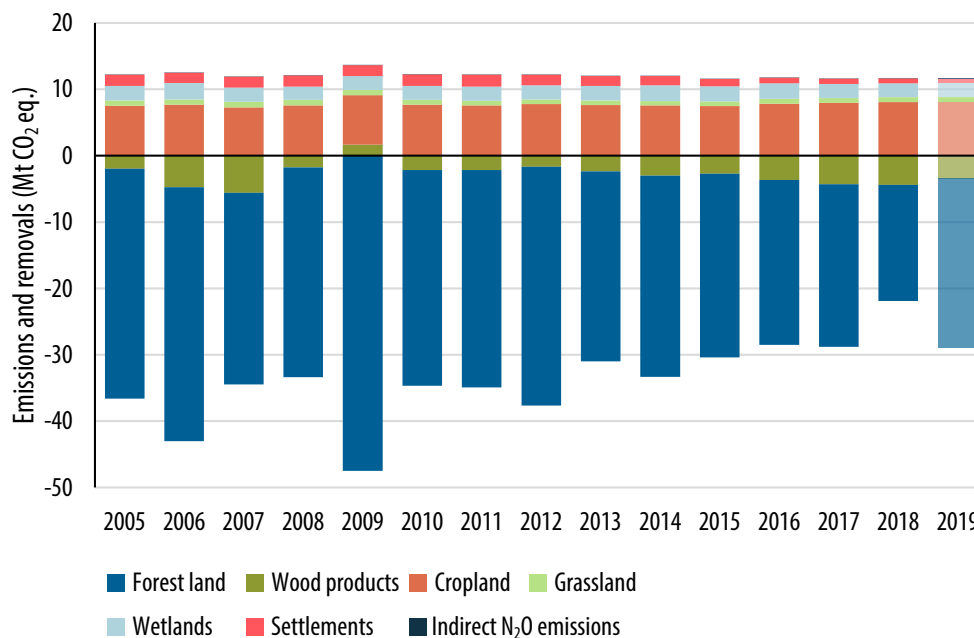


Figure 2. Land use categories in the land use sector and their net emissions or removals in 2005–2019. The sum of net emissions is positive, while the sum of net removals is negative. The data from 2019 contain proxy estimates for forest land and wood products, whereas the data for the other land use categories correspond to the previous year's figures.

Interlinkages between sectors also mean that the emissions trend in one sector may affect emissions in another sector. A typical example of this is the electrification of society's various functions. A significant trend towards electrification is underway in the transport sector, for example, as vehicles with an internal combustion engine are being replaced by electric vehicles. While the electric engine does not cause direct emissions, it increases electricity consumption and thus potentially emissions from electricity generation. This means that its emissions are transferred from the effort sharing sector to the emissions trading sector. Similar links exist between the emissions trading sector and the land use sector. In order to achieve carbon neutrality, measures will be required in all sectors, and it must be ensured that progress made in one sector is not cancelled out by increased emissions or dwindling sinks in another.

3.2 Current measures are not adequate to attain carbon neutrality

The current emission reduction measures implemented so far will bring Finland's emissions down to 39 Mt CO₂ eq. by 2035 as an estimate. This represents a reduction of approx. 46 % compared to 1990. Including the measures that have been planned but not yet implemented, Finland's estimated emissions will be 36 Mt CO₂eq. in 2035 (see Figure 3). It appears evident that the current and planned actions will not be adequate to attain the target of carbon neutrality by 2035. If, in an effort to quantify the need to reduce emissions further, we base the calculations on the assumption that the emissions should be reduced to a level of 21 Mt CO₂ eq. in 2035, we find that a reduction of approx. 15 Mt CO₂ eq. compared to the current emissions needs to be attained through new measures (see Figure 4). The new actions needed to achieve the target will be examined as the new Energy and Climate Strategy, the Mid-term Climate Change Policy Plan and the climate programme for the land use sector are prepared in 2020 and 2021. In order for Finland to attain the target of carbon neutrality, the emissions may at most be equal to the sinks in 2035.

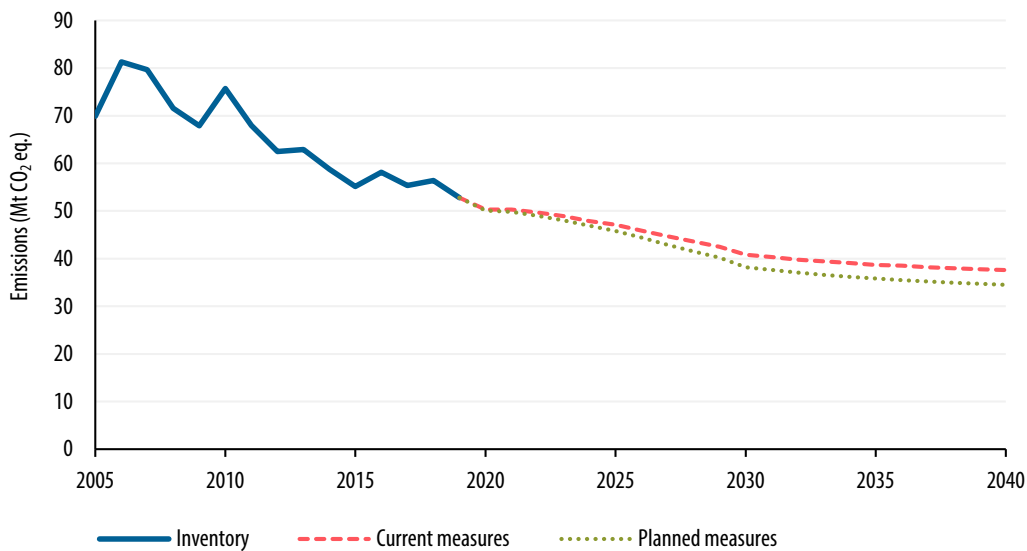


Figure 3. Trend in total emissions in 2000–2019 and the estimated trend in emissions until 2040 with the current and planned measures.

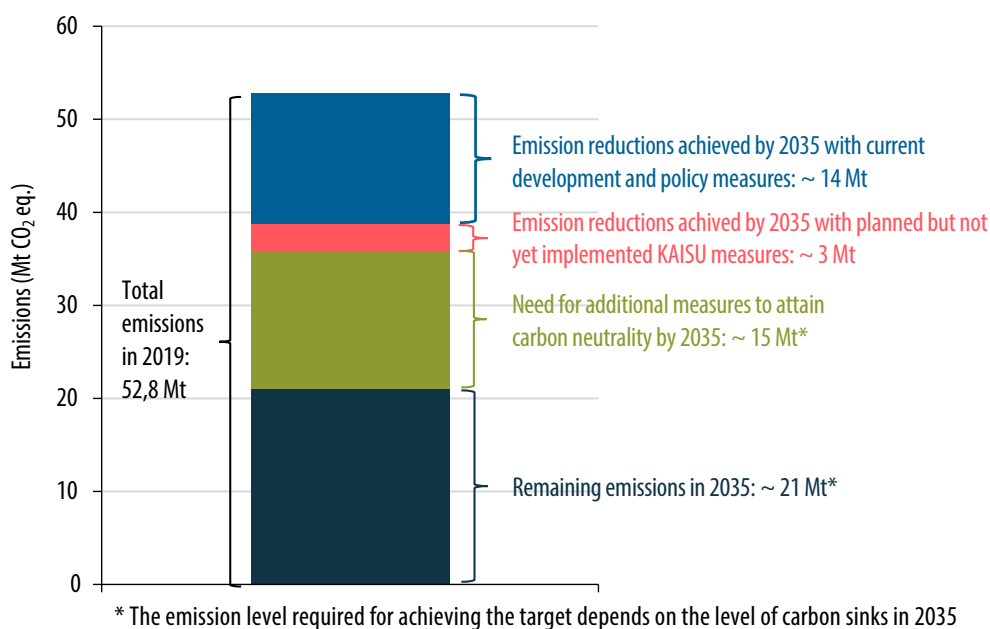


Figure 4. Emissions reductions achieved through the current and planned measures by 2035 compared to today's level and the need for new measures.

A study on long-term scenarios for attaining the carbon neutrality target, which was led by VTT Technical Research Centre of Finland, was published in early 2020 (Hiilineutraali Suomi 2035 – Skenaariot ja vaikutusarviot [Carbon Neutral Finland 2035 – Scenarios and impact assessments]). This analysis contains two policy scenarios (Saving and Continuous growth) as well as a 'With Existing Measures' scenario, which extend till 2050. The calculations used to produce the scenarios in this project differ from the ones that underlie the scenarios discussed above. The With Existing Measures (WEM) scenario used in the VTT-led project also indicates, however, that the current measures will not be sufficient to attain carbon neutrality. In the WEM scenario, emissions will exceed sinks by 25 Mt in 2035. Total emissions in the WEM scenario are approx. 44 Mt CO₂ eq., and according to an estimate produced by the Natural Resources Institute Finland, the level of carbon sinks would be approx. 18 Mt CO₂ eq. in 2035 (MALUSEPO report on estimated greenhouse gas emissions from forestry and carbon sinks in forest land). The WEM scenario would be adequate for achieving carbon neutrality by 2050, but only if the level of sinks is approx. 30 Mt. The policy scenarios were designed to achieve the carbon neutrality target. The trends in emissions and sinks in the two scenarios are rather different, however. The examinations based on the scenarios do not take a stand on the policy measures required to achieve the emission and sink trends presented in them. Neither do the scenarios look at the transition to low emissions from the perspective of regional or social justice; the basic principle of the calculations underlying the scenarios is minimising the emissions reduction costs at the national level. The impacts of the required actions are to be investigated in a project

recently launched by the Government's analysis, assessment and research activities titled 'Carbon neutral Finland 2035 – climate and energy policy actions and their impacts' (HIISI).

3.3 New national measures to be adopted in both emissions trading and land use sector

The emissions trading scheme is an EU level steering mechanism that cannot be regulated at the national level. In the emissions trading sector, the reduction of emissions is primarily based on the fact that the trading scheme puts a price on carbon. National steering instruments are additionally in use, however, which can at least to some extent influence the emissions trends of facilities within the scope of emissions trading in Finland. These facilities are also liable to pay energy tax. Taxation of heating fuels, which is based on each fuel's carbon dioxide and energy content, also applies to facilities covered by the emissions trading scheme. The most recent increase in heating fuel taxes took place in early 2019.

An act prohibiting the energy use of coal was passed by the Finnish Parliament in March 2019. In practice, this prohibition targets power plants which are within the scope of emissions trading. The prohibition will enter into force on 1 May 2029, but it is estimated that coal use will decline rapidly even before that year. Coal use in energy production is already being phased out, and the prohibition will speed up this process. With the current market trends, it is estimated that emissions from burning coal will be reduced from the current volume of approx. 6 Mt CO₂ eq. to the level of 1.1 Mt CO₂ eq. by 2030. In particular, the prohibition will reduce carbon dioxide emissions from cities' cogeneration plants.

In line with the Government Programme, a reform of energy taxation is to be prepared in 2020. The Government reached a general agreement on changes to energy taxation in February 2020. Decisions on energy taxation policies are to be made in the government budget session in early autumn 2020. The basic principle of changing energy taxation will be provision of stronger support for attaining the target of carbon neutrality by 2035. In particular, this will mean changes to the taxation of heating fuels and the industrial electricity tax.

In keeping with the Government Programme, a large number of land use sector actions will be implemented, and a climate programme for the land use sector will be created. This programme will link land use sector actions to the planning of the climate and energy policy. The climate programme for the land use sector will be completed by the end of 2021.

4 Achievement of the target for 2013–2020 in the effort sharing sector appears likely

Finland's aim is to achieve a 16% reduction in emissions in the effort sharing sector by 2020 compared to 2005. Additionally, an annual emission allocation has been set for each year in the period between 2013 and 2020. Between 2013 and 2015 as well as in 2017, Finland's emissions in the effort sharing sector fell below the annual emission allocations for these years (see Figure 5 and Table 1). In contrast, the allocation was exceeded by 1.0 Mt CO₂ eq. in 2016 and by 0.3 Mt CO₂ eq. in 2018. The key reason for the increase in emissions in 2016 was a decrease in the proportion of transport biofuels compared to previous years. This decrease was due to the frontloaded application of the distribution obligation concerning biofuels. High emissions in 2016 compared to the previous years are also explained by the exceptionally warm weather in 2014 and 2015, which reduced the need for heating energy in this period. In 2018, the emissions decreased slightly compared to the previous year, however not sufficiently to be within the emission allocation. The proxy estimate for 2019 indicates that while emissions in the effort sharing sector continued to decrease compared to the year before, they still exceed the emission allocation by approx. 0.2 Mt CO₂ eq. The baseline scenario indicates that emissions would fall below the emission allocation for 2020. The estimate takes into account the unusually warm weather in winter 2019–2020 and the impact caused by the coronavirus on emissions from the transport sector.

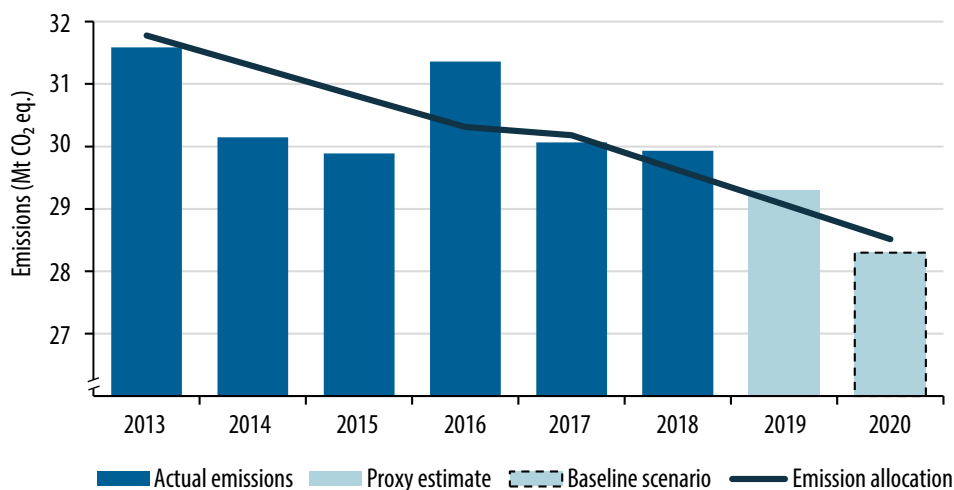


Figure 5. Emissions in the effort sharing sector in 2013–2019, annual emission allocation for 2013–2020, and emissions according to the baseline scenario in 2020.

Table 1. Finland's emission allocation for 2013–2020, actual emissions in 2013–2019, emissions in the baseline scenario (WEM) in 2020 and the difference between the allocation and the emissions (Mt CO₂ eq.). The emissions data for 2019 are based on a proxy estimate.

	2013	2014	2015	2016	2017	2018	2019	2020
Emission allocation	31,8	31,3	30,8	30,3	30,2	29,6	29,1	28,5
Actual emissions	31,6	30,1	29,9	31,4	30,1	29,9	29,3	
Emissions (WEM)								28,3
Difference between emissions and the allocation	0,2	1,1	0,9	-1,0	0,1	-0,3	-0,2	0,2
Cumulative difference	0,2	1,3	2,2	1,2	1,3	1,0	0,8	1,0

What matters in terms of meeting the emission reduction obligation for the effort sharing sector is total emissions in the entire period 2013–2020 compared to the emission allocation (sum of annual allocations), as units can be banked and borrowed between the years. If emissions fall below the annual emission allocation in any one year, the surplus units can be banked and used in later years to compensate for any years in which the allocations are exceeded. Finland used the surplus units from 2013–2015 to compensate for exceeding the 2016 emission allocation, thus meeting the target for 2016. Finland still has enough surplus units to also compensate for the overshoot in 2018, as well as for the excess emissions indicated by the proxy estimate for 2019. International units are also available for Finland if necessary. Consequently, it is likely that Finland will also meet its obligation for 2020. All in all, if the trends in emissions follow the baseline scenario, Finland would be left with surplus units amounting to approx. 1.0 Mt CO₂ eq. in 2020,

which would mean that Finland will have achieved the overall target for 2013–2020 in the effort sharing sector (see Table 1 and Figure 6). Any surplus units from 2013–2020 cannot be banked for the forthcoming period of 2021–2030.

For more information on the emission data and scenarios used, see Appendix 3.

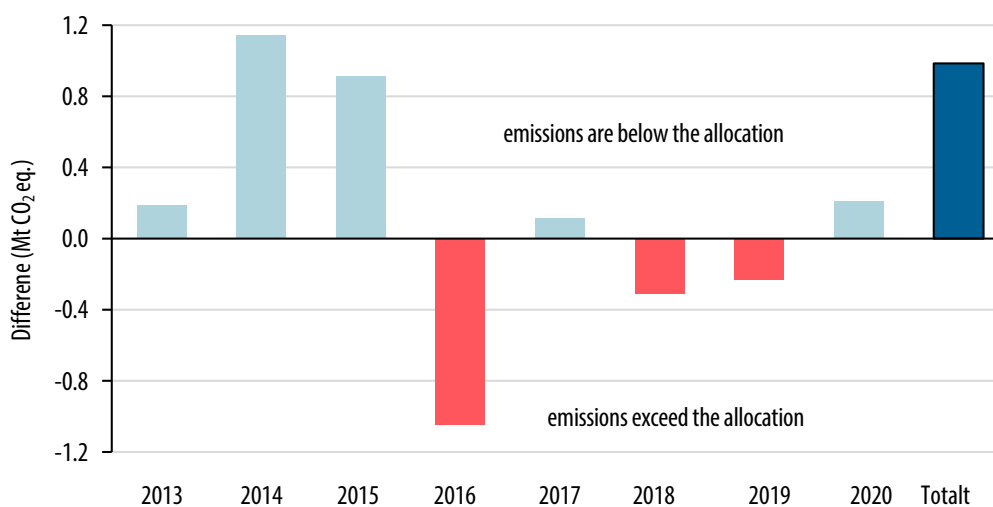


Figure 6. Difference between the emission allocation and emissions per year and in total in 2013–2020. The target is met if emissions fall below the emission allocation for the period. The obligation for the entire period will be fulfilled if the total emission allocation for 2013–2020 exceeds total emissions in 2013–2020.

5 The effort sharing sector target for 2030 can be achieved with the planned measures

Finland has an obligation to reduce emissions by 39% in the effort sharing sector by 2030 compared to 2005. This corresponds to an emission allocation of approx. 20.9 Mt CO₂ eq. for 2030. The final annual emission allocations will be confirmed as the emissions data for 2018 are finalised in late 2020. This is due to the fact that emissions in 2016–2018 affect the calculation of the emission allocations for 2021–2030. The estimated emission allocations given in this report are based on data on emissions in 2016, 2017 and 2018 provided in the most recent inventory. Inter-annual flexibilities may also be used in 2021–2030; this means that any surpluses from the previous years can be used to compensate for any deficits in later years.

In the Medium-term Climate Change Policy Plan measures have been defined in order to achieve the target for 2021–2030. The Medium-term Climate Change Policy Plan puts the deficit at almost 6 Mt CO₂ eq. in 2030 and anticipates that the additional reductions needed during the entire period will amount to approx. 26.4 Mt CO₂ eq. in total. The plan identifies measures helping to meet the target; should they be implemented in full, Finland could meet its emission reduction obligation for 2021–2030. Some of these measures have already been implemented. With existing, already implemented, measures the deficit is estimated to about 2.5 Mt CO₂ eq. in 2030 and about 7 Mt CO₂ eq. over the whole period. If in addition planned measures are implemented the target for the 2021–2030 period would be reached (see Figure 7).

Key measures contained in the Medium-term Climate Change Policy Plan and implemented by the end of 2019 included the distribution obligation of transport biofuels and the obligation to distribute biofuel oil mixed in light fuel oil. The combined impact of these measures in 2030 will be approx. 2.1 Mt CO₂ eq. Additionally, it is estimated that the threshold values for transport emissions applicable to EU car manufacturers will achieve a reduction of 0.7 Mt CO₂ eq. in emissions. The target for the transport sector

is to cut emissions by half until 2030 compared to 2005 emissions. This means that in addition to already implemented measures new measures amounting to a 1.5 Mt emission reduction would be needed in transport sector by 2030. Emission reduction measures related to agriculture, machinery (other than those related to the distribution obligation), increase of biogas use and F-gases are being implemented. The plan estimates that the combined impact of these measures in 2030 will be approx. 1.4 Mt CO₂ eq. in total. The plan of transferring waste incineration to the emissions trading sector has been dropped for the time being. Additionally, no measures related to phasing out oil heating in the public sector are currently foreseen, excluding in state-owned premises, regarding which Senate Properties and the Defence Forces have prepared their separate plans for discontinuing oil use.

Finland can also use a so-called one-off flexibility, which allows a limited amount of emission allowances to be transferred from the emissions trading sector to cover emissions in the effort sharing sector. In practice, the one-off flexibility means that the target for the emissions trading sector is higher if units are transferred to it in order to cover any excess emissions in the effort sharing sector. The possibility of transferring emission units from one sector to another does not change the ambitious level of the EU emission reduction target. In November 2019, the Government made a decision to use the one-off flexibility, and Finland notified the Commission accordingly in December 2019. Under the Government decision, the maximum amount of emission allowances in the emissions trading sector will be cancelled, corresponding to 0.7 Mt CO₂ eq. a year, or 7 Mt CO₂ eq. in total in 2021–2030. If necessary and permitted by the situation, the amount of allowances this flexibility involves can be decreased twice during the period (in 2024 and 2027).

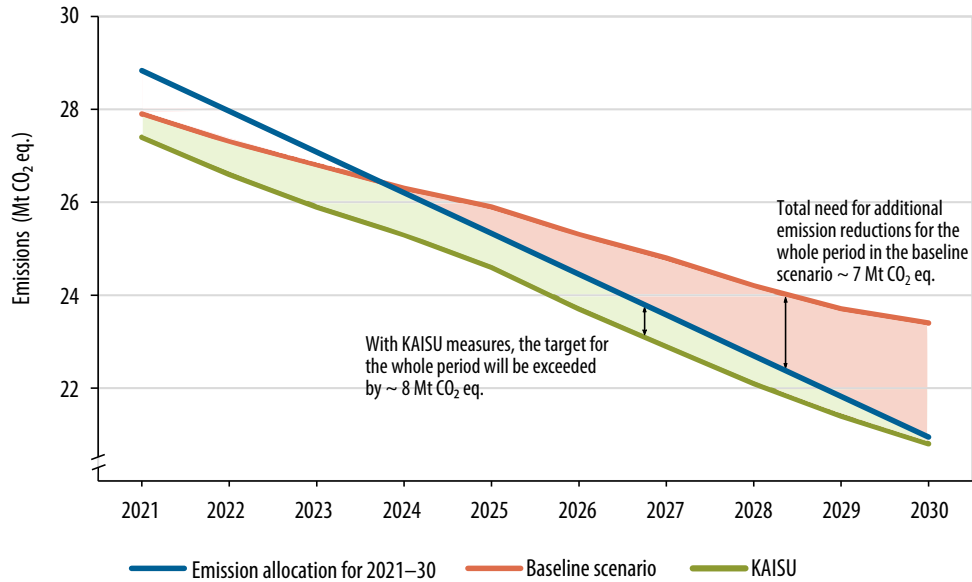


Figure 7. The emission allocation for 2021–2030, an estimate of emissions trends according to the baseline scenario, and an estimate of emissions trends achievable in 2021–2030 with the measures of the Medium-term Climate Change Policy Plan (KAISU). Some of the measures included in the KAISU are already implemented and included also in the baseline scenario. The distance of the projections from the emissions target trajectory describes the annual surplus/deficit of emission units, while the area between the lines describes the surplus/deficit accumulated during the entire period.

Table 2. The emission allocations for 2021–2030, an estimate of emissions trends according to the baseline scenario, an estimate of emissions trends achievable in 2021–2030 with the measures of the Medium-term Climate Change Policy Plan (KAISU), and the difference between these estimates and the allocation (Mt CO₂ eq.).

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Emission allocation	28,8	28,0	27,1	26,2	25,3	24,5	23,6	22,7	21,8	20,9
Emissions										
WEM	27,9	27,3	26,8	26,3	25,9	25,3	24,8	24,2	23,7	23,4
KAISU	27,4	26,6	25,9	25,3	24,6	23,7	22,9	22,1	21,4	20,8
Difference between emissions and the allocation										
WEM	0,9	0,7	0,3	-0,1	-0,6	-0,8	-1,2	-1,5	-1,9	-2,5
KAISU	1,4	1,4	1,2	0,9	0,7	0,8	0,7	0,6	0,4	0,1
Cumulative difference										
WEM	0,9	1,6	1,9	1,8	1,2	0,4	-0,9	-2,4	-4,2	-6,7
KAISU	1,4	2,8	4,0	4,9	5,6	6,4	7,0	7,6	8,1	8,2

6 New measures needed across the effort sharing sector

The Medium-term Climate Change Policy Plan defines measures for reducing emissions in each sector, ensuring that the total reductions in emissions will be adequate to meet the target for 2030 in the effort sharing sector. This section looks at emissions trends in individual sectors in proportion to the estimated impacts on emissions of the measures identified in the Medium-term Climate Change Policy Plan. Transport accounts for the highest proportion of emissions in the effort sharing sector (see Figure 8), which is why the most significant measures for reducing emissions focus on this sector.

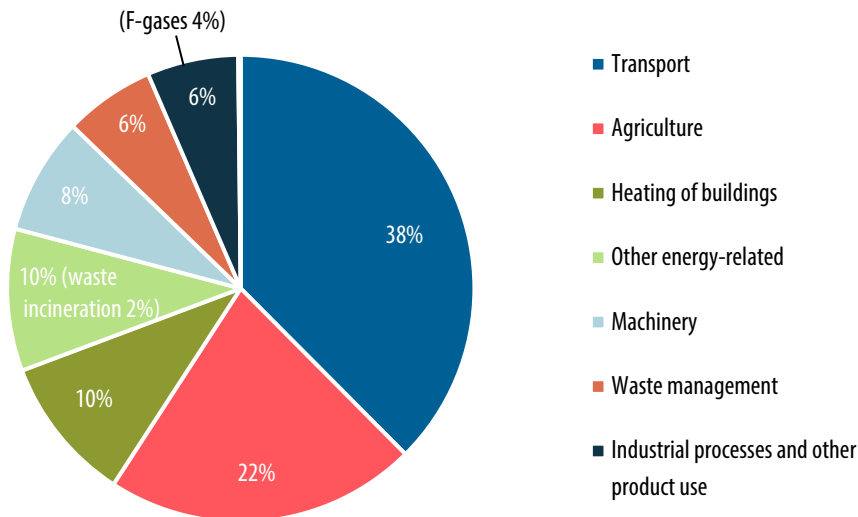


Figure 8. A sectoral breakdown of total emissions in the effort sharing sector in 2018. Heating of buildings, which falls within the effort sharing sector, includes building-specific heating as well as emissions from small district heating plants not covered by the emissions trading scheme.

In 2018, emissions remained at more or less the same level as in the year before in all effort sharing sectors (see Table 3). While there was a slight year-on-year increase in emissions

from transport and machinery, emissions decreased in the other sectors. The most significant relative reductions were achieved in emissions from building-specific heating. Emissions from agriculture and waste management also dropped slightly. However, the changes in emissions levels were very small in all sectors. The proxy estimate for 2019 indicates that emissions in the effort sharing sector decreased by 2% year on year. Among other things, emissions from transport and waste management were down, whereas agricultural emissions were almost equal to the previous year. The most significant relative reductions compared to 2005 were achieved in emissions from building-specific heating and waste management. Agricultural emissions have changed little during the period of scrutiny.

See below for more detailed information on emissions trends in individual sectors. Sector-specific indicators, which contribute to explaining the trends, are presented in Appendix 2. The data in this section are from the most recent greenhouse gas inventory. Proxy estimates for 2019 emissions have been given for those sectors where they are available.

Table 3. Sector-specific emissions in 2005, 2017 and 2018 as well as changes in the periods 2005–2017 and 2017–2018. The Table contains emissions data from the sectors for which measures have been specified in the Medium-term Climate Change Policy Plan, and consequently it does not cover all emissions in the entire effort sharing sector.

	2005 (Mt CO ₂ eq.)	2017 (Mt CO ₂ eq.)	2018 (Mt CO ₂ eq.)	Change 2017–2018 (Mt CO ₂ eq.)	Change 2017–2018 (%)	Change 2005–2018 (%)
Transport, excl. domestic air traffic	12,6	11,3	11,4	0,2	1,5 %	-9,1 %
Agriculture	6,5	6,6	6,6	-0,1	-1,1 %	0,3 %
Building-specific heating	4,0	2,6	2,5	-0,1	-5,6 %	-38,5 %
Machinery	2,6	2,4	2,5	0,0	1,9 %	-4,5 %
Waste management	2,8	1,9	1,8	0,0	-2,0 %	-35,3 %
F-gases	1,2	1,2	1,2	-0,0	-3,1 %	1,4 %

6.1 Reductions in transport sector emissions sought through an extensive package of measures

Reducing transport sector emissions plays a key role in attaining the target for 2030 in the effort sharing sector, and a significant number of the measures in the Medium-term Climate Change Policy Plan (more than a half when measured in reductions in emissions) target the transport sector. Three different factors have an essential impact on the trends in greenhouse gas emissions from transport: 1) trends in transport performance, 2) energy efficiency of means of transport, and 3) the sources of energy used. The Medium-term Climate Change Policy Plan contains targets and measures for all three factors.

Transport emissions increased up till 2007 as the transport performance grew, after which the trend has, for the most part, been downward (see Figure 9). The downward trend in emissions from 2008 on results from a slower growth in transport performance during the years of recession and an increase in the proportion of biofuels (see Figures 19 and 20). In 2016, however, transport emissions increased clearly compared to the year before. The increase in transport emissions also explains most of the increase in total emissions in the effort sharing sector in 2016, the year in which the emission allocation was exceeded for the first time. Emissions from domestic traffic increased by approx. 2% in 2018 compared to 2017. In 2018, approx. 94% of emissions from domestic transport were generated in road transport. Rail transport accounted for less than 1%, and domestic waterborne transport for approx. 4%. The increase in 2018 was due to an increased transport performance, slower improvement in vehicle energy efficiency, and a smaller proportion of biofuels than in 2017. The proxy estimate for 2019 indicates that transport emissions decreased by 3% (0.3 Mt CO₂ eq.) compared to the year before.

The measures for the transport sector identified in the Medium-term Climate Change Policy Plan have mainly been implemented or implementation is in progress. Not yet implemented measures are related to the renewal of the car fleet and the flattening out of the growth in transport mileage. The intention of a scrapping reward campaign was to boost the renewal of the car fleet but the impact of the campaign was limited to the year 2018. Additional measures are needed as the car fleet is still growing older. In addition it is worth noting that the budget resources allocated for the procurement and conversion support have been used to a limited degree, for example in 2019 only a little more than 15 % of the amount available (see Annex 1). As the emissions from domestic transport in 2005 were 12.7 Mt CO₂ eq. (excluding domestic aviation) the emission may amount to a maximum of 6.4 Mt CO₂ eq. in total in 2030. In 2019 the emissions were 11.1 Mt CO₂ eq. in total according to the proxy estimate by Statistics Finland. This means that the need for emission reductions compared to the current level is about 4.7 Mt CO₂ eq. In the base scenario for the transport sector (VTT / Aliisa 2020) it is estimated that current measures

will contribute to an additional 3.2 Mt CO₂ eq. emission reduction. This means that an additional emission reduction of 1.5 Mt would be required with new measures until 2030.

The target set in the Medium-term Climate Change Policy Plan is that 30% (physical proportion without double counting) of all liquid fuels sold for transport should be biofuels in 2030. In line with this target, the distribution obligation was increased to 30% by 2030 under the Act on the Obligation to Distribute Biofuels, which entered into force in April 2019. As the obligation to distribute biofuels has been incorporated in the legislation, it is likely that the target will be attained. According to the proxy estimate for 2019, the proportion of biofuels in transport fuels was 11% (without double counting); this represents an increase compared to 2018 (9%).

The annual variation in transport sector emissions is to a great extent explained by fluctuations in the proportion of biofuels in recent years. These fluctuations are the consequence of legislation that allows frontloaded implementation of the distribution obligation. Fluctuations may also occur in effort sharing sector emissions in the future due to changes in the volumes of biofuel use. However, the distribution obligation will increase gradually until 2030, which will reduce transport emissions further.

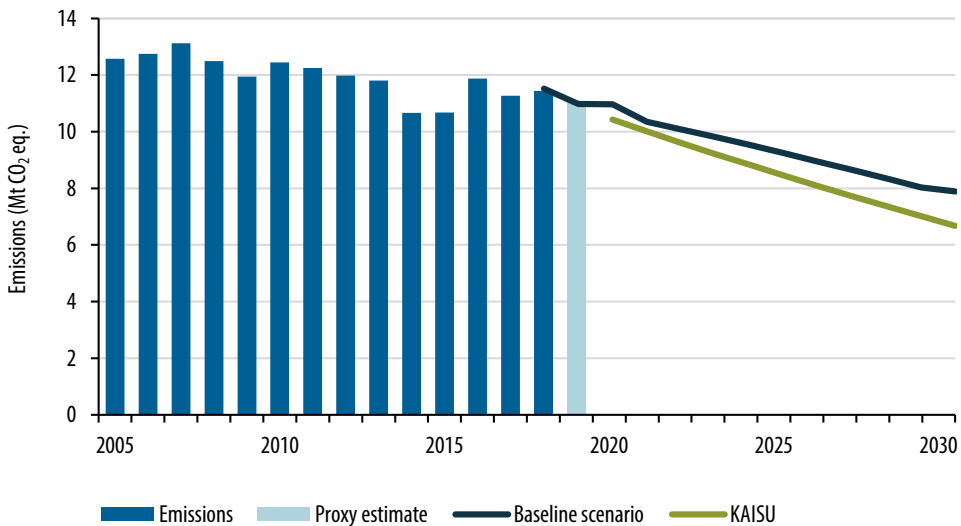


Figure 9. Trend in transport emissions (excl. CO₂ emissions from domestic air traffic) in 2005–2019, an estimate of emissions trends according to the baseline scenario, and an estimate of the Medium-term Climate Change Policy Plan (KAISU) on the trends achievable in 2021–2030 with the measures included in the plan. Some of the Medium-term Climate Change Policy Plan measures have already been implemented, and their impacts are also reflected in the baseline scenario. The data from 2019 is a proxy estimate.

The target for the transport performance of cars is halting the growth of vehicle-kilometres in urban subregions in the 2020s. In 2016–2018, the performance of cars on cities' street networks appears to have decreased somewhat, while it has increased on roads and for HGVs.

The Medium-term Climate Change Policy Plan sets as the minimum target a total of 250,000 electric cars (fully electric cars and plug-in hybrids) and 50,000 gas fuelled gas on the Finnish roads in 2030. It appears that the target of 250,000 electric cars will be achieved easily with the current policy instruments, and in 2030, the number of electric cars will probably be far greater than this figure. The interim goals set for 2020 in the National programme for a distribution network for alternative transport fuels, or 5,000 gas fuelled cars and 20,000 electric cars, have already been achieved, the former in 2018 and the latter in 2019 (see Figure 23). At the end of 2019, there were over 9,000 gas fuelled and over 29,000 electric cars in Finland.

The number of electric cars grew significantly in 2019, and the numbers of both plug-in hybrids and fully electric cars went up. The number of fully electric cars in Finland almost doubled in 2019 compared to 2018. The proportion of fully electric cars of all electric cars has been approx. 20% in recent years. The contribution of plug-in hybrids to the reduction of emissions is not equal to fully electric cars, particularly if petrol or diesel are used frequently for driving long distances on the road.

Other targets set in the Medium-term Climate Change Policy Plan include renewing the Finnish car fleet significantly faster than at present, and reducing emissions from new cars to near the average threshold value (95 g/km) set for EU car manufacturers by 2020. The current rate of reduction will not be adequate for achieving this target, however (see Figure 22). In 2016–2019, Finland has increasingly fallen behind the target trajectory. Additional ambition will also be needed to achieve the target as more stringent EU threshold values were imposed on car manufacturers in 2019.

The average age of cars on Finnish roads has continued to increase and was 12.2 years in 2019. To bring this average age down, the sales of new cars would have to grow compared to previous years (see Figure 21). Imports of used cars also continued to grow: in 2019, almost 46,000 second hand cars were imported into Finland, whereas this figure in 2018 was less than 40,000. Compared to first registrations, larger diesel cars with higher emissions are prominent among imported second hand cars on the one hand; on the other hand, the proportion of vehicles using alternative fuels has also increased continuously among imported cars and is greater among imported vehicles than among those registered for the first time in Finland.

Negotiations on the land use, housing and transport agreements (MAL agreements) for 2020-2031 were successfully finalised with the urban subregions of Helsinki, Tampere, Turku and Oulu in June 2020. In line with the Government Programme, the time span of the MAL agreements has been extended to 12 years, and climate change mitigation by integrated urban structure and sustainable forms of mobility have an increasingly large role in their objectives. The objective of the MAL agreements is to coordinate urban structure and transport system development, creating preconditions for sufficient and diverse offer of sites and housing production, more concise urban structure, and an effective, safe and sustainable transport system. These measures promote a low-carbon and sustainable urban structure, and a transport system that supports it, in order to mitigate climate change as well as to enable smoothly running daily lives, a well-functioning labour market and viable businesses. The negotiation results take into account in a profound way promotion of sustainable transport by including measures for developing walking, cycling and public transport, especially rail transport. The central government has launched negotiations on MAL agreements with three new urban subregions (Jyväskylä, Lahti and Kuopio) in June 2020.

Continuous multi-actor cooperation is required to develop station areas and to improve their service levels. Railway stations are transport nodes and thus play a key role in enabling low-carbon daily life and travel chains. Versatile services at stations increase the attraction of public transport and make residents' daily lives smoother. However, the service levels of stations vary significantly around Finland. Station areas have in recent years been subject to extensive development pressures, and several concrete projects to develop them have been launched by both cities and the central government. Station area development has also figured prominently in the MAL agreements, as they are excellent examples of efforts to coordinate transport and land use.

Central government actors involved in station area development include the Finnish Transport Infrastructure Agency and Senate Station Properties Ltd. In addition, the Finnish Transport and Communications Agency promotes service level development at passenger and goods transport nodes, including station areas, as part of its work on transport systems and the development of public transport and other transport services. VR also plays an important role in the development efforts.

In a handful of cities, the offer of services in station areas has additionally been developed with a new approach in cooperation between the central government and the cities in the Smart Stations project in 2018–2020, first as a pilot and later as an ERDF financed cooperation project.

Around stations which serve long-distance traffic, such services as park-and-ride facilities have been developed in recent years. These development efforts are underpinned by the

Finnish Transport Infrastructure Agency' publication 7/2019: Park-and-ride facilities around railway stations as part of the transport system – Current state of and development needs for park-and-ride facilities at 1st class stations in long-distance transport. The Agency's on-going work related to station areas is also discussed in the following reports (in Finnish): Finnish Transport Infrastructure Agency's operating principles concerning stations, Finnish Transport Infrastructure Agency Publications 19/2019; and General description of project management in station area projects, Finnish Transport Infrastructure Agency Publications 28/2019.

A programme which promotes walking and cycling is also underway, aiming for a 30% increase in the number of journeys completed by walking or cycling by 2030. The programme is due to be implemented during the current government term. EUR 24.9 million has been reserved for promoting walking and cycling in the Budget 2020, which represents an enormous increase compared to previous years. EUR 10 million of this amount was allocated to measures targeting state-owned networks and EUR 14.9 to grants for municipalities and other actors.

The preparation of a 12-year national transport system plan, Transport 12, is currently underway, and the plan is due for completion in spring 2021. In keeping with the plan's objectives and strategic policies, people will have better possibilities of choosing more sustainable modes of mobility. The transport system will guarantee the accessibility of the entire country and respond to the needs of businesses, commuting and housing. The effectiveness of nodes and travel chains will be improved. As the starting point of the plan's preparation, the Finnish Transport and Communications Agency has completed two reports: The current state of the transport system and the changes in its operating environment, and the Strategic status of the transport network. Both reports deal with the current status and development needs of station areas.

According to Prime Minister Marin's Government Programme (2019), Finland will be carbon neutral in 2035. The goals of reducing transport emissions should also promote this aim. The target set in the Government Programme is that by 2030, Finland will reduce transport emissions by at least 50% compared to the 2005 levels, and transport will be carbon free by 2045.

Drafting a roadmap for fossil-free transport in accordance with the carbon neutrality target is one of the key measures of the Government Programme. The roadmap is currently being prepared, and it is to be submitted to the Government in late 2020. The roadmap will contain proposals making it possible to attain the climate targets set for transport. A reform of transport taxation will also be prepared during the current government term. This reform is being investigated by a working group appointed by the Ministry of Finance whose mandate extends until March 2021. The working group's

task is to assess the effectiveness and impacts of the current transport taxation regime as well as other tax instruments and tax-like charges in terms of the climate targets and public finances, and to evaluate the cost-effectiveness of policy instruments in achieving emissions reductions.

The Government Programme also pledges the annual amount of EUR 20 million to supporting climate measures in public transport. In 2020, EUR 13 million of this support will be allocated to competent public transport authorities following a separate application procedure organised by the Finnish Transport and Communications Agency. The support is intended for large and medium cities and other competent public transport authorities. In the early years, the main focus of this central government support will be on measures related to clean public transport fleets and fuels. It is likely that its focus will later be shifted towards measures with a permanent impact on increasing the modal share of public transport. A decision on the use of the remaining EUR 7 million will be made by the Ministry of Transport and Communications in 2020.

6.2 New measures also in agriculture

Greenhouse gas emissions from agriculture are reported in several reporting sectors. Methane and nitrous oxide emissions from agriculture, which mainly originate from production animals, manure and the soil, as well as carbon dioxide emissions from liming and urea fertilisation, are reported in the agricultural sector (Figure 24). Carbon dioxide emissions associated with agricultural land and grasslands are reported in the land use sector (Land use, land use change and forestry, LULUCF) for cropland and grassland (see Figure 11). Additionally, emissions from agricultural machinery and building-specific heating are reported as part of energy-related emissions in the effort sharing sector.

Agricultural emissions included in the effort sharing sector have remained relatively stable in 2005–2017 (Figure 10). In 2018, they decreased by one percent to approx. 6.6 Mt CO₂eq. The most significant reasons explaining this minor reduction were lower emissions from plant waste on croplands due to a poor crop yield and from the digestion of production animals as the numbers of animals were reduced. The proxy estimate for 2019 indicates that agricultural emissions changed little from the previous year. The minor growth in emissions (one per cent) was caused by a good crop yield and greater volumes of plant waste. This increased the volume of organic matter, and thus nitrogen, in the soil, resulting in higher nitrogen oxide emissions from the soil. There was a further reduction in animal numbers, decreasing emissions from their digestion and manure treatment compared to previous years. With the existing measures, agricultural emissions are expected to remain relatively stable until 2030. If the measures set out in the Medium-term

Climate Change Policy Plan are implemented as planned, agricultural emissions should show a slight decrease.

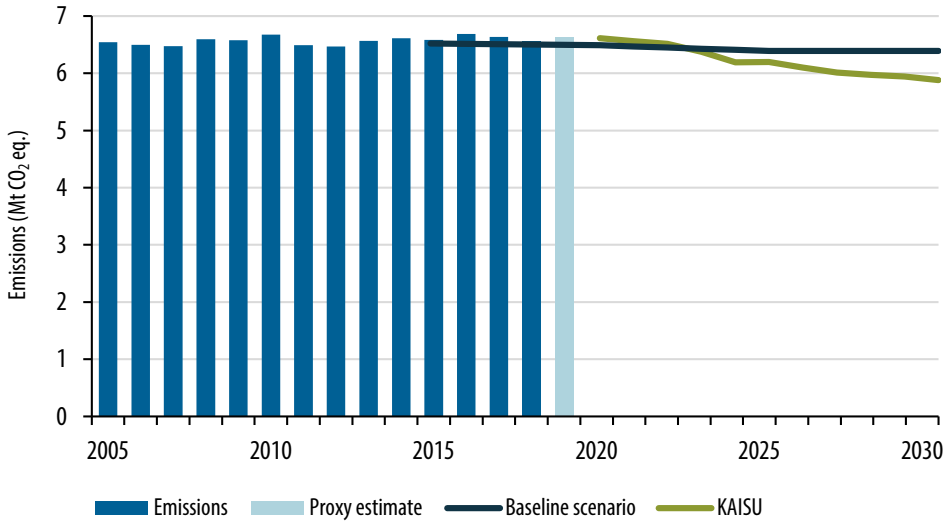


Figure 10. Trends in agricultural emissions in the effort sharing sector in 2005–2019, an estimate of emissions trends according to the baseline scenario (source: Climate neutral Finland 2035 – scenarios and impact assessments), and an estimate of the Medium-term Climate Change Policy Plan (KAISU) on the trends achievable in 2021–2030 with the measures included in the plan. The data from 2019 is a proxy estimate.

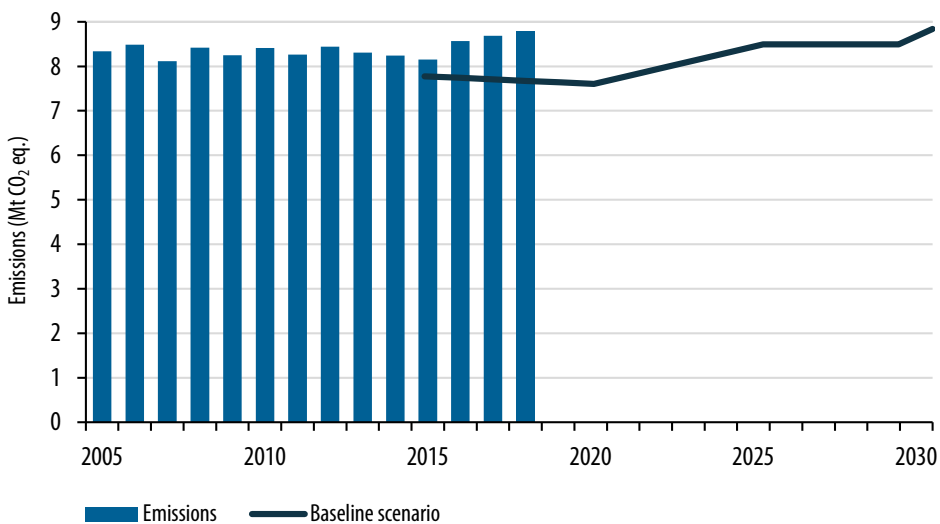


Figure 11. Agricultural emissions reported in the land use sector (cropland and grassland) in 2005–2018 and trends according to the baseline scenario until 2030 (source: Climate neutral Finland 2035 – scenarios and impact assessments).

The Medium-term Climate Change Policy Plan includes measures related to perennial cultivation of organic soils without soil preparation and raising the groundwater level with the help of controlled subsurface drainage. These measures are already in place in the current Rural Development Programme for Continental Finland 2014–2020. A reform of the EU's Common Agricultural Policy for the next financing period is currently underway, and the measures will be reviewed in this context. The objective is that 40% of the total EU funding for CAP measures will be allocated to climate measures, and an obligation to direct 30% of rural development funds to environmental and climate measures will be imposed on the Member States.

The afforestation measures set out in the Medium-term Climate Change Policy Plan are currently being examined. Promoting afforestation will be part of the climate programme for the land use sector referred to in the Government Programme. While there is currently no legislation in Finland on supporting afforestation, the Ministry of Agriculture and Forestry is preparing a government proposal on a fixed-term act on subsidising afforestation.

The Medium-term Climate Policy Programme also provides for the promotion of biogas production in the agricultural sector, which has been estimated to yield an additional reduction of 0.31 Mt CO₂eq. in effort sharing sector emissions in 2030. This reduction will be divided between the agricultural, transport and machinery sectors as well as building-specific heating. In 2018, a total of 931 GWh of biogas was produced in Finland, of which approx. 12 GWh by farm plants. The total production volume of biogas dropped by 2.4% year on year, whereas production at farm plants grew by approx. 47%.

In line with the Government Programme, the Ministry of Economic Affairs and Employment appointed a working group to prepare a national biogas programme in 2019. It completed its work in January 2020. Key challenges to development in the biogas sector continue to be associated with poor profitability. The working group found that profitability could be improved by reducing investment costs, improving the sales price obtained from the end products, and more efficient acquisition of raw materials from farming. The high investment costs are a particular obstacle for small plants. The measures proposed by the working group are being implemented.

Another measure referred to in the Medium-term Climate Change Policy Plan for reducing agricultural emissions is increasing and preserving soil carbon stocks, including promotion of the 4 per 1000 initiative. The Rural Development Programme for Mainland Finland 2014–2020 contains measures which, in addition to promoting water protection, also contribute to increasing and preserving soil carbon stocks. The resulting reduction in emissions affects both the land use sector and the agricultural sector. These measures include recycling nutrients and organic matter, incorporation of slurry into fields, plant

cover on fields in winter, maintaining environmental grasslands and water level regulation (controlled subsurface drainage). Several research and development projects related to increasing and preserving soil carbon stocks are currently underway.

In keeping with the Government Programme, the preparation of an overall climate programme for the land use sector has been initiated. The measures of the climate programme include reducing emissions from cropland and enhancing carbon sequestration.

As measures related to food consumption, the Medium-term Climate Change Policy Plan highlights reducing food waste and eating in compliance with nutrition recommendations. The Natural Resources Institute Finland (Luke) conducted a project aiming to develop a tool for measuring and estimating food waste in 2016–2018. Currently, Luke is engaged in the monitoring of food waste and development related to it in different parts of the food chain as well as putting together a national roadmap for reducing food waste. The Government Programme sets the target of halving food loss by 2030. Reducing food waste and changing eating habits will not directly reduce emissions from the agricultural and land use sectors in Finland, and the precondition for reducing emissions is that these changes also bring about changes in domestic food production.

A project titled Assessment of climate and environmental impacts of reduction of food waste and eating according to nutrition recommendations (FoodMinimum) completed in 2019 investigated how an extensive change of diet would affect the climate, nutrient intake, and agriculture and food industry, and evaluated means of supporting a dietary change. A diet that brings climate benefits while being in line with nutrition recommendations can be achieved in many ways, all of which involve reducing meat consumption, however. Sustainable diets containing animal products would additionally require goal-oriented measures for preserving and increasing the soil carbon stock in croplands. Whereas adopting a diet with climate benefits would revolutionise agriculture and the food industry, the value of the production could be preserved. New value chains and financial investments would be needed for a controlled change. Public steering could support the change by means of strong strategic goals and effective combinations of financial instruments and guidance by information.

In line with the Government Programme, a national climate food programme is being prepared with the goal of minimising the climate footprint of the food consumed in Finland and improving citizens' understanding of how food is produced.

6.3 Phasing out oil in building-specific heating

While emissions from building-specific heating have been showing a downward trend for years, annual fluctuations occur, caused among other things by weather conditions (see Figure 12). In 2014 and 2015, for instance, the weather was exceptionally warm, resulting in lower emissions than in 2016. The reasons for this downward trend are phasing out of oil heating (see Figure 25) and the improved energy efficiency of buildings. Most emissions from building-specific heating are caused by oil heating. In 2018, emissions from building-specific heating amounted to approx. 2.5 Mt CO₂ eq., which is approx. 6% less than in the year before. The Energy Efficiency Agreement on the Distribution of Liquid Heating Fuels (HÖYLÄ) has also improved the energy efficiency of oil-heated buildings and thus affected the emissions trend. In the baseline scenario, emissions are expected to go down further as a consequence of the renewal of building stock, renovations and changes in heating systems. The measures included in the Medium-term Climate Change Policy Plan are expected to reduce emissions further. The obligation to distribute bio fuel oil will have major impacts on reducing emissions. Under the Act on the Promotion of Biofuel Oil Use, which entered into force on 1 April 2019, the share of biofuel oil will be 3% in 2021, gradually increasing to 10% in 2028.

The Medium-term Climate Change Policy Plan specifies that oil heating will be phased out in central government premises by 2025. All other public actors are encouraged to follow suit. In central government, Senate Properties and the Construction Establishment of Defence Administration are responsible for most oil-heated buildings. The Construction Establishment of Defence Administration has set as its target transitioning to renewable energy in the building-specific heating of its premises within the limits permitted by the security of supply by 2025. Senate Properties has also included phasing out oil heating in its programme for attaining carbon neutrality.

In line with Prime Minister Marin's Government Programme, the use of fossil fuel oil in heating will be phased out by the start of the 2030s. Oil heating will no longer be used in properties owned by the central and local governments by 2024. A separate action plan will be adopted to encourage properties using oil heating to switch to other forms of heating during the 2020s. Coordinated by the Ministry of the Environment, preparation of the action plan was launched in early 2020. This work is carried out by the key ministries as well as Statistics Finland and Motiva, which participate in an expert capacity.

The phasing out of oil in residential buildings (residential buildings account for approx. 1 Mt CO₂ eq. of emissions from oil heating) will also be promoted by means of grants, applications for which will be received from the beginning of 2021. A total of EUR 10 million has initially been earmarked for this purpose. The estimated impact on annual emissions will be approx. 0.02 Mt CO₂ eq.

An attempt will also be made to reduce the emissions of residential buildings by means of grants for projects that improve energy efficiency. A total of EUR 100 million has initially been earmarked for these grants in 2020–2022. The estimated impact on annual emissions will be approx. 0.14 Mt CO₂ eq., affecting emissions from all residential buildings (not only those heated with oil). The grants will be administrated by the Housing Finance and Development Centre of Finland (ARA).

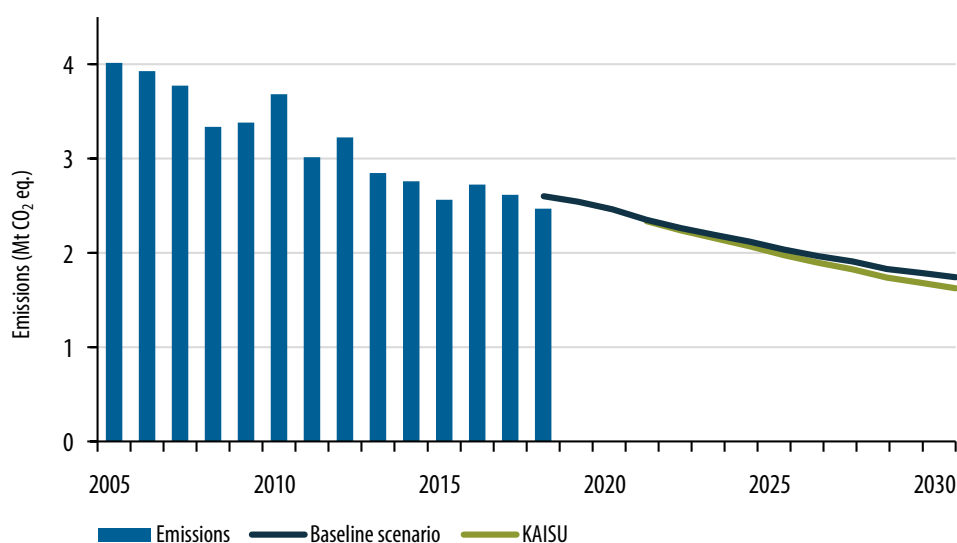


Figure 12. Emissions from building-specific heating in 2005–2018, an estimate of emissions trends according to the baseline scenario, and an estimate of the trends achievable in 2021–2030 with the measures of the Medium-term Climate Change Policy Plan (KAISU). The impact of the obligation to distribute biofuel oil set out in the Medium-term Climate Change Policy Plan has been accounted for in the baseline scenario. The emissions data produced by the inventory include all greenhouse gases, whereas the scenario graph in the image only includes CO₂ emissions. Consequently, the image does not account for such items as methane emissions from small-scale combustion of wood, and the graphs slightly underestimate emissions from building-specific heating. The difference is relatively minor, however. Total emissions in the effort sharing sector include all emissions.

6.4 First targeted measures for reducing emissions from machinery

Emissions from machinery decreased somewhat between 2005 and 2018 (see Figure 13). Machinery is considered to include machinery used in industry (such as construction and extractive operations), agriculture and forestry as well as households and the service sector. There are annual fluctuations in the emissions caused by the level of activity in construction and industry, among other things. While the emissions increased by approx. 2% in 2018 compared to the year before, they were approx. 5% lower than in 2005. In 2019, the emissions decreased by approx. one per cent year on year.

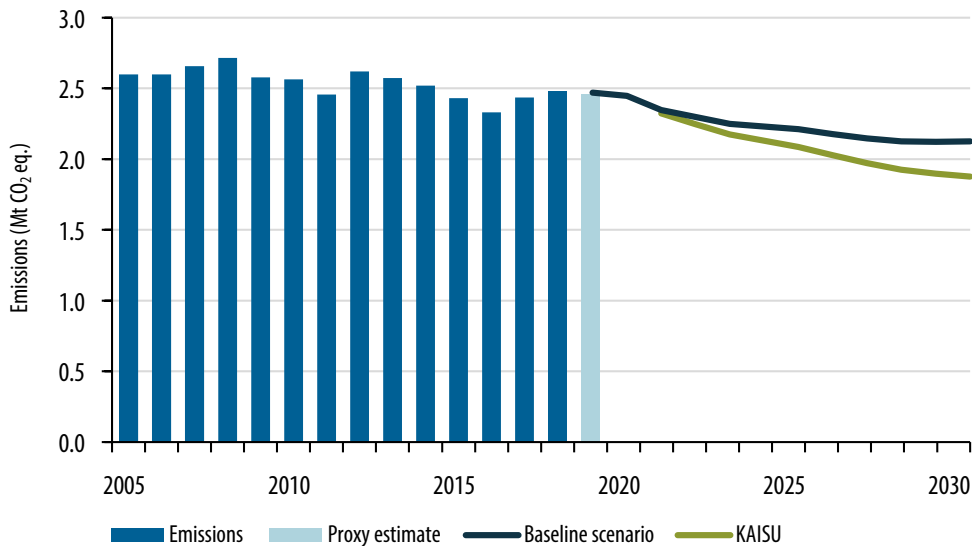


Figure 13. Emissions from machinery in 2005–2019, an estimate of emissions trends according to the baseline scenario, and an estimate of the trends achievable in 2021–2030 with the measures of the Medium-term Climate Change Policy Plan (KAISU). The data from 2019 is a proxy estimate. The impact of the obligation to distribute biofuel oil set out in the Medium-term Climate Change Policy Plan has been accounted for in the baseline scenario.

Most of the emissions from machinery (90%) are caused by light fuel oil use and a smaller proportion (10%) by petrol use. The trends in emissions in different sectors caused by the use of light fuel oil in machinery also developed in different directions between 2005 and 2018 (see Figure 26).

The Medium-term Climate Change Policy Plan now contains emission reduction measures for the machinery sector for the first time. The most significant individual measure is the obligation to distribute liquid biofuels set for light fuel oil. Under the distribution

obligation, light fuel oil shall contain 3% of bio oil in 2021. This obligation will increase in a linear fashion to 10% in 2028. The Act laying down the distribution obligation entered into force in April 2019, and its impacts were accounted for in the baseline scenario of Figure 13.

The obligation to distribute light fuel oil will affect emissions from not only building-specific heating and machinery but also from industrial oil use. In the sectoral breakdown used in this report, emissions from industrial machinery are included in the emissions figures for the machinery sector. The distribution obligation will also affect other light fuel oil use, but as the volumes used are relatively low, the impact on emissions will be minor.

The calculation criteria for the taxation of heating changed at the beginning of 2019, and the life cycle emissions of the fuel are now counted as its carbon dioxide emissions. The taxation of light fuel oil was simultaneously raised by approximately 2%, which also affects the price of machinery fuel.

One of the measures intended to reduce emissions from machinery in the Medium-term Climate Change Policy Plan is converting tractors to run on biogas. Grants for this purpose are available under the Rural Development Programme as a measure for improving the ecological status of farms. Funding can also be granted as investment support for purchasing a gas component for a tractor.

An effort has been made to improve the knowledge base of emissions from machines by developing the quality of the input data for the TYKO model developed by VTT Technical Research Centre of Finland, which is used to calculate emissions. This project, which was implemented by VTT and funded by the Ministry of the Environment, was completed in May 2019. The TYKO model will be developed further as part of the overall development of the LIPASTO system in a preliminary study project coordinated by the Ministry of Transport and Communications. Once the preliminary study has been completed, the needs for specific further development of the TYKO model will also be evaluated.

A Green Deal was concluded between the Ministry of the Environment and the Association of Finnish Technical Traders in 2019 with the principal aim of reducing carbon dioxide emissions from machinery. This agreement represents an effort to increase the offer of fully electrical and other low-emission machines and to encourage their wider use. As part of the Deal, the Ministry of the Environment is working together with the Association of Finnish Technical Traders to plan training on energy efficient machinery use. The ministry has undertaken to fund this training project by EUR 50,000.

The Ministry of the Environment is also negotiating on a Green Deal on emission-free sites with purpose of reducing emissions from public contracting entities' sites through

procurement. Among other things, emissions from sites can be reduced by procuring machinery powered by electricity, biogas and hydrogen as well as by using biofuels. Once the deal has been concluded, the plan is that KEINO will lead efforts aiming to develop a system for monitoring the goals of the agreement and common criteria for machinery procurements.

6.5 Emissions declining from landfills and increasing from waste incineration

Emissions from waste management have decreased relatively steadily in 2005–2018 (see Figure 14). In 2018, they decreased by approx. 2% year on year to approx. 1.8 Mt CO₂ eq. In 2019, there was a reduction of 5% (0.1 Mt CO₂ eq.) compared to the year before. Compared to 2005, emissions went down by as much as 35% by 2018. The reasons for this include decreased landfilling of municipal waste and increased use of waste to generate energy as a result of stricter waste legislation (see Figure 27). Methane produced by landfills is the most significant source of emissions in waste management. Other emission sources include biological treatment of waste (composting and anaerobic digestion) and wastewater treatment (see Figure 28).

The downward trend in emissions is also expected to continue in the near future as a result of a decree enacted in 2016 that limits the landfilling of organic matter, reducing greenhouse gas emissions from landfills further and leading to old landfills producing less gas. The Medium-term Climate Change Policy Plan states that the enforcement of the Government Decree on Landfills will be overseen and monitored. However, the reductions in emissions achieved by the Government Decree on Landfills are already taken into account in the baseline scenario, and no actual new emission reduction measures have been foreseen.

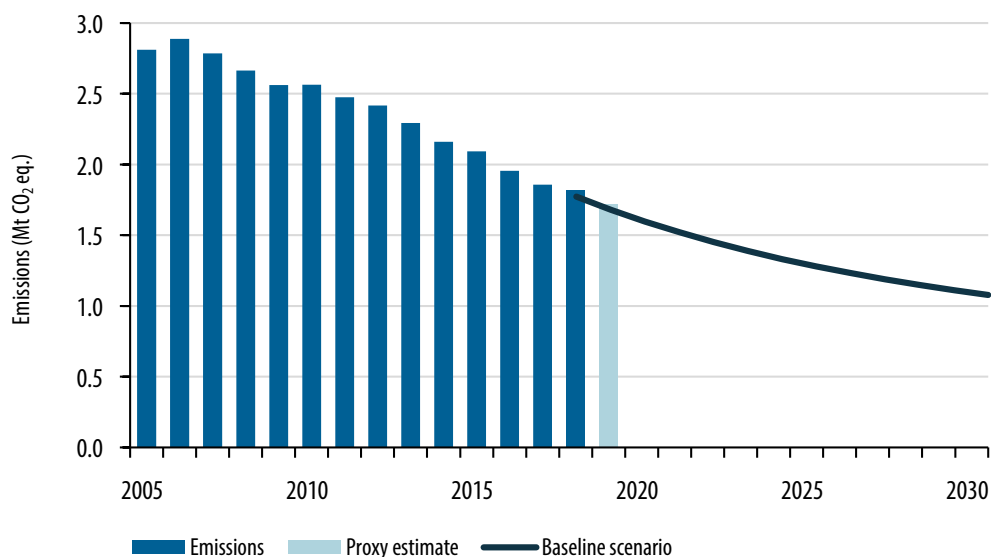


Figure 14. Trends of emissions from waste management in 2005–2019, an estimate of the emissions trends according to the baseline scenario. The data from 2019 is a proxy estimate.

Emissions caused by recovery of energy from waste (waste incineration) are reported in the energy sector, which is why they are not included in the data on emissions from waste management presented above. Only emissions from plants that incinerate municipal waste are included in the effort sharing sector emissions, whereas co-incineration plants belong to the emissions trading sector. Emissions from waste incineration in the effort sharing sector increased in 2005–2018 (see Figure 15). In 2018, this increase was approx. 2% compared to the previous year, and it was due to an increase in the utilisation of municipal waste for energy. Approx. 57% of the municipal waste generated in 2018 was used for energy, whereas in 2008, this proportion was as low as approx. 17%. Emissions from waste incineration are expected to increase slightly in the next few years and stabilise subsequently. The Medium-term Climate Change Policy Plan referred to looking into transferring waste incineration to the emissions trading sector. The conclusion of an investigation conducted in 2018 was, however, that this transfer will not go ahead, at least not for the time being. Other policy measures focusing on emissions from waste incineration, including taxation of waste incineration and a waste incineration Green Deal, will be examined in 2020.

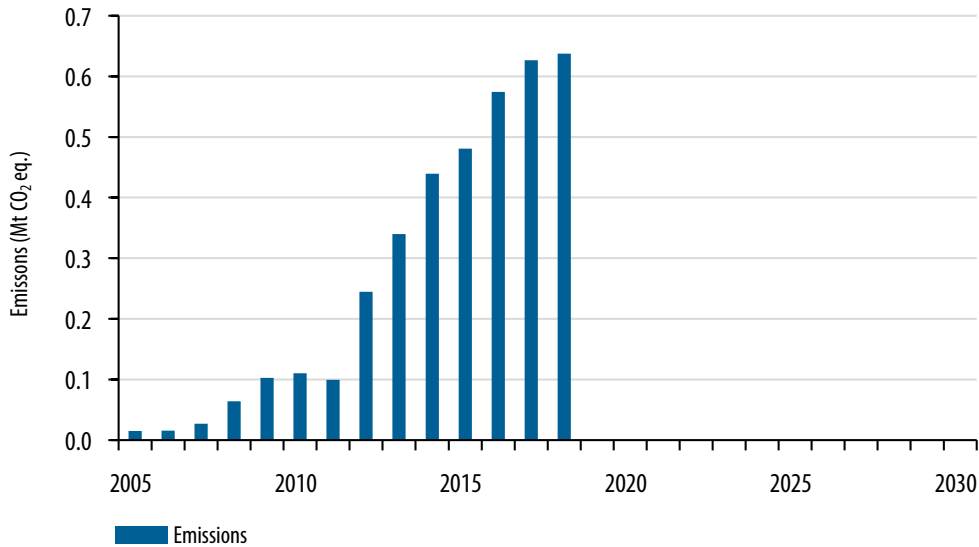


Figure 15. Trends in emissions from waste incineration in the effort sharing sector in 2005–2018. Emissions have increased strongly as a result of increased recovery of energy from waste. Emissions from waste incineration are expected to increase slightly in the next few years and stabilise subsequently.

6.6 A downward trend in F-gas emissions

Emissions caused by the use of F-gases increased from the 1990s until 2013, after which year there has been a slight decline (see Figure 16). Among other things, F-gases are used in refrigeration and air conditioning equipment and aerosols. The main reason for the increase in F-gas emissions since the 1990s is the replacement of ozone-depleting compounds with F-gases in refrigeration and cooling equipment. In 2018, emissions decreased by approx. 3% compared to the previous year. This was almost equal to the 2005 level but more than 20 times as high as in 1990. The proxy estimate for 2019 indicates that the emissions decreased by 1.3% compared to the previous year. Emissions of F-gases from all emission sources decreased. The greatest reduction in emissions took place in the sectors of commercial and industrial refrigeration and cooling equipment. F-gas emissions of shops are reduced by the constantly increasing use of carbon dioxide as a refrigerant in large commercial refrigeration facilities. New facilities using R-404A, which is a high-GWP refrigerant, were no longer commissioned in 2019. R-404A emissions from industrial refrigeration and cooling equipment are also decreasing. Especially in air conditioning equipment for cars, F-gas emissions are additionally being reduced by the introduction of an alternative for HFC refrigerants a few years ago. Since 2018, EU

legislation has no longer permitted the registration of new cars and small vans whose air conditioning systems use a refrigerant with a GWP value exceeding 150.

Additional F-gas legislation has been adopted at the EU level, including a regulation on fluorinated greenhouse gases, the aim of which is to gradually reduce the volume of F-gases placed on the market (see Figure 30). Current measures are expected to reduce F-gas emissions to less than a half, and the measures in the Medium-term Climate Change Policy Plan to about a quarter, of their current level by 2030.

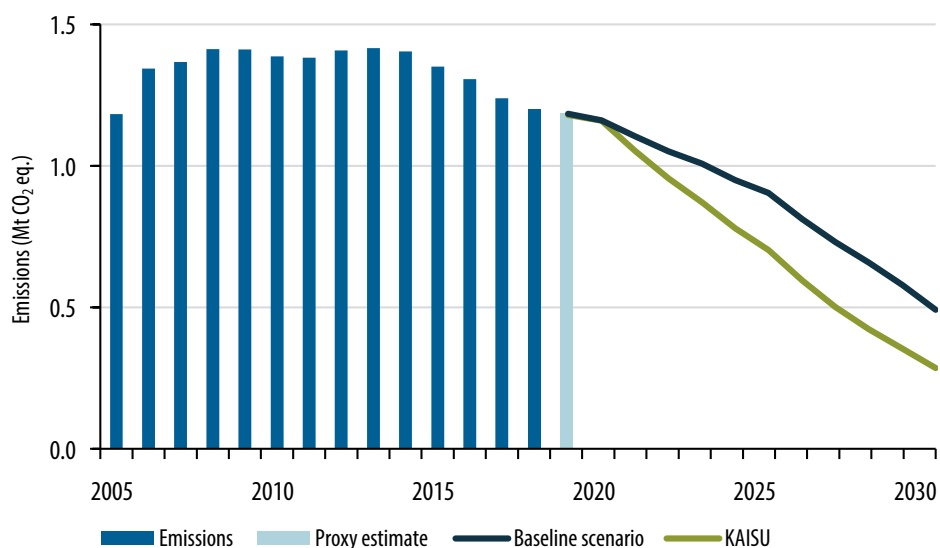


Figure 16. F-gas emissions in 2005–2019, an estimate of the emissions trends according to the baseline scenario, and an estimate of the trends achievable in 2021–2030 with the measures of the Medium-term Climate Change Policy Plan (KAISU). The data for 2019 is a proxy estimate.

7 Cross-sectoral measures needed in addition to sector-specific ones

The Medium-term Climate Change Policy Plan presents not only sector-specific measures but also a number of cross-sectoral ones. They include climate work in municipalities, measures related to consumption, and public procurement. Finland can only achieve carbon neutrality in 2035 if the municipalities and regions also engage in active and effective climate work. The municipalities are responsible in their areas for such functions as land use and zoning, traffic planning, ownership steering of energy companies and choices of heating methods for their buildings. In addition to their own climate actions, municipalities can promote the climate work of the residents, business life, agricultural entrepreneurs and other stakeholders in many ways. Municipalities serve as platforms and enablers, inspiring and accelerating local and regional climate work.

7.1 Giving momentum to municipalities' and regions' climate work

Almost one half of Finnish people live in municipalities which are striving for carbon neutrality by 2030. The new emission data service published by the Finnish Environment Institute (SYKE) in February 2020 indicates, however, that municipal emissions in the effort sharing sector have decreased by as little as 12% between 2005 and 2017. The modest reduction in emissions compared to the ambitious targets shows that more determined efforts should be made to promote the municipalities' climate work and give it new momentum. The Finnish Environment Institute's new emissions calculation system and emission data service now enable all 310 municipalities and 18 regions in Finland to monitor the emission trends in their areas easily and commensurately, without any costs. The emission data service makes it easy to find information on emissions in the effort sharing and emissions trading sectors as well as total emissions by municipality and region. The system also includes the so-called Hinku method, which emphasises the motivating nature and fairness of emission calculations from the

perspective of municipalities and regions, for example with regard to road traffic and wind power compensation.

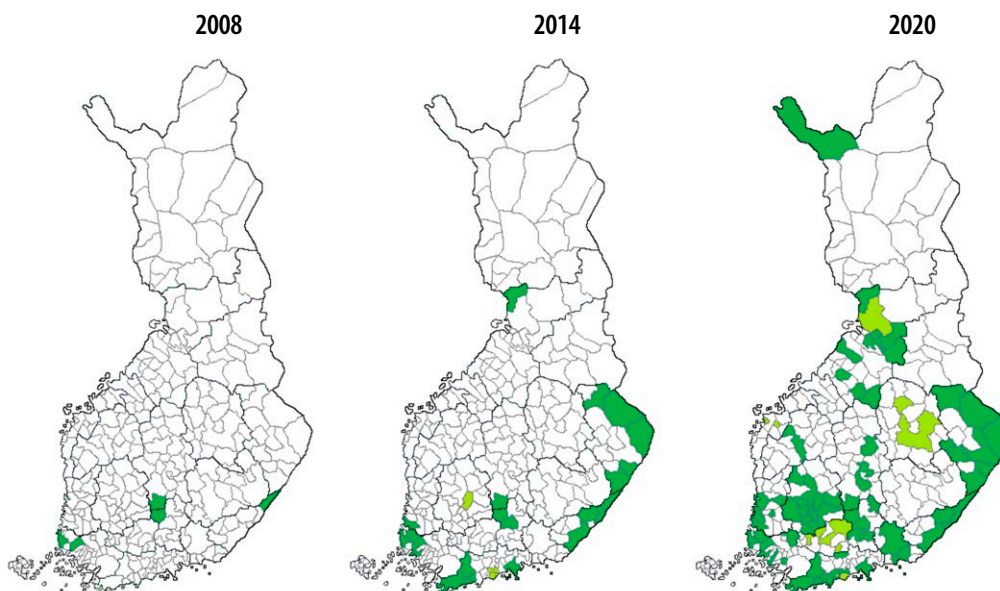


Figure 17. Municipalities which have set their target at carbon neutrality by 2030 (dark green) or after 2030 (light green). The Figure shows the situation in 2008, 2014 and 2020.

The best results in climate work are achieved if the municipalities are given concrete support and resources for utilising and accelerating the introduction of appropriate climate solutions best suited for their local conditions. The municipalities need tools and operating models for such tasks as climate leadership, providing impetus for the climate work of residents and companies, and assessing the environmental and other impacts of various climate measures. The most effective way to reduce municipal emissions is through genuine and goal-oriented interaction and cooperation between the local government organisation and other stakeholders in the municipality.

As part of implementing the Medium-term Climate Change Policy Plan (KAISU) for 2030, the Ministry of the Environment has been granted an annual appropriation of EUR 1 million for 2018–2021 to promote climate work in municipalities and regions. In its spending limits discussion of spring 2020, the Government additionally reserved an additional appropriation of EUR 4 million for 2021 to provide impetus for climate work in municipalities and regions. These appropriations will be allocated to support local and regional climate work through the Ministry of the Environment's Municipal climate change solutions programme.

This programme accelerates and finances not only the municipalities' and regions' own climate projects but also national solution models and tools that support their work. The impact of the programme is enhanced through interactive stakeholder cooperation at the national, regional and local level. The objective of the programme is to lower the threshold and attract as many new municipalities and counties as possible to join in on the goal-oriented climate work. The idea of the Municipal climate change solutions programme is that municipalities and regions would also make efficient use of other national and international sources of finance.

The appropriation for the Municipal climate change solutions programme is used to fund around 15 climate projects conducted by the municipalities and regions and around 10 small-scale trials each year. A large number of good applications were received from municipalities in the call for grant applications in 2019 and 2020, only about one half of which could be funded. While the projects produce positive climate impacts, they also promote the vitality of municipalities and create employment locally and regionally. Good examples of projects funded under the programme are i) Climate actions of resource smart companies (REIVI), which creates operating models for climate work to support cooperation between the municipalities and companies in a region and which lends itself to extensive application across Finland, and ii) Climate actions in municipalities, in which the Regional Council of Central Finland aims to integrate climate work systematically into the activities of the region's municipalities and build up the climate competence of municipalities in Central Finland.

The Municipal climate change solutions programme annually funds a few large national climate projects whose outcomes, operating models and tools benefit municipalities and regions extensively around Finland. For example, the programme has funded the Climate Leaders project led by Motiva, in which best practices in municipalities' climate leadership have been identified and disseminated through peer learning. The programme has also funded a support package for developing climate work in municipalities innovated by the Association of Finnish Local and Regional Authorities. Information materials, training and free communication materials are continuously being produced for municipalities.

Regional climate work is becoming increasingly important for supporting the municipalities' efforts. For example, the programme is funding a project conducted by the Regional Council of Central Finland, which ensures the commitment of all municipalities in the region to shared climate work. The programme also supports the climate work of regional state authorities through the Centres for Economic Development, Transport and the Environment (ELY Centres). A project which is led by the ELY Centre for Pirkanmaa and which involves all Finnish ELY Centres examines the role, effectiveness and opportunities that the regional state authority has in climate change mitigation and adaptation. The effectiveness of regional climate work is also supported by the fact that five ELY

Centres allocated an additional appropriation granted to them in the Budget 2020 to the promotion of climate and circular economy work.

7.2 Households' carbon footprint is growing but several measures are available for curbing emissions from consumption

In the Medium-term Climate Change Policy Plan, the most important measure related to consumption is encouraging citizens to reduce their carbon footprint by an average of 50% by 2030. After showing a downward trend, the carbon footprint of Finnish households has started to grow again in recent years. The Medium-term Climate Change Policy Plan highlights the participation of citizens, peer learning and the significance of local pilots in increasing the effectiveness and acceptability of climate actions as well as the role of citizens as developers of solutions.

In spring 2019, the Finnish Environment Institute published a report on the development of emissions caused by Finnish households' consumption (the KUHIMA project, see Figure 18). The findings indicate that emissions from consumption increased by 12% between 2000 and 2016. In particular, this development is driven by an increase in consumption expenditure. Households' share in all emissions caused by consumption is crucial for the overall development. In 2016, the combined carbon footprint of Finnish households was 60 Mt. As a whole, consumption-based emissions (private and public consumption and investments) are clearly higher in Finland than regional emissions. The difference arises from the fact that foreign trade is taken into account in the calculation of emissions. In a consumption-based analysis, emissions associated with imported products are included in Finland's consumption-based emissions, and emissions caused by the manufacturing of exported products are correspondingly excluded. A precondition for monitoring the carbon footprint of household consumption is regular updates of the calculation data, and partly also the calculation method.

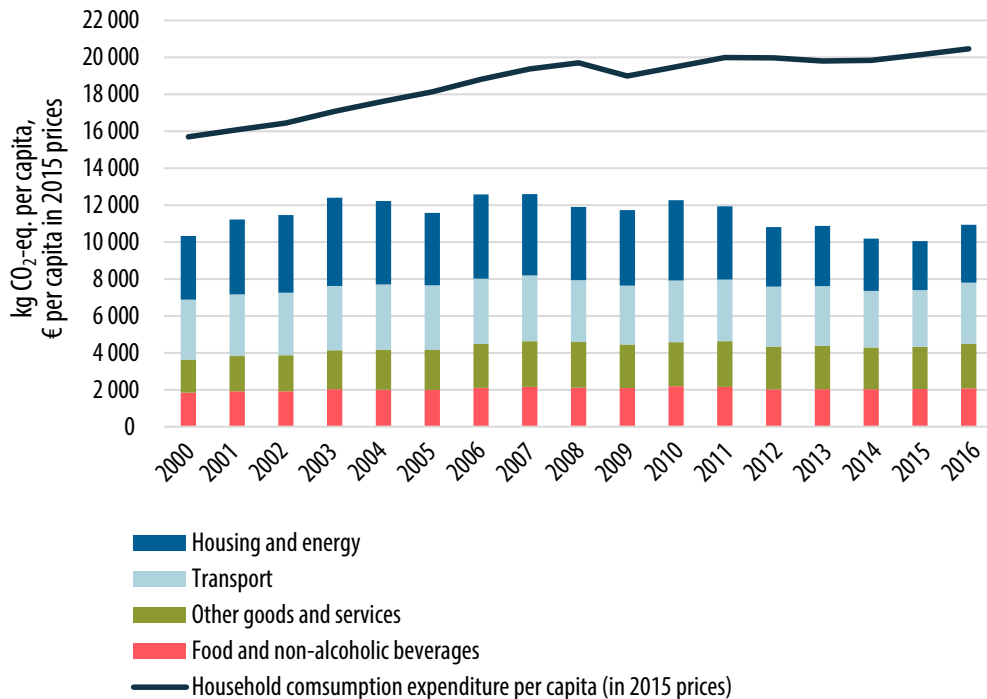


Figure 18. Average consumption expenditure and carbon footprint of Finnish people in 2000–2016. The data are based on a Finnish Environment Institute’s study published in spring 2019 on the trend of emissions caused by Finnish households’ consumption.

Efforts have been made to strengthen the knowledge base of the link between consumption and climate change by means of research projects. The FoodMinimum project completed in 2019 by the Government’s analysis, assessment and research activities calculated the impact of diets consistent with nutrition recommendations compiled in different ways on citizens’ carbon footprints, and the effects of reducing food waste on cutting emissions. The Climate Diet calculator developed by the Finnish Environment Institute has been updated to meet today’s technical requirements and to offer suggestions for lifestyle changes to users.

Together with Sitra, the Prime Minister’s Office launched a service in which Finnish people can calculate their carbon footprints and make personal plans in which they commit to reducing their carbon footprint. This is part of the Society’s Commitment to Sustainable Development scheme maintained by the Prime Minister’s Office and its # Commitment2050 service. Over 76,000 citizens have calculated their carbon footprints, and almost 2,300 Finnish people have made their personal commitments (situation on 25 May 2020).

Energy efficiency measures for consumers were discussed by the Energy Efficiency Working Group appointed by the Ministry of Employment and the Economy in 2018 and 2019. In the final report published by the Ministry of Economic Affairs and Employment on 30 September 2019, an expert group on consumers emphasised the importance of energy advice and communications in achieving consumer-related objectives. In addition to individual energy efficiency measures directed at households, the utilisation of renewable energy and the opportunities provided by consumption flexibility should also be taken into account. The measures listed by the Energy Efficiency Working Group included comprehensive energy advice services for consumers, communications and information, and various services aimed at promoting consumers' energy efficiency. The work to plan and implement the measures proposed by the working group was launched under the leadership of the Ministry of Economic Affairs and Employment in October 2019.

At the national level, Motiva provides energy advice for consumers, and each county of Mainland Finland has an actor serving this purpose selected by the Energy Authority in a tendering process. Consumers can access free and impartial advice, for example by telephone and e-mail, at events and through various campaigns. The most frequent consumer questions concern heat pumps, heating solutions, solar power and heat, replacing oil with renewable energy sources, saving energy and the carbon footprint. The energy advice services for consumers are funded by the Energy Authority, and these activities will continue until the beginning of May 2023.

7.3 Supporting climate change mitigation through public procurement

The carbon footprint of public procurement was calculated for the first time last year in a project titled 'Carbon footprint and use of natural resources in public procurement and household consumption' conducted by the Finnish Environment Institute. The carbon footprint of public procurement in Finland was 8.3 million tonnes of carbon dioxide equivalent in 2015. The calculation included consumption-based emissions, and thus also imports and exports. The central government accounted for 21%, municipalities for 57%, and joint municipal authorities for 22% of the carbon footprint. Procurements in the Ministry of Defence's administrative branch accounted for the greatest proportion of greenhouse gas emissions, followed by the Ministry of Transport and Communications and the Ministry of the Interior. The greatest emissions were generated from procurements of heat and electricity, construction services, repair and maintenance services of civil and water engineering infrastructure, and travel and transport services. Foodstuffs, cleaning and laundry services, fuels and lubricants, and pharmaceuticals and medical supplies also generated a large proportion of the emissions.

In recent years, efforts have been made to improve leadership and effectiveness in public procurement, among other things to curb greenhouse gas emissions, by establishing KEINO, the Competence Centre for Sustainable and Innovative Public Procurement, which began operating on 1 March 2018. KEINO is a network-based consortium in which Motiva Oy, the Association of Finnish Local and Regional Authorities, VTT Technical Research Centre of Finland, Business Finland, the Finnish Environment Institute, Hansel Oy and Sitra are responsible for working on and jointly developing different areas.

Together with contracting entities, KEINO aims to develop and test new operating models in procurement. In 2019, KEINO launched the development programme KEINO Academy and appointed 15 regional change agents to spar with and advise those responsible for procurement in their counties. KEINO buyer groups in the areas of clean vehicles and transport, sustainable procurement in healthcare regions and low carbon construction are working to achieve climate objectives. At the end of 2019, the buyer group on low carbon construction had five case sites of public service buildings, on which low carbon targets and a carbon footprint calculation method are applied to procurements. The network also includes municipalities which observe the activities and their results with interest. In the buyer group focusing on low carbon construction, a sub-group consisting of parties responsible for swimming pool maintenance was established in late 2019. Significant potential for improving energy efficiency and means of tackling this issue through procurement in both renovations and new building projects was identified in this field.

Hansel Oy's improved procurement calculation tool, Hankintapulssi ('Procurement Pulse'), now links information on greenhouse gas emissions to purchase invoice data. The new feature of Hankintapulssi and calculation of carbon footprint in procurement were piloted by 27 procurement organisations which participated in the KEINO Academy.

Low-carbon and circular economy accelerator for public procurements, a two-year project coordinated by the Finnish Environment Institute and funded by Sitra, ended in 2019. It encouraged municipalities to make low-carbon procurements in keeping with circular economy principles in construction, traffic and transport as well as in public catering services. The project focused on ten procurement cases. The case analyses also made visible the emission reductions to be achieved. Two national joint procurements were also organised within the framework of the project: procurements of biogas fuelled and fully electric cars, and electric car charging infrastructure. Expert support provided by the project helped the procurement organisations to translate the objectives into concrete terms in their procurements.

Many low-carbon procurements related to such areas as new, energy efficient technology, renovation and new building sites, and foodstuffs received support from the EU Life project 'Towards Carbon Neutral Municipalities and Regions' (CANEMURE).

Municipalities have also set sustainability targets for food and foodstuff procurements, such as increasing the use of vegetarian foods and vegetable protein and reducing the offer of foods containing meat. In the Accelerator project, a carbon footprint calculator for public catering services was developed and piloted in the catering service procurements of Turku. National criteria for sustainable food procurement will be updated by the Ministry of Agriculture and Forestry in 2020.

Motiva Oy and the ministries are preparing to pilot a Green Deal model between the ministries and interested regions to promote the goals of sustainable development. For example, a Green Deal on emission-free worksites is currently being prepared. The objective of the Deal is to reduce carbon dioxide and local emissions caused by machinery, site transport, and electricity supply and heating for sites through public procurement as well as to strengthen market dialogue, create common procurement criteria and share best practices between municipalities.

A project of the Government's analysis, assessment and research activities was launched to incorporate the carbon and environmental footprint as a criterion in public procurement. The project will produce information and recommendations on how existing legislation and the operating models and steering methods of public procurement should be developed to support decision-making. The project also examines how the objectives set for procurements should be monitored and measured to make it possible to address the carbon and environmental footprint cost-effectively in public procurement.

In September 2019, the Ministry of Finance established an action plan for effective public procurement, 'Procurement Finland'. Finland's first common national procurement strategy will be drawn up within the framework of the action plan, and measures to improve the effectiveness of public procurement will be coordinated. The strategy will be published in autumn 2020, and one of the strategic expressions of common intent in the current draft is that 'Finland will be a trendsetter in ecological public procurement'. To translate this into concrete terms, the draft version has identified the following objectives: public procurement in Finland will support the country's target of carbon neutrality by 2035 and the realisation of circular economy; public procurement in Finland will support the preservation of biodiversity; and public food and catering service procurements in Finland will promote sustainable food supply and focus on sustainably and responsibly produced foods.

8 The need for new measures and flexibilities must be assessed regularly

According to current estimates, the existing measures will be sufficient to cover the emission reduction obligation for 2013–2020. Currently it seems likely that Finland's emissions in 2020 will stay within the allocated amount. However, there will be no certainty regarding the situation in 2020 until 2022 as the final emissions data for 2020 are published. However, preliminary data published in 2021 will already give a fairly reliable idea of the emission trends in 2020. If the emissions exceed the emission allocation in an individual year, Finland will primarily resort to inter-annual flexibilities referred to in the Effort Sharing Decision to meet its obligation. To compensate for exceeding the emission allocation for 2016, for example, surplus emission units from previous years' allocations were used.

If the surplus units accumulated in previous years are not sufficient to fulfil the obligation, other flexibilities can be used, including emission reduction units obtained with the project-based mechanisms included in the Kyoto Protocol. At present, the Finnish Government's account holds approximately 9.8 Mt in Certified Emission Reductions (CERs)¹ and approximately 2.9 Mt in Emission Reduction Units (ERUs).² Additionally, the Effort Sharing Decision provides for the possibility of purchasing emission units from other countries in order to fulfil the obligation.

The measures included in the Medium-term Climate Change Policy Plan are primarily sufficient to meet the emissions reduction target for 2030. Some of these measures were already adopted in 2018 and 2019. Based on continuous monitoring of the plan's implementation, it is possible to adopt new measures or enhance the effectiveness of existing measures as necessary. Future Annual Climate Reports will comment on the sufficiency of the measures in more detail, particularly from the perspective of the

1 CERs are generated in Clean Development Mechanism (CDM) projects carried out in developing countries.

2 ERUs are generated in Joint Implementation (JI) projects carried out in industrial countries.

2030 target. However, it already appears likely that new measures will be needed in the transport sector, for example.

The preparation of the next Medium-term Climate Change Policy Plan will begin in spring 2020. Work on an updated National Energy and Climate Strategy was also launched in 2020. The idea is that the Plan and the Strategy will be underpinned by a consistent knowledge base and completed in 2021. The relevant time horizon for the Plan and the Strategy comprises trends until 2035. A key starting point for planning thus is attaining the carbon neutrality target set in the Government Programme for 2035.

At its climate meeting held in Vuosaari in February 2020, the Government adopted a package of measures to be implemented in addition to the existing emission reduction measures. The new measures aim for a reduction of 17 to 24.6 Mt by 2035. The agreed reductions also apply to the effort sharing sector, and their more precise targeting will be determined in the course of further preparative work. The launch of additional measures in the next few years will also have an impact on the emissions trends between 2021 and 2030. In addition to emission reduction measures, the Government also decided to strengthen net sinks in the land use sector by 3 Mt in compared to what can be achieved by the current measures.

Finland should also be prepared to use the flexibility mechanisms permitted under EU legislation in 2021–2030. Using inter-annual flexibilities will remain a necessity as annual fluctuations are likely to continue also after 2020. In addition, the obligation will become clearly more stringent compared to the current period's level, and new policy measures will thus need to be adopted. Their effectiveness usually involves uncertainty.

9 Urgency of adaptation measures is highlighted

The urgent nature of climate change adaptation measures is now coming to the foreground, as economic losses caused by the accelerating global warming and extreme weather and hydrological phenomena are increasing. For example, flood damage in the EU territory is expected to increase tenfold during this century from the current annual figure of approx. EUR 10 billion. In Finland, the increase in flood risk is curbed by less frequent spring floods, especially in the southern parts of the country. As a whole, the flood risk in Finland is expected to grow two or three-fold compared to the current level for such reasons as an increase in stormwater floods. Additionally, the risks associated with spring floods in Northern Finland will continue to be significant, as has been seen this year.

Not only extreme weather and hydrological conditions but also the risks of diseases and pests and the spread of invasive alien species are a threat to human, animal and plant health, the natural environment and industries based on natural resources, including agriculture and forestry as well as game husbandry and fisheries. The impacts of climate change will also be felt in Finland indirectly through global flows of raw materials, energy, money and people as well as logistics chains. These international repercussions are expected to affect sectors underpinned by international networks, in particular, such as energy and various industrial sectors but potentially also parts of the food system. While detailed information on the costs of the different risks is not yet available, it is obvious that the costs of inactivity will be significant and that preparedness will be more cost-effective than repairing and compensating for damage. As the risks are significant, a uniform climate policy must be strengthened; this means mitigating climate change while building up society's climate resilience and preparedness for the impacts of climate change. Closer cooperation, partnerships, and climate sustainable solutions can contribute to promoting the exportation of Finnish expertise and solving challenges related to global food security, sufficiency of clean water, and the sustainability of natural resources.

The National Climate Change Adaptation Plan 2022 was adopted as a Government resolution in 2014. The objective of Adaptation Plan implementation is reducing the

adverse consequences of climate change for human safety, health and living conditions, natural and other environments, business and industries, infrastructure and important functions of society. Its implementation is promoted and monitored by the Adaptation Plan Monitoring Group coordinated by the Ministry of Agriculture and Forestry, the broad-based composition of which comprises almost all Finnish ministries, agencies and research institutes, regional and local government representatives and other key actors.

All significant climate risks have not yet been sufficiently identified. The mid-term review of the National Adaptation Plan published in spring 2019 notes that while awareness of the importance of adaptation measures has increased, particularly in public administration and data production, regional, cumulative and interdependent climate risks and adaptation to them are not yet sufficiently recognised. As a result, climate risk management is partly inadequate, and the focus on the planning and implementation of all adaptation measures has not yet been sufficient to enable cost-effective prevention of future negative consequences of climate change.

The knowledge base of the impacts and risks of climate change is constantly being developed. For example, the results of a project titled *The network of protected areas in a changing climate* (SUMI, 2017–2019) published in February 2020 indicate that climate change will increasingly affect the conditions, species and habitats in protected areas. The project produced new information to support climate smart conservation planning related to the impacts of climate change on the Finnish network of protected areas and on the species and habitats found in these areas. New information has also been produced in a project on the adaptation of the Sámi culture to climate change titled *SAAMI – Sámi people's adaptation to climate change* (2019–2020). The knowledge base of health impacts caused by climate change has long been fragmented, and the understanding of these impacts is being advanced in a research programme titled *Climate change and health* (CLIHE, 2020-2023) funded by the Academy of Finland. Currently, such stakeholders as the Finnish Meteorological Institute are developing an impact database which aims to combine impact analyses and forecasts suitable for different time spans and geographic scales in order to support the understanding and management of risks. The knowledge base related to the costs of climate change impacts and adaptation will be improved in a project to be conducted by the Government's analysis, assessment and research activities in 2020.

The need to strengthen climate change adaptation is obvious, particularly in order to improve risk management. In 2018, climate change adaptation was linked to the National risk assessment and the regional risk assessments that are part of it. Better climate sustainability tools are needed to monitor climate sustainability at the national, regional and local levels and to support both policy-making and operational activities. In addition to research and development in several sectors, the Finnish Climate Change Panel's work

also supports adaptation and the development of climate risk management. Among other things, the Climate Change Panel has produced a report on the climate change preparedness of water supply services, especially from the perspective of health risks (2019). The Climate Change Panel has also launched an extensive adaptation project to support the drafting of the Climate Change Act review and the knowledge base of the National Climate Change Adaptation Plan update (2020–2021).

In keeping with the National Climate Change Adaptation Plan, the ministries are responsible for the implementation, monitoring and evaluation of the plan in their respective administrative branches. Branch-specific adaptation plans contributing to the implementation of the National Adaptation Plan have been produced in the administrative branches of the Ministry of Agriculture and Forestry and the Ministry of the Environment. In the administrative branches of the Ministry of Transport and Communications and the Ministry of Defence, for example, adaptation is incorporated in more extensive climate or environmental programmes,.

A report was drawn up on the progress of the Action Plan for the Adaptation to Climate Change of the Environmental Administration in 2016–2019. The monitoring results show that the implementation of almost all scheduled measures described in the action plan has progressed as planned, and the measures have been completed. While headway has been made in the development of steering methods as regards taking the adaptation needs into account, room for improvement still remains in the coherence of steering. There is greater awareness of the potential impacts of climate change, but more attention should be paid to the planning and knowledge base of the adaptation measures. The consequences of changes in ecosystem services for livelihoods and lifestyles dependent on them are still insufficiently known.

At the regional level, the ELY Centres play a key expert and official role in adapting to climate change and translating national plans into practice. The official duties of the different departments in the ELY Centres currently include several measures promoting climate change adaptation identified in the regional government climate roadmap project launched in 2019. In addition, the project is looking for adaptation interfaces in the official duties of the ELY Centres which have so far not been identified. The roadmap project responds to the objective of the National Climate Change Adaptation Plan of integrating adaptation into sectoral planning and activities as well as to the proposals for measures brought up in the mid-term evaluation of Adaptation Plan implementation with regard to the ELY Centres' role as authorities. The roadmap project conducted by the ELY Centre for Pirkanmaa combines the perspectives of adaptation and mitigation, ensuring the coherence of climate work and increasing its effectiveness. As part of the roadmap project, a national climate network of the ELY Centres was established in 2019,

which is coordinated by the ELY Centre for Pirkanmaa. The network also promotes the dissemination of adaptation measures as part of the climate work.

Appendices

Appendix 1: Policy measures

Table 4. Policy measures in the effort sharing sector. The Table includes both the measures outlined in the Medium-term Climate Change Policy Plan (KAISU) (indicated by an x in the last column) and measures which are not included in the it but which have been decided after its completion.

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
Transport	Act on the Obligation to Distribute Biofuels	The Act on the Obligation to Distribute Biofuels (419/2019) entered into force on 1 April 2019	Under this Act, the obligation to distribute biofuels will be 18% in 2021 and increase to 30% in 2029 and beyond (without double counting).	x
	Investigation of the obligation to distribute biogas	As part of rapid actions to reduce emissions, the Government Programme of Prime Minister Marin (2019) states that sustainably produced biogas will be included in the scope of the distribution obligation. The Ministry of Economic Affairs and Employment is drafting a legislative amendment in connection with the implementation of the Renewable Energy Directive (RED II) in 2020–2021.		
	Transport tax reform	A reform of taxes and charges related to sustainable transport will be launched in keeping with the Government Programme. The reform is being prepared by a working group appointed by the Ministry of Finance. The working group's mandate will extend till 1 March 2021.		
	Roadmap for fossil-free transport	The Government Programme states that a roadmap for fossil-free transport will be drafted during the current government term. The roadmap is due for completion in autumn 2020.		

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
	Digitalisation of public transport services	Under the Mid-term Climate Change Policy Plan, an appropriation of EUR 3.5 million/year was reserved in Budget 2018 for the development of public transport in large urban subregions in 2018–2021 to promote the digitalisation and servicification of transport. To date, a total of EUR 2.2 million of funding has been granted. The funding is used retroactively and, by means of deferrable appropriations, it can still be granted in 2022 and 2023.	The Finnish Transport and Communications Agency has granted funding for projects on account-based payment systems in urban subregions in 2018–2019 (a joint project of Helsinki Regional Transport, Tampere, Turku and Oulu) and for a project on contactless payment (Turku). The projects are still ongoing. In addition, funding was granted to Tampere for projects concerning the development of real-time transport automation and an account-based mobile ticket service in 2018–2019. New project initiatives will also be welcomed.	x
	Subsidy for climate actions in public transport	In 2020, medium and large cities and the ELY Centres can apply for a climate-based government subsidy for public transport granted by the Finnish Transport and Communications Agency Traficom. EUR 13 million of these subsidies will be allocated to competent public transport authorities following a separate application process organised by the Finnish Transport and Communications Agency in the spring. The Ministry of Transport and Communications will make a decision on the use of the remaining EUR 7 million. In February 2020, Traficom requested the opinions of competent public transport authorities and stakeholders on the most helpful uses of climate-based state aid for public transport.	The Government Programme of Prime Minister Marin states that a climate-based overall increase will be provided to public transport subsidies and purchases, annually EUR 20 million.	
	Subsidies for the construction of distribution infrastructure for transport electricity and gas	In the budget of the Ministry of Employment and the Economy/the Energy Authority, EUR 3 million/year between 2018 and 2021 was reserved for subsidising the construction of infrastructure for electric transport and transport use of biogas. The Government issued a decree on this subject on 27 June 2018. A competitive tendering process concerning the subsidies was organised in autumn 2018 and 2019. On the second round in 2019, applications in all tender categories were received and accepted. In 2018–2021, housing companies can apply to ARA for grants for upgrading electrical systems required for electric vehicle charging points. Applications for these grants have been accepted since late summer 2018. The original amount of EUR 1.5 million/year was increased to a total of EUR 5.5 million in the Budget of 2020.	The distribution infrastructure subsidies are used to promote investments in the public charging and refuelling infrastructure for vehicles using alternative power sources: gas refuelling stations, electric bus charging systems as well as high-power and basic vehicle charging systems. The ARA grants, on the other hand, promote more widespread possibilities for charging electric cars at home and thus the growth of the electric car fleet.	x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
	Support for the procurement and conversion of fully electric cars and scrapping premiums	<p>EUR 6 million/year was reserved in the Ministry of Transport and Communications budget for 2018–2021 to promote the procurement of fully electric cars and to convert old cars to run on ethanol or gas. In addition, EUR 8 million was set aside in the Ministry of Transport and Communications' budget for 2018 for scrapping premiums for old cars. A government proposal on the subsidies and premiums was submitted on 26 October 2017. The Act entered into force on 1 January 2018. As little as 14.16% of the annual appropriation for subsidising the procurement and conversion of vehicles was used in 2018, and 15.16% had been used by October 2019.</p> <p>The Government Programme states that EUR 6 million will also be reserved for conversion subsidies in 2022.</p> <p>Approximately 90% of the EUR 8 million allocated to the scrapping premium in the Budget was used. The new cars purchased with the scrapping premium were mainly petrol powered, while approx. 6% were cars running on a renewable power source.</p>	<p>A person who purchases a fully electric car or takes one on a long-term lease for their personal use is eligible for a purchase subsidy of EUR 2,000 provided by the government. Government aid is also available for converting and old petrol car to run on natural gas or ethanol. The conversion subsidy is EUR 1,000 for a gas fuelled car and EUR 200 for an ethanol-powered car. Only private individuals are eligible for these grants. The scrapping premium granted to the buyer of a new car who scrapped their old one was either EUR 2,000 or 1,000, depending on its power source.</p>	x
	Green Deal for the automotive industry	<p>A climate agreement between the central government and the automotive industry (Green Deal) was signed on 22 November 2018. By March 2020, 17 companies in the industry had signed the agreement. A report on the progress of the agreement will be published in spring 2020.</p>	<p>The shared goals of the automotive industry and the central government support reducing carbon dioxide emissions from transport, improving vehicle energy efficiency, and increasing the use of biofuels and other alternative power sources. The agreement was signed by the Ministry of Transport and Communications and the Ministry of the Environment on behalf of the government. It will remain valid until 2025.</p>	x
	Public procurement	<p>In June 2019, the so-called Clean Vehicle Directive (CVD) was adopted by the EU. A working group led by the Ministry of Transport and Communications is preparing the national implementation of the Directive, which will begin in August 2021.</p>	<p>The Directive defines a clean vehicle and sets the minimum proportions of these vehicles in public procurement for each EU Member State. The Directive covers the procurements of both vehicles and passenger and goods transport services. Obligations concerning the number of clean vehicles in public procurement have been set for Finland. For example, 41% of new vehicle and service procurements of buses and coaches must be clean between August 2021 and 2025, and 59% from 2026 onwards.</p>	x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
	MAL agreements and public transport development	Negotiation results on the land use, housing and transport agreements (MAL agreements) for 2020-2031 were achieved in June 2020 with the urban subregions of Helsinki, Tampere, Turku and Oulu. The contract period is 12 years. The central government has launched negotiations on MAL agreements with three new urban subregions, or Jyväskylä, Lahti and Kuopio, in June 2020. The MAL agreements guide the placing of housing, jobs and services in urban centres and areas accessible by sustainable forms of transport in the urban structure.	The objective of the MAL agreements is to coordinate urban structure and transport system development, creating preconditions for sufficient and diverse offer of sites and housing production, more concise urban structure, and an effective, safe and sustainable transport system. These measures promote a low-carbon and sustainable urban structure and a transport system that supports it in order to mitigate climate change as well as enable smoothly running daily lives, a well-functioning labour market and viable business and industries.	x
	Rail transport purchases	EUR 2 million/year was reserved in the Ministry of Transport and Communications' budget for the period 2018–2021 to increase purchases of rail traffic.	The additional appropriation was used to purchase complementary rail services in different parts of Finland in 2018–2019, taking into account efficient use of rolling stock and rail capacity. The current agreement on purchased services and the decision on public service traffic will be valid until the end of 2020. In spring 2020, the Ministry of Transport and Communications and VR started negotiations on the procurement of passenger rail services after 2020.	x
	Programme for the promotion of walking and cycling	The programme document was completed in March 2018. The Government adopted a resolution in support of the programme on 22 March 2018. The Ministry of Transport and Communications granted discretionary government transfers amounting to EUR 3.5 million/year in 2018 and 2019 to municipalities for implementing an investment programme on walking and cycling. The objective of this support is to increase the number of journeys completed by walking and cycling and the modal share of these means of transport by improving the conditions for and attractiveness of walking and cycling. In 2019, Traficom granted support for 12 projects around Finland. EUR 24.9 million has been earmarked in the Budget of 2020 for promoting walking and cycling, which is considerably more than before. EUR 10 million of this amount was allocated to measures targeting state-owned networks and EUR 14.9 to grants for municipalities and other actors.		x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
	Park-and-ride facilities for bicycles at transport nodes	Some of the projects that received discretionary government transfers through the Walking and cycling investment plan in 2019 also promote the development of bicycle parking at public transport nodes. Funding for the basic maintenance of walking and cycling infrastructure will in 2020 be used for such purposes as developing park-and-ride facilities for bicycles at railway stations and for developing these facilities at stops located at road network nodes. The Finnish Transport Infrastructure Agency works continuously together with the municipalities to develop park-and-ride facilities for bicycles at long-distance traffic stations.		x
	Development of station areas	Efforts to develop station areas are made in cooperation between a number of actors. Central government actors involved in station area development include the Finnish Transport Infrastructure Agency and Senate Station Properties Ltd. In addition, the Finnish Transport and Communications Agency promotes the service level development of passenger and goods transport nodes, including station areas, as part of its work on transport systems and development of other transport services. The Ministry of the Environment is involved in the development work, for example through the Smart Stations service experiment and the Sustainable City programme.		x
	Investigation of congestion charges	Congestion charges have been investigated in connection with such projects as MAL2019 planning in Helsinki subregion. Preconditions for making progress in this matter include legislative amendments and active measures by the central government and urban subregions. The Government Programme of Prime Minister Marin (2019) states that during the current government term, legislation will be introduced enabling traffic congestion charging to be introduced in city regions, with the aim of managing traffic. The impacts of congestion charges will be assessed as part of the work on the roadmap for fossil-free transport.		x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
Agriculture	Perennial cultivation in organic soils with no tillage	Rural Development Programme for Mainland Finland 2014–2020	A five-year commitment at the beginning of the programming period. Support rate EUR 50/ha/year. The reform of the EU's Common Agricultural Policy for the next financing period is currently under way, and the measures will be reviewed in this context.	x
	Afforestation of organic soils and wetlands	Being investigated	Possibilities of attaining climate targets through land use sector measures (MISA)	x
	Raising the groundwater level through controlled subsurface drainage	Rural Development Programme for Mainland Finland 2014–2020	Investment support may be granted for establishing controlled subsurface drainage amounting to 40% of eligible costs. Agri-environment payments may also be granted for controlled subsurface drainage, controlled irrigation and recycling of runoff waters. The reform of the EU's Common Agricultural Policy for the next financing period is currently under way, and the measures will be reviewed in this context.	x
	Promoting biogas production	Rural Development Programme for Mainland Finland 2014–2020. A national biogas programme has been prepared under the leadership of the Ministry of Economic Affairs and Employment. Biogas investments referred to in the Government Programme, new manure processing techniques, and a biogas production subsidy based on nutrient circulation are being prepared by the Ministry of Agriculture and Forestry.	Support can be granted for investments in renewable energy on farms amounting to up to 40% of total eligible costs. The energy generated by the supported plant must be used on the farm. Small rural enterprises and SMEs processing agricultural products may apply for a rural business subsidy for non-agricultural business under the Rural Development Programme. Such factors as the size and location of the business and the activities to be supported affect the support rates and amounts under the Rural Development Programme. Investment support is additionally granted for purchases of gas components for tractors. To finance investments in energy production from renewable sources, state guarantees are available in addition to grants.	x
	Promoting the increasing and preserving of soil carbon stocks and implementing the 4 per 1,000 initiative through research and pilot projects	Rural Development Programme for Mainland Finland 2014–2020. The drafting of the climate programme for land use referred to in the Government Programme has begun. It includes reducing emissions from agricultural land and strengthening carbon sequestration.	Existing measures: recycling nutrients and organic matter, incorporating slurry into the field, plant cover on fields in winter, environmental management grasslands, and water level regulation (controlled subsurface drainage). The reform of the EU's Common Agricultural Policy for the next financing period is currently under way, and the measures will be reviewed in this context. A number of research and development projects related to this topic are underway.	x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
	Climate food programme	Preparation of the climate food programme referred to in the Government Programme has begun.	The objective of the programme is to support society's transition towards a climate sustainable food system in which all aspects of sustainability (social, economic, cultural and ecological) are taken into account. The programme supports the Government's target of making Finland carbon neutral by 2035.	
Building-specific heating	Promoting renovations through grants to improve energy efficiency in 2020–2022	The Government issued a decree on the grants in December 2019. ARA has accepted grant applications since 2 January 2020.	Grants are available for renovation projects which improve the energy efficiency of residential buildings. Their preliminary total will be EUR 20 million in 2020 and EUR 40 million per year in 2021–2022.	
	Supporting the phasing out of oil heating in residential buildings	Initially, the sum of EUR 10 million has been earmarked for these grants for 2021. Decisions on their allocation will be made in connection with the preparation of the action plan.		
	Action plan for encouraging the transition of oil-heated properties to other forms of heating in the 2020s	Preparation of the action plan is underway, and the plan is due for completion in late 2020.		
	Obligation to distribute bio-fuel oil	The Act on the Promotion of Biofuel Oil Use entered into force on 1 April 2019.	From 2021 on, some of the light fuel oil intended for heating, machinery and fixedly installed engines must be replaced with biofuel oil, the proportion of bio-fuel oil being at least 3% in 2021 and increasing thereafter by one per cent every year to at least 10% in 2028.	x
	Taxation of heating fuels	The tax was raised as of 1 January 2019.	The tax on light fuel oil was raised by approx. 2%.	x
	Phasing out of oil heating in the public sector	The Defence Administration has continued to phase out oil heating as planned	Transition to renewable energy sources in connection with a tendering process for district heating plants has been a key measure.	x
Waste management	Investigating the transfer of emissions from waste incineration emissions from the effort sharing sector to the emissions trading sector	The transfer of emissions from waste incineration has been dropped, at least for the time being.	Other methods of reducing emissions from waste incineration are being investigated, including the possibility of a Green Deal and taxation of waste incineration.	x
	Waste Act reform, promoting separate collection and recycling	A government proposal on reforming the Waste Act will be completed in 2020.		

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
F-gases	Avoiding equipment containing F-gases in public procurement	A report titled 'Role of sustainable public procurement in reducing F-gas use and emissions – criteria for high heating potential options' and leaflets based on it were published in 2019. Communication and deployment are in progress.	The purpose of the criteria is to guide municipalities and other contracting entities as well as private sector actors to procure equipment with low GWP refrigerants. There is a time delay between the publishing of the criteria and their application, and the impacts on emissions will be seen later.	x
	Promoting the adoption of alternative technologies and enhancing the recovery of F-gases through training and information activities	Qualification requirements for persons handling natural refrigerants are being examined to ensure a safe transition from F-gases to alternative substances. The Finnish Environment Institute has improved the efficiency of information activities and guidance related to alternative substances.		x
	Exploring and demonstrating alternative technologies suited to local conditions	A preliminary study is in progress, professional kitchen refrigeration equipment was selected as the target sector.	The project will identify a sector in which F-gases are used, in which the transition to natural refrigerants is about to begin, and in which the transition will help improve the energy efficiency of equipment. The sector should also engage in equipment manufacturing in Finland. The goal is to develop new equipment that use natural refrigerants and to deploy it on selected sites. The project will go ahead if funding can be obtained.	x
Machinery	Obligation to distribute bio-fuel oil	The Act on the Promotion of Biofuel Oil Use entered into force on 1 April 2019.	From 2021 on, some of the light fuel oil intended for heating, machinery and fixedly installed engines must be replaced with biofuel oil, the proportion of bio-fuel oil being at least 3% in 2021 and increasing thereafter by one per cent every year to at least 10% in 2028.	x
	Taxation of heating fuels	The tax was raised as of 1 January 2019.	The tax on light fuel oil was raised by approx. 2%.	x
	Improving the quality of data on emission from machinery	A project funded by the Ministry of the Environment aiming to develop the TYKO model was completed on 15 May 2019. A preliminary study led by the Ministry of Transport and Communications was launched to update the entire LIPASTO system (including the TYKO model).	The project aimed to develop the quality of the TYKO model's input data. The preliminary study phase of the Ministry of Transport and Communications' project is due for completion in spring 2020.	x
	Increasing the proportion of energy-efficient and low-emission machinery through public procurement	Zero-emission sites – Concluding a Green Deal on sustainable procurement.	Creation of the emission-free site concept includes developing procurement criteria for machines used on sites. This work is led by KEINO.	x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
	Promoting the energy-efficient use of machinery through management by information	Needs for training in the use of machinery have been identified.	The Ministry of the Environment together with the Association of Finnish Technical Traders is planning training on energy efficient use of machinery. The Ministry of the Environment has undertaken to fund this training project by EUR 50,000.	x
Consumption	Encouraging citizens to reduce their carbon footprint by half	At the end of 2018 a new service by the Council of State was launched to promote new sustainable life styles (Commitment2050). The service provides a test for sustainable lifestyles which offers advice on how to reduce the carbon footprint by half in everyday life. Several projects and investigations are ongoing in relation to consumption. Also as part of the project on Climate solutions for municipalities projects related to consumption are being funded.		x
Municipalities	Giving new momentum for climate work in municipalities and regions	Municipalities' and regions' projects are assisted, and national projects supporting climate work in municipalities are funded. Interaction between the national and regional levels is ensured.	To give new momentum for climate work in municipalities and regions, EUR 1 million/year has been reserved in 2018–2021. The Government granted an additional appropriation of EUR 4 million for this purpose for 2021. The funding will be coordinated through the Ministry of the Environment's Municipal climate change solutions programme.	x
	Supporting decision-making by cost estimates of measures.	The Ministry of the Environment is funding a project that examines the possibilities of producing a tool which municipalities can use to assess the impacts of their climate actions.		x
	Ensuring the provision of unbiased regional energy advice to different consumer groups in municipalities.	Regional energy advice is supported with project funding in 2018–2021.	Regional energy advice includes advising consumers in energy-related matters as well as promoting energy audits and energy efficiency agreements among municipalities and SMEs.	x
	Encouraging all public-sector operators to phase out oil heating in their buildings by 2025.	Implementation has not started.		x
Public procurement	Developing a 'one-stop-shop model' to promote sustainable and innovative procurement.	KEINO Competence Centre was established. It has launched such activities as buyer groups and is preparing to pilot Green Deals on public procurement.	The buyer groups include those focusing on the promotion of low-carbon construction and autonomous public transport. Green Deals are being prepared, for example to promote low-emission construction sites.	x

	Policy measure	Implementation status	Additional information	Medium-term Climate Change Policy Plan measures (x)
Monitoring	Developing climate and energy policy impact assessments.	In 2019, a project by the Government's analysis, assessment and research activities titled 'assessment of the cost-effectiveness of emission reduction measures' was implemented.	The purpose of the project was to build up the knowledge base of assessing cost-effectiveness. Among other things, the project produced an overview of practices in other countries, assessed the cost-effectiveness of the selected measures, and issued recommendations for improving cost-effectiveness assessments.	x

Table 5. The most recent policy measures in the emissions trading sector. The Table lists some of the key national policy measures aiming to reduce emissions in the emissions trading sector.

	Policy measure	Implementation status	Additional information
Energy production	Tendering process concerning a renewable energy production subsidy (so-called premium system)	The tendering process took place between 15 November and 31 December 2018, and the Finnish Energy Authority made its decisions in March 2019.	Subsidies were granted to a total of 7 wind power projects, the total annual output of which is 1.36 TWh.
	Act on Phasing out Coal in Energy Use	The Act entered into force on 1 April 2019.	The energy use of coal in the production of electricity and heat will be prohibited as from 1 May 2029.
	Investment support for energy projects replacing coal in 2020–2025	The Government issued a decree on the support on 19 March 2020. The Decree will be in force until 31 December 2025.	The objective of the support is to promote voluntary, accelerated phasing out of coal use by the end of 2025. EUR 30 million a year (a total of EUR 90 million) has been reserved for the support programme in the General Government Fiscal Plan for 2020–2022.
Industry	Reducing the industrial electricity tax to the EU minimum level	Decision made at the Government's climate meeting on 3 February 2020. The proposal on implementing the decision is being prepared by a working group appointed by the Ministry of Finance.	
	The industrial energy tax rebate system for energy-intensive industries will be abolished	A proposal on implementing the policy contained in the Government Programme is being prepared by a working group appointed by the Ministry of Finance.	
	Transferring heat pumps and data centres generating heat for the district heating networks to category II electricity tax.	A proposal on implementing the policy contained in the Government Programme is being prepared by a working group appointed by the Ministry of Finance.	
	Preparing sector-specific roadmaps for low carbon emissions together with operators in the sector.	Roadmap preparation has started, and the maps should be completed in May or June 2020.	The roadmaps will be used to prepare new climate measures.
Companies and corporations	Energy Efficiency Agreements	Agreement period 2017–2025 is underway	By March 2020, a total of 568 companies and their 5,914 offices as well as 96 municipalities/joint municipal authorities had joined the energy efficiency agreements of different sectors.

Appendix 2: Sector-specific indicators

I. Transport

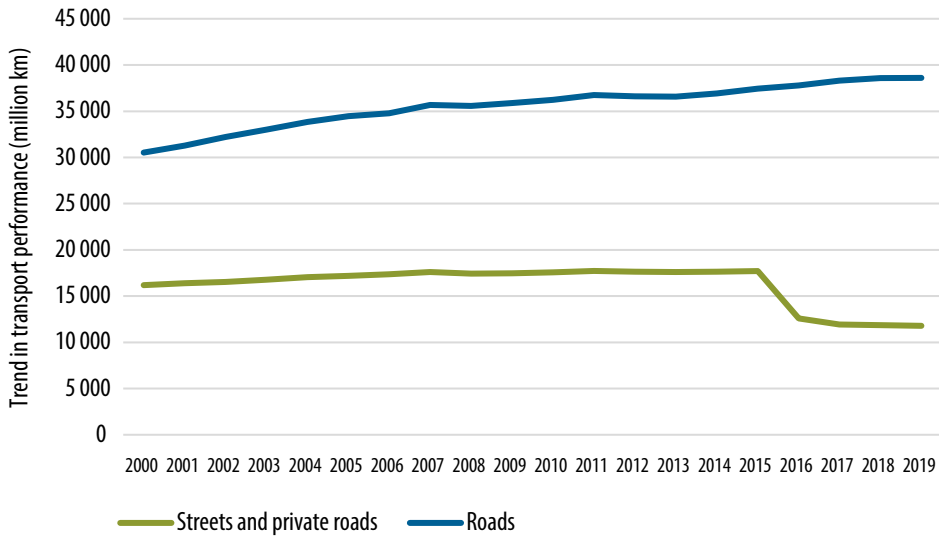


Figure 19. Transport performance in 2000–2019. The goal is to halt the growth in the transport performance of cars in urban subregions before 2030. The method used for compiling statistics on this performance changed in 2016, which may make the situation more difficult to assess. However, the data for 2017–2019 indicates that the goal has been reached.

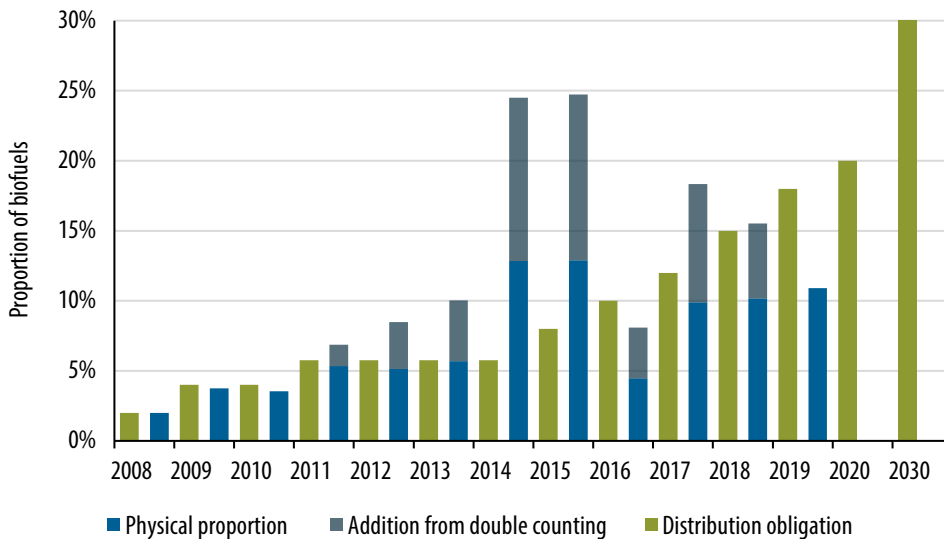


Figure 20. Proportion of biofuels in transport fuels (%). Double counting is taken into account in the targets for 2008–2020. In contrast, the target for 2030 does not include double counting. The data for 2019 are preliminary and only contain the physical proportion of biofuels. Eurostat and Statistics Finland statistics were used as data sources.

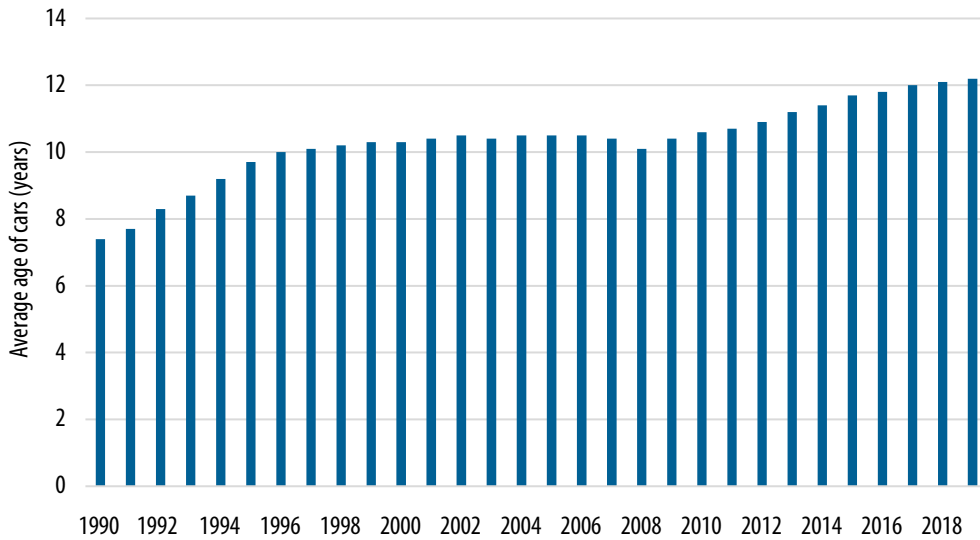


Figure 21. In recent years, the average age of cars on Finnish roads has continued to go up and was 12.2 years at the end of 2019 (including museum cars). To reduce the average age of the car fleet, the annual sales volume of approximately 135,000 to 150,000 new passenger cars should be reached. In 2019, the number of new cars sold was as low as 114,119.

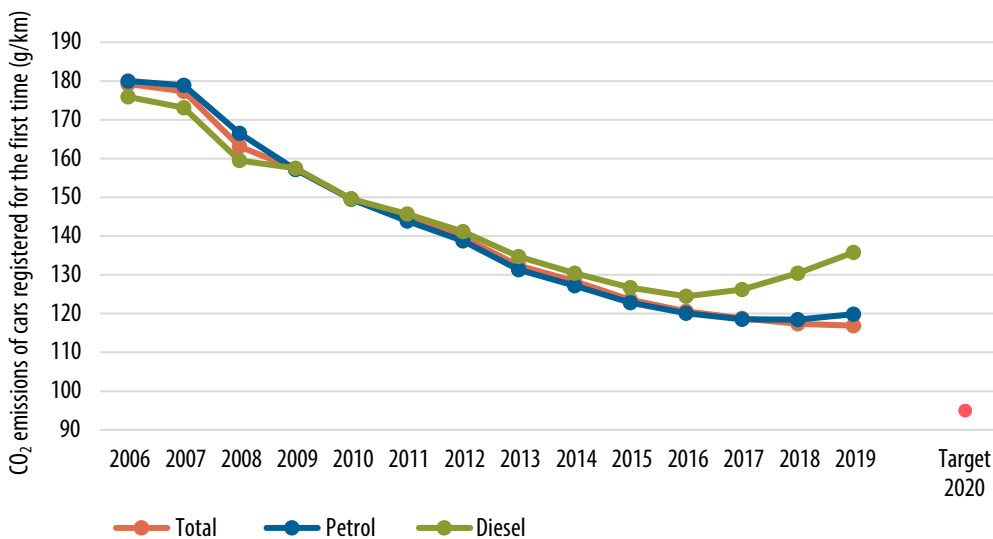


Figure 22. In 2019, the CO₂ emissions of first registered passenger cars were on average 116.9 g/km. While a reduction of almost 30% was achieved between 2008 and the end of 2019, the reduction in emissions has slowed down between 2016 and 2019 and, in part, even started increasing. The emissions from cars running on diesel, in particular, increased in 2016–2019.

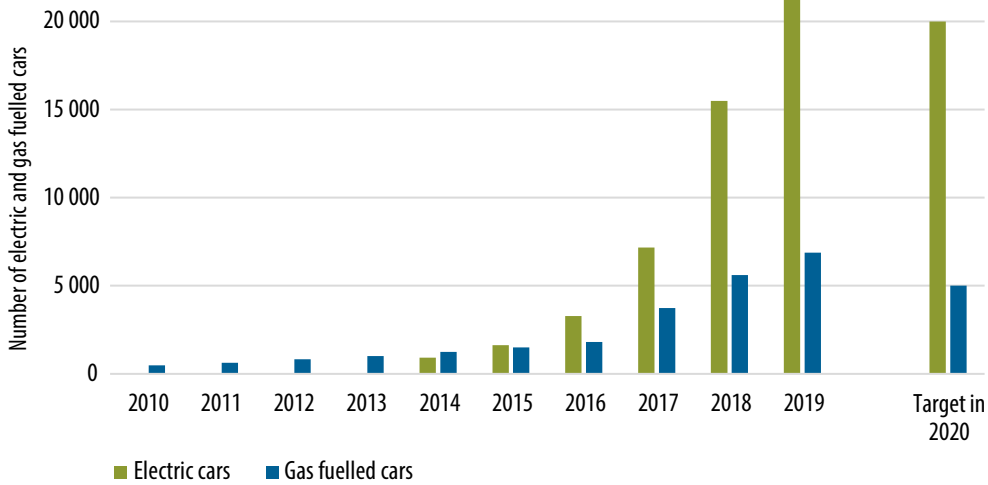


Figure 23. Numbers of electric and gas fuelled cars in Finland in 2010–2019. According to the national plan for a distribution network for alternative transport fuels, there should be at least 20,000 electric cars and 5,000 gas fuelled cars in 2020. In 2019, there were around 29,365 electric cars and 9,380 gas fuelled cars in Finland, and the targets for 2020 have thus already been clearly exceeded. However, the proportion of fully electric cars of all electric cars is low compared to many other countries at no more than 16%.

II. Agriculture

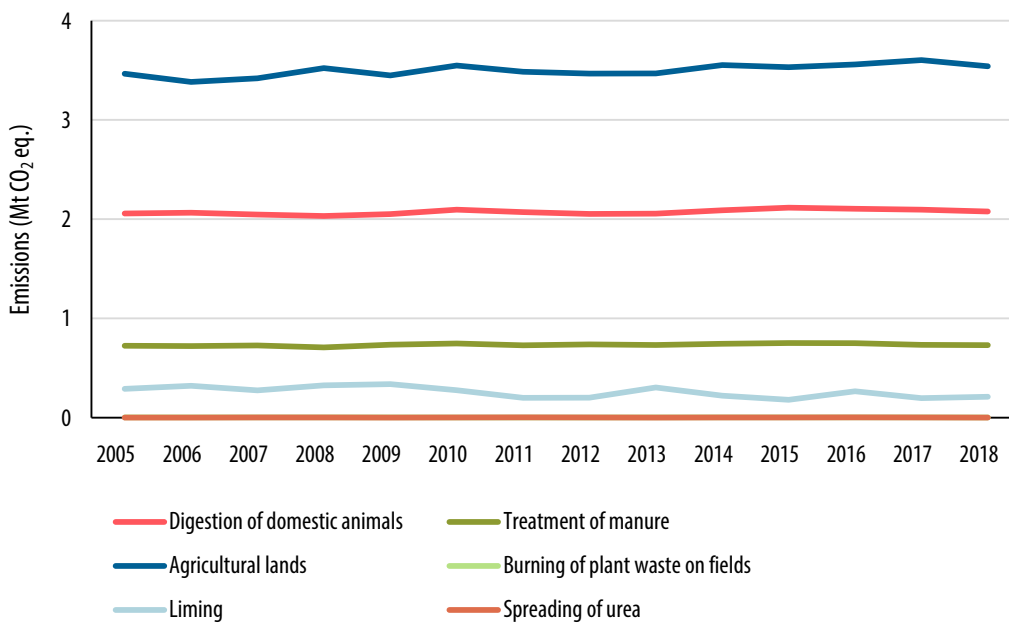


Figure 24. Greenhouse gas emissions from the agricultural sector allocated to the effort sharing sector in 2005–2018, breakdown by source of emission.

III. Building-specific heating

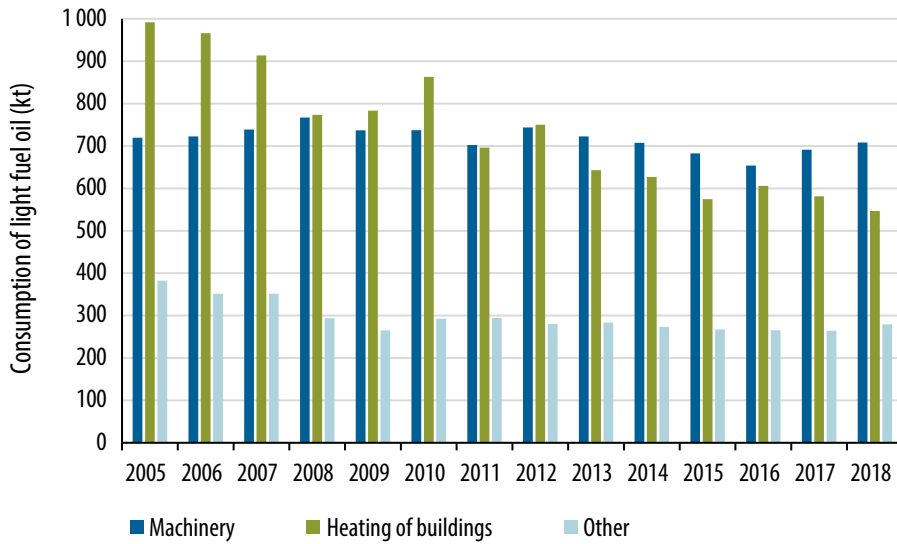


Figure 25. Consumption of light fuel oil in the effort sharing sector, broken down into machinery, heating of buildings and other use. Other uses include oil use in industry for purposes other than machinery as well as oil use in rail transport, waterborne transport and fishing vessels.

IV. Machinery

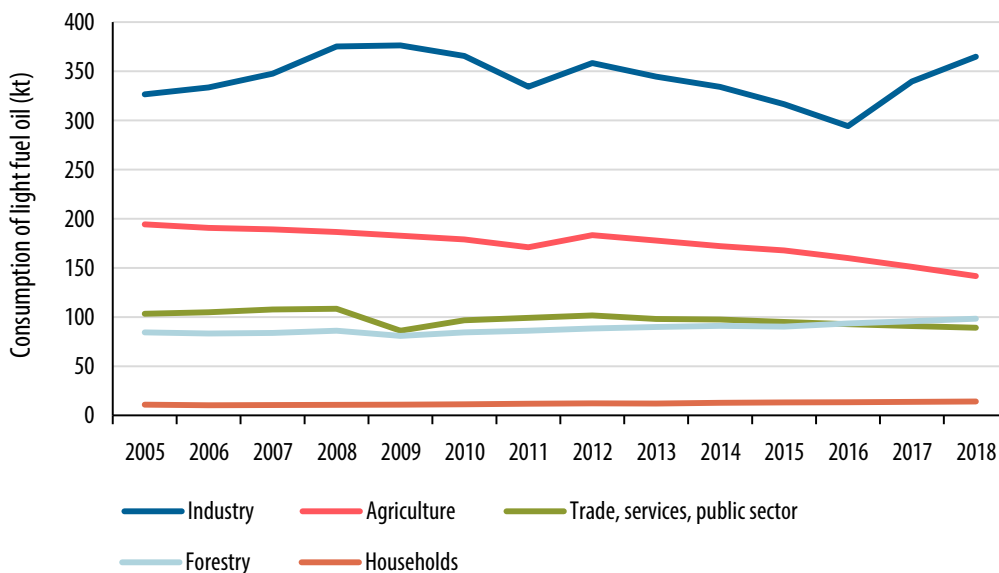


Figure 26. Light fuel oil use in machinery broken down by sector. Industrial use accounts for the greatest consumption levels, followed by agricultural machinery. The proportion of households is relatively low.

V. Waste management

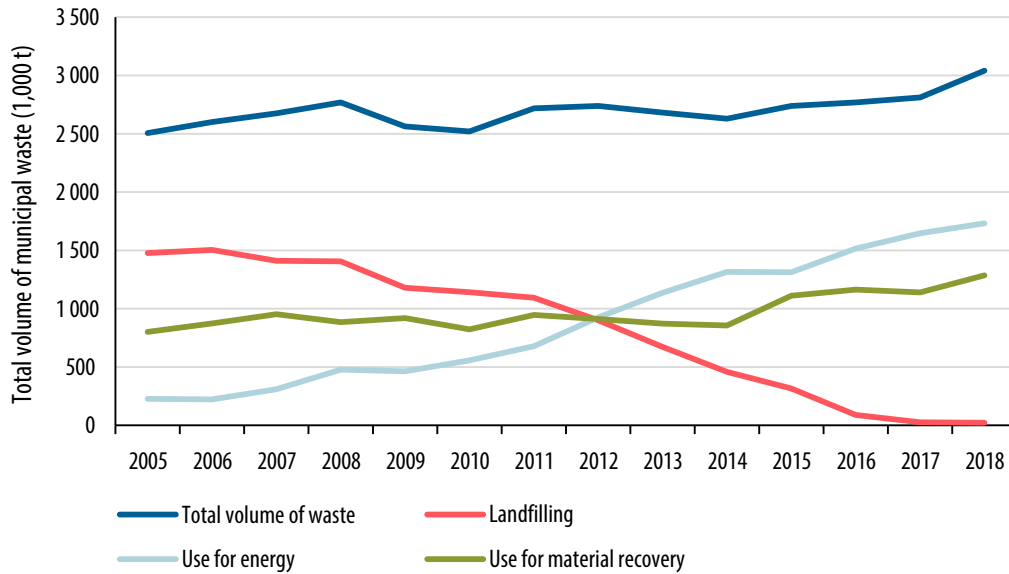


Figure 27. Volume of municipal waste in Finland by treatment method. The total amount of waste in 2018 was approx. 3,041,000 tonnes, of which approximately 1% was placed in a landfill, while 42% was used as material and 57% as energy.

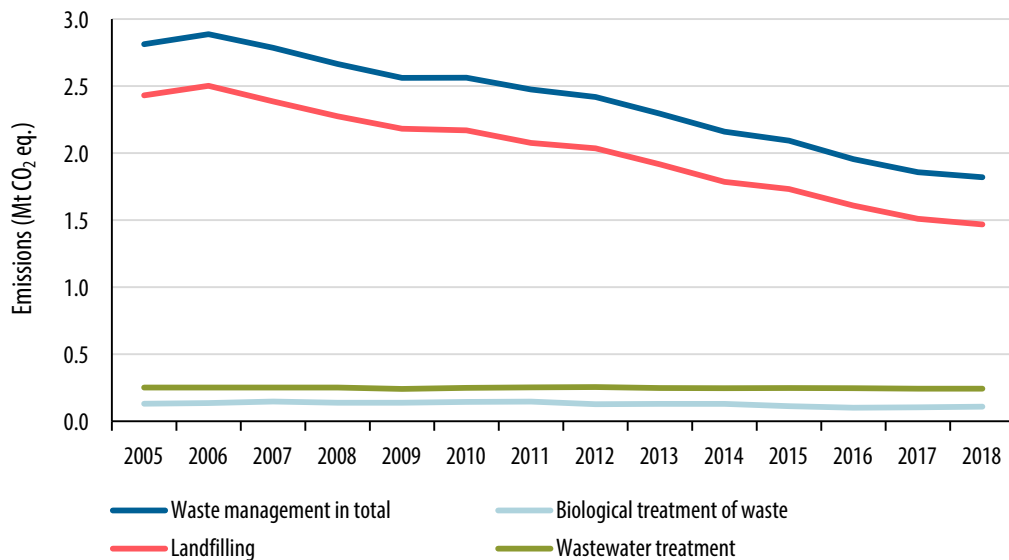


Figure 28. Emissions from waste management, broken down by source in 2005–2018. The greatest source of emissions is landfills; however, their emissions have decreased strongly as a result of decreased landfilling.

VI. F-gases

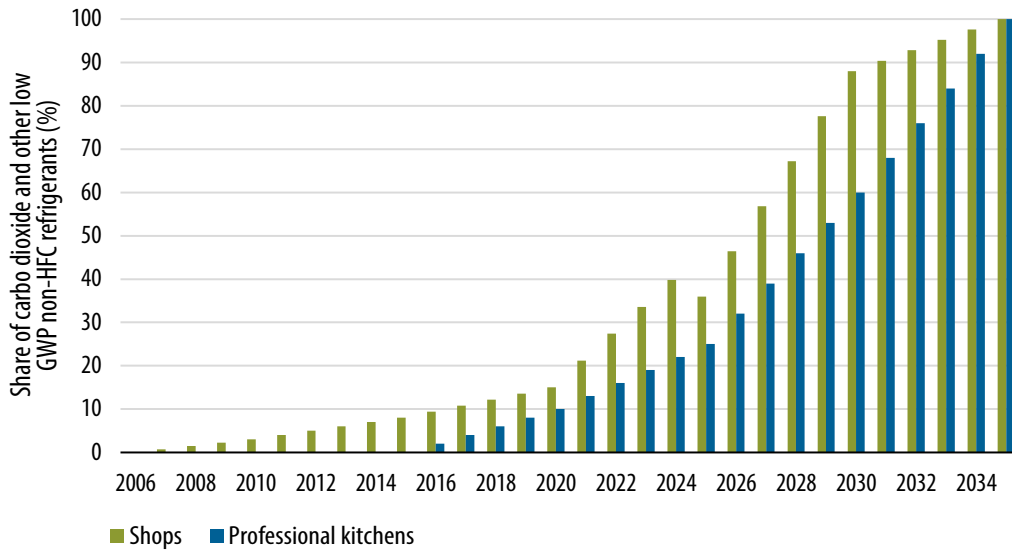


Figure 29. The proportion of carbon dioxide and other low GWP non-HFC refrigerants in central refrigeration systems of shops and professional kitchens.

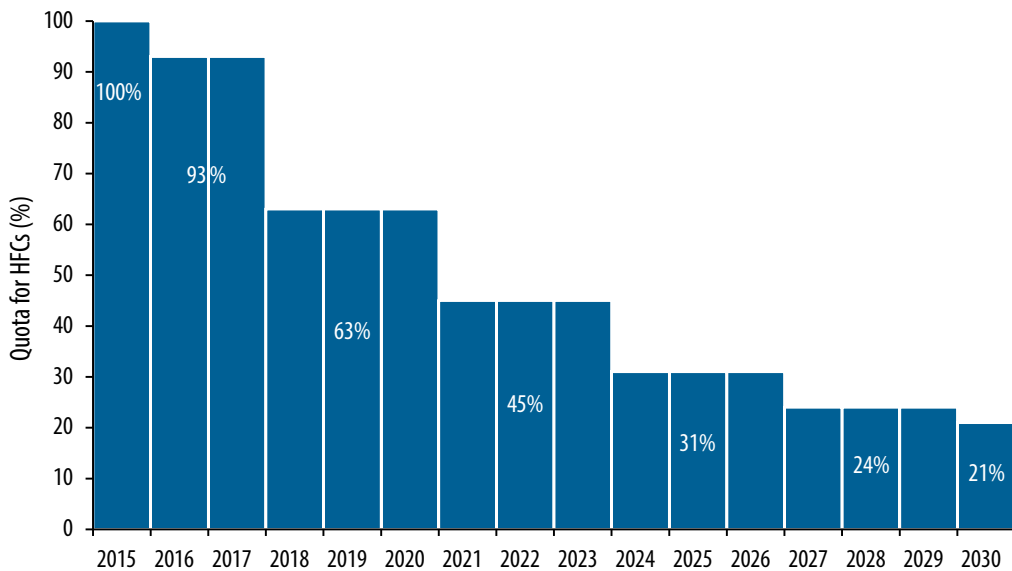


Figure 30. Allocations of HFCs placed on the market in EU territory between 2015 and 2030 as a percentage of their levels in 2009–2012.

Appendix 3: Statistical data and scenarios

The emission data for 2005–2018 presented in this report are consistent with Finland's official greenhouse gas inventory, and they were calculated following IPCC guidelines. The descriptions of methodology used for reporting emissions data are included in Statistics Finland's emission data publications. Statistical methods are undergoing continuous development, which is why the emissions data may also change retrospectively. Such changes are usually minor. There are major fluctuations in the emissions and sinks in the land use sector from year to year. Additionally, the effectiveness and knowledge base of land use sector actions are associated with greater uncertainties than in other sectors.

The data for 2019 are so-called proxy estimates. The proxy estimates are calculated at a rougher level than the actual inventory. Consequently, the proxy estimates differ from final data, and more accurate emission data are published as all the data used in the calculations are complete. The figures used to monitor the fulfilment of the obligation under the Effort Sharing Decision are finalised in conjunction with annual reviews and not updated retroactively. In the Figures and Tables of Chapter 4 of this Annual Climate Report, the data for 2013–2017 are based on emissions data finalised in conjunction with EU reviews. This is why the emissions data in the most recent release and inventory submission by Statistics Finland for these years deviate from what is presented in this report. The data for 2019 are proxy estimates, and the assessment of the emissions and allocation overrun/underrun is not final.

The estimates of attaining the emission reduction targets given in the report are partly based on scenario calculations. The emission scenarios were prepared by compiling sector-specific estimates of trends in emissions over the coming years. A scenario is a calculated estimate of how emissions will develop if the assumptions underlying the calculation come true. The scenario calculations are continuously being updated and developed with the aim of complementing and improving the accuracy of the knowledge base of the scenarios. Scenario calculation typically relies on mathematical models used to create the required emission development trajectories. The baseline scenario for emissions trends presented in this Annual Climate Report includes any measures implemented by the end of 2019, and it deviates from the baseline scenarios set out in the Medium-term Climate Change Policy Plan adopted in 2017.

The EU's climate legislation is currently based on sector-specific regulations, namely the ETS Directive, the Effort Sharing Regulation and the LULUCF Regulation. This is why the same sectoral division has been followed in the monitoring of the fulfilment of emissions obligations.

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